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The Use of the "Indoor-Outdoor-Indoor" Approach to Teaching Science Conservation with Concentration on Methods of Inquiry and Emphasis on Processes of Science, Grades K-3.
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Contained are instructional materials developed by the Science Project Related to Upgrading Conservation Education. The lesson plans given are intended to demonstrate the "indoor-outdoor-indoor" approach to teaching science conservation, with concentration on methods of inquiry and emphasis on processes of science. Four subject areas are treated: Air, Water, and Weather; Living Things; The Earth and Its Composition; and Our Growing Bodies. One plan is given for each area for each of grades K-3. The plans list materials required, set problem questions, then describe indoor and outdoor activities to help students discover answers to the questions. Relevant science concepts and conservation concepts are listed. The manual also lists the objectives of "Outdoor Discovery Guides," and given an example guide. There is a summary of the goals of the program, together with general guidelines for teaching and selected references for the teachers. This work was prepared under an ESEA Title III contract. (EB)

Science Project

Related to Upgrading Conservation Education

SPRUCE

A CURRICULUM PRESENTATION

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Project Director

DEMONSTRATING

THE USE OF THE "INDOOR-OUTDOOR-INDOOR" APPROACH TO TEACHING SCIENCE CONSERVATION WITH CONCENTRATION ON METHODS OF INQUIRY AND EMPHASIS ON PROCESSES OF SCIENCE

FOR GRADES K-3 IN AREAS:

Air, Water, Weather
Living Things
The Earth and Its Composition
Our Growing Bodies

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CONTENTS

INTRODUCTION

Area: AIR, WATER, AND WEATHER Grade K

Materials: Two stuffed rag dolls with feet.
Pair of plastic or rubber boots to fit the doll.

Problem: How do boots keep your feet dry?

1. Use 2 large cotton dolls or 2 pairs of stockings stuffed to represent feet. Put boots on one pair of "feet" and none on the other pair. Set both pair "feet" in the snow. Take a walk around the school. Upon your return, take the dolls or stuffed stockings indoors.

   Indoors: Remove boots from the cotton-stuffed "feet." Let all children touch all the "feet."

   The children can then remove their shoes. How do their feet feel, like the stuffed "feet" with boots or without boots?

2. Children can make snowballs with plastic bags over gloves to find out whether their hands keep dry.

Science concepts: Snow is wet.
Snow turns to water when it touches parts of our warm bodies such as our feet.
Snow is cold.

Conservation concepts: Wet feet get chilled, and chilled feet might lead to a cold.
If one gets a cold, he might infect others, so it is wise to prevent colds and to cure a cold if you do get one.

Area: LIVING THINGS Grade K

Materials: Patience, concentration, all the senses.

Problem: Where, around our school, do plants and animals live?

1. Explore the ground one day. Look for holes, castings of earthworms, and nest entrances, chipmunk holes, etc. Spider webs, other insect homes in fallen leaves, spittle bug froth on grass, etc. are some of the things to seek. How does each kind get food, protection, water?

2. Another day explore areas at eye level: fence posts, bushes, under the bark of trees, on tree bark, etc.

3. Look overhead for signs of nests, tent caterpillar webs, freshly chipped-out tree holes, bunches of leaves of squirrel nests, etc.

4. A "trip in the air." Sit or stand still for 5 to 10 minutes. Look for animals moving in the air - birds, insects, (people in airplanes).

5. Make similar excursions to locate plant life.

Science concepts: Each animal lives in a definite kind of home.
Each kind of animal must be near food, water, protection, a place where it can have babies.
Plants have certain needs too. Each plant lives where it can get moisture.
Some plants live in the shade.
Some plants live in the sun.
Wherever there is soil, some kind of plant grows.

Conservation concepts: If we want to have certain animals near us, we should provide the right kinds of homes and food (includes water) and shelter.
Destroying a tree means destroying many lives that depend on the tree.
Certain plants live best in certain conditions.

Area: THE EARTH AND ITS COMPOSITION Grade K

Problem: Where is rock outside and where is soil outside?

1. Find soil. How does it look, feel, smell?
2. Compare soils of different colors. Where are the darker soils? Where are the lighter soils?
3. Where is rock found? Pick up some soil and examine it, examine buildings, look on top of ground and on edges of fields. Where else might you look?
4. What covers the ground? Explore walks paved with rock materials of sandstone, slate, granite, etc. Compare natural rocks used on the ground and in buildings with artificial ones such as asphalt, brick, concrete.
5. What happens to the rainwater when it falls on soil? on rock? Pour some water on different surfaces and observe what happens to the water as well as what happens to the surface on which it falls. Look for changes in color, smell, texture.
6. Look for various uses of materials from the earth - such as stone statues, tombstones, copper, brass, iron, etc.

Science concepts:

1. Soil usually consists of smaller pieces than rock.
2. Rock is hard.
3. There are many kinds of rock.
4. There is much rock on the earth.
5. Rock comes from the earth.
6. You can find rocks of many different sizes.
7. When rock breaks into tiny pieces, they become part of the soil.
8. Plants grow in soil.
9. Metals come from the earth.

Conservation concepts:

1. Where there is less soil, there are fewer plants.
2. It takes a long time for soil to form.
3. Water from rain and snow goes into soil.
4. Paved roads and walks do not soak up water.
5. Copper and brass are very attractive when used on buildings.
6. Iron is strong unless it rusts. Iron objects break where they rust.
7. Some rocks, such as marble and granite, are very attractive.
8. Many different kinds of materials which come from the earth are beautiful.

Area: OUR GROWING BODIES Grade K

Materials: A pair of pruning shears
String or yardstick for measuring height of plants
Data sheets to keep growth records

Problem: Where around the school are young trees? Where are "grownup" trees?

1. Find some newly planted trees. These might be taller than some older plants such as yews.

2. Explore ways in which young trees are protected: metal collars at base where dogs congregate (especially in cities) since urine can injure the tree, protection against rabbit or other animals who might nibble the bark, guy wires to help the tree grow straight, burlap wrapping to prevent wind burn.

3. Look for plants which are kept small by cutting them back. Hedges (privet or others) are good examples.

4. Try to find very young seedlings of trees which might have grown wild from a seed (such as maple) or which have been planted (such as an evergreen from the Conservation Department).

5. Trim one small bush. Measure its height and width regularly. Keep a record.

Science concepts:
Trees and shrubs have growing bodies. They get taller as they get older.
Some older plants are shorter than younger ones.
Not all trees of the same kind are the same height.
Cutting a plant can reduce its height without killing it.
The bodies of trees and shrubs do not grow during the winter.

Conservation concepts:
Trees and shrubs make the outside of the school building more attractive.
The government helps people to grow trees. You can get small trees to plant around homes and schools.
Young trees need to be protected from wind and from animals.

Area: AIR, WATER, AND WEATHER Grade 1

Materials: Yardsticks
Rubber bands of 2 different colors
Outline map of school and area immediately surrounding it
Pencils

Problem: How deep is the snow around our school?

1. Children can test different areas by probing a yardstick into the snow and sliding a rubberband over the stock to indicate the depth.

2. Children can determine where there is the highest accumulation of snow and where there is the least by using a yardstick and two differently colored rubberbands, one for the deepest snow and one for the shallowest snow.

3. Children walk around the school to explore areas where snow was removed and areas onto which removed snow had been dumped. They indicate their findings on a simple map of the school and the immediate area by shading the locations where snow has been dumped.

Science concepts: Snowflakes pile on top of each other.
Snowflakes stick together.
There is more snow in some areas than in others because of the direction of the wind which blows snow, or a wall which collects snow, or because snow has been dumped there.

Conservation concepts: It is important to remove snow from places where people walk because they may slip.
Snow is removed from roads so that cars can continue to be driven over them and so that accidents can be prevented.
Wherever there is more snow, more water will form.

Area: LIVING THINGS Grade 1

Materials: Flock of pigeons, assorted foods.

Problem: What kind of food do pigeons select?

1. Locate a flock of pigeons near the school. Select an item of food which children might eat such as cereal, bread, hard-boiled egg, meat. Scatter some, then observe whether pigeons feed readily. Is there any selection among the food offered?

2. Plan to try other foods: peanuts, split peas, lentils.

3. When certain foods appear more acceptable than others, plan to find out which is most readily accepted. Arrange an even number of particles of 2 foods, making sure that the sizes are the same.

Science concepts: Pigeons travel in flocks.
Pigeons live where people live.
House sparrows and starlings frequently mix with pigeons and accept similar food.
Pigeons feed on a great variety of foods which people eat.

Conservation concepts: Pigeons give off wastes which are unattractive and which attract rats.
Some cities have laws which forbid feeding pigeons.
Pigeons attract starlings and house sparrows when they are fed.
House sparrows and starlings also feed on insects which injure plants.
Studied as individual birds, the pigeon, the starling and the sparrow are attractive and interesting.
None of these birds are native to America. All have been introduced: the pigeon from Asia, starlings and sparrows from England.

Area: THE EARTH AND ITS COMPOSITION Grade 1

Problem: How do earthworms help to get air into the soil?

Materials: Wide-mouthed jar, cover with holes in it
Sand
Humus
Clay
Earthworms
Rotted leaves
Ruler

1. Put about two inches of clay soil into the bottom of a jar, two inches of sand on top of that, and two inches of dark humus on top of that. Put two earthworms on top of all the soils. Add a few rotted leaves. Observe after a few days. How distinct have the three soil layers remained? What happened to them? to the rotted leaves? to the earthworms?
2. Look for holes of earthworms around the school. From where do the little mounds of soil (castings) around the holes come?
3. How deep are earthworm burrows?
4. Count the number of earthworm burrows in a given area.
5. Look for earthworms before and after a rain. When do you find more earthworms? Why?

Science concepts:

1. Earthworms dig into the soil to make tunnels or burrows.
2. Earthworms feed on decayed leaves.
3. The outside of an earthworm's burrow has little bits of soil around it.
4. There are more earthworms on top of the ground after a rain than before a rain.
5. Earthworms are active at night.

Conservation concepts:

1. Earthworm burrows allow air to get into the soil.
2. Earthworms "plow up" the soil by bringing little soil particles from below to the surface of the ground.
3. Earthworms enrich the soil by feeding on decayed leaves and depositing the changed leaves in the soil.
4. The presence of earthworms is an indication of a rich soil.

Area: OUR GROWING BODIES Grade 1

Materials: Gloves and mittens for children.
A variety of materials to test for warmth on a cold day, such as: plastic bags, paper bags, aluminum foil, fabric bags, etc.
"Bags" of different colors but of the same type of fabric.
Rubbers, boots of various materials, "snow" gloves of plastic, rubber, leather.

Problem: How do we keep our bodies warm in the winter?

1. Wear a mitten or glove on one hand. Keep the other bare. Go out on a cold day. Expose hands for 5 minutes. Remove the one glove or mitten and touch both hands to face. Which feels warmer?

2. Cover each hand with different materials. Test each for warmth by going outdoors for 5-10 minutes. Remove covers. Hold hands to cheeks. Which feels warmer? One day a plastic bag could be worn on one hand and a paper bag on the other; another day a cotton glove on one hand and a woolen on the other, etc.

3. Try walking without wearing gloves on either hand. Keep one hand rolled up in a fist and spread the other hand out. After 5 minutes, have children decide which is warmer.

4. Test pieces of fabric of same color but different textures in order to find out which might make the warmest overcoat. Little bags can be made of the materials, a thermometer inserted in each "bag" for 5 minutes outdoors, and a record taken of the temperature readings.

5. See whether color affects temperature. Take several samples of the same kind of material, such as velvet or felt or cotton. Make little "bags" the size to accomodate a thermometer. Hang up bags with their thermometers for 5 minutes outdoors. Make a record of results.

6. Test different materials which are best for playing in the snow: rubber, plastic, wool, etc.

Science concepts: People wear warm clothes to retain their body heat.
Darker colors absorb more heat than lighter colors.
Some fabrics retain more heat than others.

Conservation concepts: Appropriately warm clothes in winter can prevent colds.
Colds make us ill and cause such illness to spread to others.
Wearing proper "snow clothes" helps to protect shoes, pants, dresses, etc.

Area: AIR, WATER, AND WEATHER **Grade 2**

Materials: Shovels
Plastic containers
Hand lenses
Compasses
Simple map of school building & environment

Problem: Are there any plants or animals under the snow?

1. Look for snowtracks of any kind. Where do they lead? If they seem to go down, brush some snow away and find out what is underneath.

2. The children can try to identify each other's bootprints in the snow.

3. Take a handful of snow, soil, leaves, etc. from the bottom of a snowbank. Put it into a plastic container. When you get indoors, examine for evidence of small organisms. Hand lenses will be useful here.

4. On a sunny corner against the building, you frequently find dandelions in bloom under the snow. You can find rosettes of green leaves of other plants too. The children can take compass readings of the different sides of the building and locate the exposures where plants are living under the snow. These locations might be indicated on a simple map of the school and surrounding area.

Science concepts: Plants live under the snow.
Animals live under the snow.
Animal footprints can be seen on top of the snow. This means that animals go on top of the snow.
Each animal has its own kind of footprint.

Conservation concepts: Snow protects plants and animals under the snow.
Winter is a hard time for plants and animals. By being protected in winter, these plants and animals will be able to have offspring so that these plants and animals do not die out.
Shelters can be provided for plants and animals during the winter: hedge rows, fence rows, logs are some.

Area: LIVING THINGS Grade 2

Materials: A variety of dried seeds, containers for water for each child, plastic bags, basin, water, construction or other paper, scissors, ruler.

Problem: What evidence can we find that seeds take in (absorb) water?

1. Each child measures one large lima bean by tracing its outline on a piece of paper. It is then put into a dish with water to cover and left overnight. Remove it the next day. Dry it. Trace again. The 2 tracings can be cut out and compared.

2. A similar investigation can be made with other seeds. (If lentils, peas, etc. are used, make sure that they are not treated for "quick-cooking.")

3. Fill a plastic bag with beans. After the bag has many as it can possible hold add water and close by twisting and tying. Make sure that there are only beans and water in the bag and no air. Place in a basin overnight. Observe the next day.

4. Plant some seeds outdoors and dig one up each day in order to compare the size and rate of swelling of the seeds planted outdoors with those investigated indoors. Use the same seeds inside and outside.

5. Observe the ground for signs of swelling seeds by visible cracks on the surface.

Science concepts:
- Seeds take in (absorb) water.
- Seeds swell very much as a result of the water which enters.
- The swelling of the seed is followed by the bursting of the seed coat and the growing of the root.

Conservation concepts:
- Many seeds cannot grow in hard-packed soil which is too hard for the seed root to grow.
- Seeds should not be kept in damp places because they take in water and can spoil.
- There are many different kinds of seeds. Each kind seems to serve as a form of food for living animals.
- Seeds are made only by plants so animals depend on these plants.
- Rice is a seed. A great many people in the world depend on rice as their chief source of food.
- When there is a drought seeds cannot sprout.
- Much starvation in the world is due to drought and to floods. Too much water removes the topsoil in which the sprouted seed can grow.

Area: LIVING THINGS

Grade 2

Conservation concepts, continued:

If seeds are kept dry, they last a long time.
Field animals such as mice, chipmunks, and birds depend on wild seeds.
All winter long, the wild seeds of plants such as ragweed and goldenrod prevent starvation among wild seed-eaters.

Area: THE EARTH AND ITS COMPOSITION Grade 2

Problem: What kinds of materials which come from the earth can we find in and around our school?

Materials: White vinegar in small plastic bottles
Plastic medicine droppers
Newspapers to cover desks
Containers for rock specimens
Geology hammer, if possible

1. Explore the inside of the building and try to identify some of the rocks of which it is made and to tell whether they are natural or artificial. (Glass is made from silicon, a substance from the earth.)
2. Explore the outside of the school building, other buildings, walks, pavements. Which materials come from the earth?
3. Bring back broken pieces of rock from anywhere, including pavement. Test them with vinegar. Which are limestone?
4. Rub 2 pieces of rock together for 5 minutes and measure how much "soil" the class made. This is subsoil, made from a rock, and therefore one of the materials which comes from the earth.
5. Is subsoil as good for planting as is subsoil plus topsoil? Plant the same kind and same number of seeds in cups of equal quantities of subsoil and topsoil. Give all plantings the same conditions of temperature, water, etc.

Science concepts:

1. Each kind of rock has a certain color, a certain appearance, and is made of the same minerals.
2. Rocks formed millions of years ago.
3. Limestone rocks fizz when acid is added. Other rocks do not.
4. Rocks are very hard and are therefore used to make buildings and walks strong.
5. Some rocks come from the earth. These are natural rocks. Some are made by man. These are artificial rocks.
6. Artificial rocks are most often made with materials from the earth.
7. Topsoil has more natural fertilizer for plants than subsoil so topsoil is better for plants.

Conservation concepts:

1. Many building materials come from the earth. After a rock is taken from the earth, another rock is not formed in its place.
2. People have learned how to make some artificial rocks. This helps to save natural rocks.
3. Rocks are stronger than wood for building houses, roads, walks.
4. There is less topsoil than subsoil.
5. Topsoil is very important for growing food for people and animals.

Area: OUR GROWING BODIES

Grade 2

Materials:
- flower pots
- soil
- seeds (radish, beans, grass, corn)
- watering can
- trowel
- ruler
- yardstock
- fertilizer

Problem: How tall do children grow?

1. Measure height of each child. Compare heights according to sex and exact age. Check at the end of a week. Measure height of several shrubs or small trees. Check at the end of a week. Did any growth take place in the children? In the plants? Keep this up for several months - perhaps for the entire year.

2. Plan a comparative study of the height of boys and girls in two different classes of the same grade.

3. Plant some seeds indoors in several pots. Put half of the pots outdoors. Observe results. Keep a record of how much growth occurs each week.

4. Plant several pots of seeds. Add fertilizer to half the number of pots but not to the other. Keep a record of plant growth.

5. How many children in the family of each child? Figure out how many people would result if each child in each family became a parent and had as many children as his parents.

Science concepts:
- Nourishment helps living things to grow.
- Plants grow at different rates.
- People grow at different rates.
- Plants do not grow outdoors during winter. They can grow indoors.
- Children grow all year.

Conservation concepts:
- In order to improve plants around school or elsewhere, it is necessary to fertilize the soil.
- Children in poor countries grow bigger and stronger when their food is improved. Richer countries can help the poorer ones.
- As people grow up, get married, and have families, the total number of people keeps getting larger and larger.
- As the number of people in the world increases, more and more food is necessary for building stronger growing bodies.

Area: AIR, WATER, AND WEATHER Grade 3

Materials: Aluminum or plastic measuring cups
Thermometers
Dry gloves or "snow" gloves for children

Problem: How do plants and animals live where there is cold snow?

1. A walk around the school to observe trees after a snowfall shows that evergreens can withstand heavy loads. Their supple branches bend but do not break with the snow. Children can touch the branches and watch them swing.

2. Collect a cup of snow. Take indoors to find out how much water it forms.

3. Take temperature readings of air below, in, and above a snowbank.

4. Build a large snow shelter, shaped like an igloo. Read the temperature in it and outside. Take a temperature reading after a child has been "inside" for five minutes. Compare reading with another taken after two children have been "inside" for five minutes.

Science concepts:
- Trees have flexible branches which can support the weight of snow.
- Snow of a given quantity forms a smaller quantity of water.
- Different kinds of snow yield different amounts of water.
- Air below a snowbank is warmer than that above it.
- People give off heat which can warm a snow shelter, such as an igloo.

Conservation concepts:
- Snow falls slowly from evergreens to the ground, melts, and forms water which will go into the ground.
- Water from snow is used by plants or animals. Some is stored underground. People can use this water.
- Snow protects living things beneath it by keeping them warm and preventing them from freezing to death.
- People give off heat which can warm a shelter. If lost in the snow, it is best for two people to stay close together and warm.

Area: LIVING THINGS Grade 3

Materials: Earthworms, clear plastic containers of 1 qt. size or larger, trowels, water, decayed leaves, black construction paper.

Problem: How do earthworms improve the soil?

1. Make a survey of where earthworms are found. Explore the ball field, playground, lawn. Look near paved paths bordering soil and plants. Little holes surrounded with earth pellets (castings) are entrances to earthworm burrows. Greatest success is achieved during a light rain or right after a rain.

2. Map the school and surrounding area for a short distance. Locate with an "E" each spot rich in earthworms.

3. Estimate the number of earthworms in a given area.

4. Prepare a container (clear plastic, about 1 qt. capacity is good but other sizes and materials will do too) with 3 distinct kinds of soil in definite layers. Clay is placed on the bottom, sand on top of the clay, and humus on top of all. A fine layer of powdered charcoal can be sprinkled between the layers but this is not essential. Place 2 to 3 earthworms on the surface, plus a few decayed leaves. Surround with a black paper cover since earthworms live underground, in darkness. Observe after a few days. What has happened to the distinct layers of the soil? How does this bring air down into the soil? How does the earthworm's activity make soil richer?

Science concepts:
Earthworms live in the soil.
They come out after dark.
They also come out after a rain.
Earthworms feed on decayed leaves, lining part of their burrows with them.
Earthworms are brown. They have many "rings" to their bodies. One end is pointed. The other is flat.
They take in air through their skins.

Conservation concepts:
Earthworms aerate the soil by casting up pellets of earth as they dig their burrows.
Earthworms fertilize the soil as they break down decayed leaves which pass through their bodies.
Some birds such as the robins feed on earthworms.
A drought kills many earthworms and this makes farmlands less rich.

Area: THE EARTH AND ITS COMPOSITION Grade 3

Problem: Where are artificial rocks used in and around the school?

Materials: Plaster of Paris
Empty #2 cans for mixing plaster
Waxed paper
Water
Pieces of wood for stirring plaster
Cardboard for making "collars" around footprints when casting them

1. Examine the school building from the outside. What parts are natural rock? Where is artificial rock used?
2. Walk around the neighborhood. Find natural and artificial rock used for paths and pavements. In what ways are they better than soil? In what ways are they not as desirable as soil?
3. Locate paved areas which are broken. What lies beneath the pavement?
4. Repair some paved areas. What is the value of such repair?
5. If a building is being constructed, find out where cement is being used. How is the cement reinforced to make it sturdier? What methods are being used for mixing the cement? Why does it have to be used right away after mixing?
6. Make some artificial chalk.
7. Make a plaster cast of a footprint of an animal in the soil. Why is the mud on street curbs in cities a good place to find such footprints? What footprints would you expect there? (Note the heat given off by the liquid mixture of Plaster of Paris and water.)

Science concepts:

1. Mixing cement, which contains several other dry substances, together with water forms a new substance which is a hard rock, concrete.
2. Some substances become hot when they change into another substance.
3. When Plaster of Paris mixed with water is a liquid, its shape changes to fit the container or mold which holds it. When it hardens, its shape does not change.
4. Plaster of Paris is made from a mineral, gypsum, which is mined from the earth as coal is mined.

Conservation concepts:

1. There is a great deal of rock in the earth, but once it is used up there is no more. You cannot grow rocks as you grow plants and animals.
2. Artificial rocks can be used as substitutes for natural rocks. Sometimes the artificial rocks are prettier, sometimes stronger, sometimes cheaper, sometimes necessary because there are no more certain natural rocks or because we do not want to use up all the natural rocks.

Conservation concepts, continued:

3. Rocks as building materials are harder to use than wood, but rocks are safer from fire and last longer.
4. As the number of people increase, more houses, factories, businesses, roads, etc. are needed.
5. Never pour a plaster mixture down the sink or toilet. It will harden and prevent water flow and damage plumbing.

Area: OUR GROWING BODIES Grade 3

Materials: Extinguished kitchen matches
Thumbtacks
Library paste

Problem: What are some things which affect our pulse rate?

1. Using the burnt matchstick on thumbtack technique, each child takes his pulse rate. Note change of pulse rate after some indoor activity. Go outdoors. Do some outdoor running. Return to class and quickly take pulse again. Compare the 3 readings. Account for the differences.

2. After sitting quietly, take pulse rate. Take a few deep breaths. Take pulse again. Repeat the same thing outdoors. It will probably be necessary to stand, rather than sit, but what the children are searching for is whether there is a change in pulse rate after breathing deeply, and whether there is a greater difference in the one area (indoors) as compared with the other (outdoors). Discuss the differences in the kind of air being breathed deeply indoors and out.

3. Compare the pulse rates of boys with the rates of girls. After regular outdoor playtime, make a similar comparison. Is there a greater difference amongst one sex as compared to the other? Here is a good place to discuss the importance of pure air and of room for playing.

Science concepts: Pulse rate indicates the frequency of heart beat.
The pulse rate varies under different conditions: slower at rest, faster after exertion.
Pulse rates vary among individuals.
After active play, there is an increase in pulse as well as in rate of breathing.

Conservation concepts: Deep breathing for health is more desirable outdoors than indoors since fresher air is available outdoors.
People breathe more deeply when they are active.
Clean air is preferable to polluted air.
Room for running and playing safely is necessary for health.
Carrying on outdoor investigations provides opportunities for breathing fresh air and for stimulating blood circulation.

Objectives of Outdoor Discovery Guides

Note the Active Verbs

1. To foster the natural curiosity which children have about the world around them.

2. To guide children to learn about their environment by getting them involved in the process of finding out for themselves.

3. To give children a chance to appreciate science as a method of discovery through solving problems out-of-doors.

4. To emphasize the ecological approach by including studies in the physical and biological aspects of the environment.

5. To help foster the kind of attitudes and appreciations which lead to understanding how a scientist works: to explore things in depth rather than superficially, to be accurate and unbiased, to collect sufficient evidence, to not jump to conclusions, etc.

6. To stimulate interests and to develop skills which enable children to investigate for themselves.

7. To develop an understanding of the out-of-doors which leads to related hobbies of various kinds.

8. To create an awareness that our resources are not restricted to soil, forests, fish and wildlife; but that they also include peace, quiet, clean air, clean water, space, and beauty.

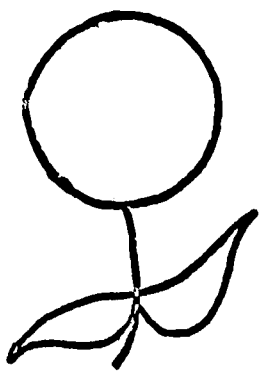
9. To lead children to the enjoyment of the esthetic beauties in the outdoors and to explain the privileges and duties each one has to make it possible for others to obtain the same enjoyment.

10. To appreciate conservation as it develops from an understanding of the ecological interrelationships in our environment and to recognize that man is part of this "web of life."

An Example of an Outdoor Discovery Guide

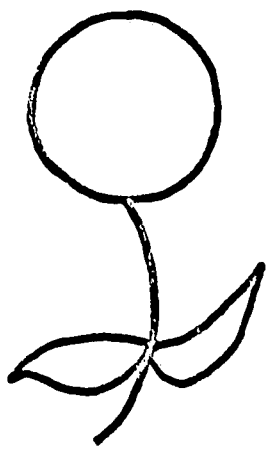
Find a flower which is in bloom. Do not pick it. Which of your crayons makes a color that looks like the flower? Color this circle with that crayon.

Now color the leaves with the crayon which looks most like the leaves of this plant.

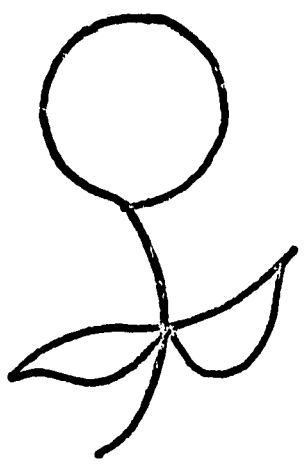


Flower 1

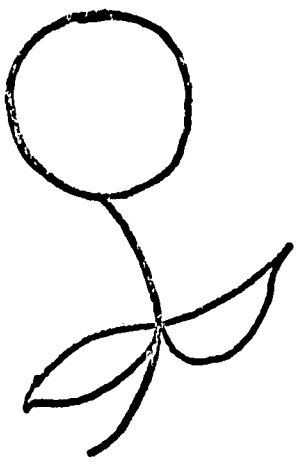
Find 4 more flowers, each of a different color. For each of these 4 flowers pick out matching crayons and color a circle and the leaves



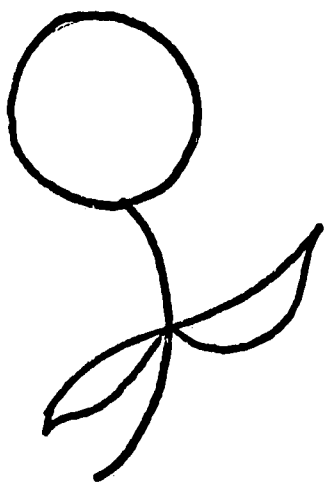
Flower 2



Flower 3



Flower 4



Flower 5

Which parts of these 5 flowers are the same color?
Which parts are of different colors?

SUMMARY

I. The Goals - To bring to the children of this region an intelligent understanding of their environment, their dependence upon it for their existence, and their need for developing a sense of responsibility to help carry out the wisest conservation practices.

Conservation should be understood as the continual making of "enlightened choices." This enlightenment results from know- about one's world, indoors and outdoors.

II. Checklist for essentials of a lesson
   - A. Science concepts
   - B. Conservation concepts
   - C. Overarching theme
   - D. Process(es) of science - cognitive functions
   - E. Indoor investigation
   - F. Outdoor investigation
   - G. Homework extension

III. Where you teach
   - A. In the classroom
   - B. In the immediate outdoor surroundings
   - C. At a nature center, park, etc.
   - D. "At home"

IV. What you teach
   - A. Elements of your science course of study leading to science concepts appropriate to the grade.
   - B. Ecological interpretarions leading to conservation concepts appropriate to the grade.
   - C. Integrated aspects of math and social studies where they fit and are appropriate to the grade.

V. Where you can get ideas for background and stimulation:

1. Conservation Education Bulletin from Conservation Foundation, 30 E. 40th St., New York, N.Y. 10016 - free.
2. Science and Children, The National Science Teachers Assoc., 1201 Sixteenth St., N.W., Washington, D.C. 20036 - $4.00 per year.
3. Nature and Science, Natural History Press, Garden City,
4. Audubon Bulletin, National Audubon Society, 1130 Fifth Ave., New York, N.Y. 10028 - 20¢ a bulletin. Send for catalogue.
5. Curious Naturalist from Massachusetts Audubon Society, Lincoln, Mass. 01773. Distributed at present by PINE Project, free.
6. Cornell Science Leaflets, Stone Hall, Cornell University, Ithaca, New York 14850. $1.00 per year or 25¢ per issue.
7. New York State Conservationist, N.Y.S. Conservation Dept., State Campus, Albany, N.Y. 12226. Subscription $1.00 per year if mailed to elementary school.
8. Texts of various kinds - Study "flow" charts.

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