DCCUMENT RESUME

ED 033 787 88 RC 003 791

AUTHOR Mascn, Fred J.
TITLE Cbservation Skills - Tuning Up the Five Senses.
INSTITUTICN Ccnservation and Environmental Science Center fcr Scuthern New Jersey, Brcwn Mills.
Spons Agency Cffice of Educatien (DHEW), Washington, D.C. Div. of Plans and Supplementary Centers.
Report No DPSC-68-5679
Pub Date [68]
Note 25p.

EDRS Price EDRS Price MF-$0.25 HC-$1.35
Descriptors Educatienal Cbjectives, Evaluatien Methcds, Instructional Materials, *Intermediate Grades, Learning Activities, *Lesscn Plans, Observation, *Cutdoor Education, Perceptien, *Senscry Experience, *Study Guides, Teaching Guides

Abstract

Iesscn plans designed to increase the observation skills fcr intermediate elementary students and provide them with a variety of senscry experiences in learning situatiens are presented in this document. Iesson plans include objectives, cutlines for both indccr and outdoor learning experiences, materials and equipment needed, and evaluation prccedures. Suggested activities with instructicns and forms tc be used are given. A study guide is presented to aid in the study of a natural area in an organized manner, tc learn what kinds of plants and animals can live tcgether in a small ccmmunity environment. Related dccuments are RC 003 788, RC 003 789, RC 003 790, and RC 003 792. (SW)

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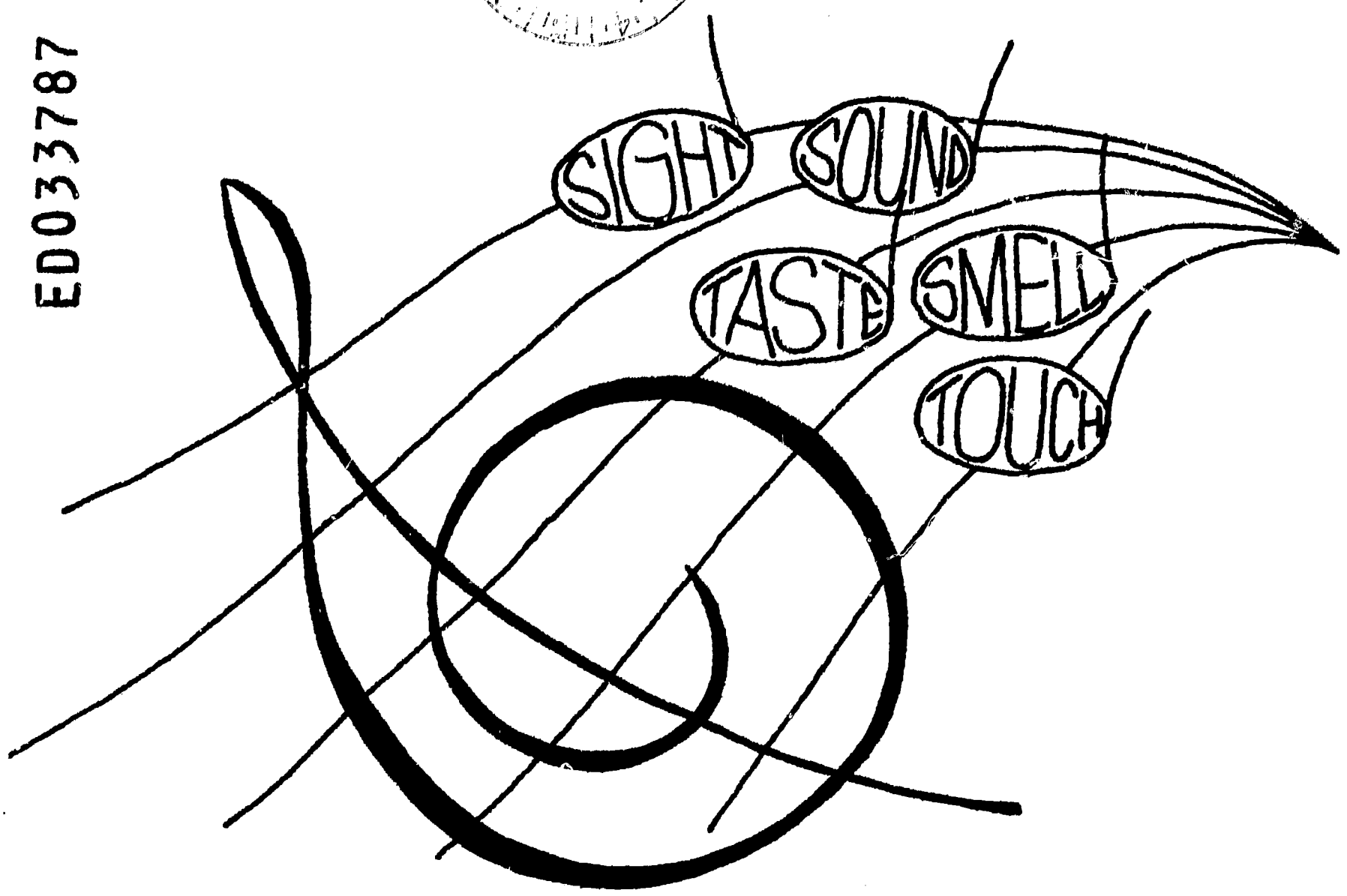

TUNING UP THE FIVE SENSES

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Designed for:

Intermediate
Elementary
Students

TITLE: OBSERVATION SKILLS - Tuning up the Five Senses

Grade Level: Intermediate Elementary

Overview

Imagine before us the painting "Christina's World" by Andrew Wyeth. In it the artist has chosen to depict a woman crawling through a grassy field towards a distant farmhouse and outbuildings. If we were to seat a fifth grade teacher and one of her pupils in front of this picture, we would observe a curious dissimilarity in their reactions. To the teacher the subject of the work is the woman in the foreground, while the youngster views the entire painting as being relevant. This divergence of viewpoint is the result of a cultural screening action which has been developing since birth in the mental process of the adult but which has not yet occurred in the mind of the child.

Since the world outside our minds is composed of an infinite number of objects and their interactions (events), we must develop some criteria for choosing those items which are of most importance. The screening process, however, should not evolve haphazardly as it has in most of us, but would rather be the result of direct, multi-sensory interplay with the environment in teacher-guided learning situations. Educational researchers maintain that the more variety of sensory experiences provided in such learning situations, the greater the understanding of a particular idea or generalization will be.

Objectives

Cognitive:

Students are able to:

1. categorize information received according to the sense used for reception
2. write a description of an object using words which will convey sensory images
3. draw rough sketches of small environmental areas
4. list several characteristics of various objects
5. "test" objects by the use of their senses
6. utilize library research methods to learn more about individual objects
7. identify selected species of flora and fauna by use of "keys"
8. effectively use such tools as the hand lens, binoculars or microscopes to increase their sensory effectiveness

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Affective:

1. Students can subjectively identify with "pet" objects and convey feelings and beliefs about these through varied means of creative expression.
2. Students can demonstrate formation of a conservation ethic by showing selectivity in removing objects from their natural environment.
3. Students should demonstrate an increase in pursuing further study of their environment.

Strategy:

The following series of lessons is designed to provide a stimulating learning climate focusing on the process of learning rather than on a given body of content.

Included are several experiences in the outdoor environment which require the student to function in the realm of problem solving and imagination. Also present are a number of opportunities for the utilization of words which can communicate what the student saw, heard, felt, smelled or tasted when he was examining his environment. This is especially valuable to the intermediate level student who is adding word building blocks to the foundation of his adult vocabulary.

The suggested flow of the lessons is from a macroscopic observation of the students' world towards a more microscopic focus on smaller environmental areas. The structure of the series is not rigid and any lesson can serve as an initiatory device for a myriad of new learnings. The author emphatically suggests that users of this environmental instruction plan provide time for students to follow up with further research any tangential discoveries which they may make in the out-of-doors.

Lesson Outline

Lesson 1 - Indoors - Preliminary Discussion - (Senses)

Use an initiatory device such as actual popping of popcorn or observation of a small flame to discuss:

1. What are "senses?"
2. How do we learn about things?

Invite students to attempt either a written or oral description of an imagined fire experience.

Lesson 2 - Outdoors - Sensory Impression Hunt

An outdoor hike in which individual students, working in previously established groups, are to gather sights, sounds, smells, tastes and tactile impressions and record these on worksheets according to the appropriate sense. Emphasize use of caution in touching and tasting, (see worksheet).

Lesson 3 - Indoors - Stories About "Our Hunt"

Discuss sensory experiences gathered in previous lesson. Have each student group attempt to put together a group story based on their sensory impression hunt, using words which convey some of the sensory impressions they experienced. (see worksheet)

Lesson 4 - Indoors - Sensory Games

Prepare a cardboard box so that it has an access area such that the contents are not readily visible. Some suggestions for use of this device to develop sensory awareness are:

1. Touch Box - Place an item or several items of various shapes and textures in the box. Have students reach in, touch the item and describe orally what they felt within the container.

2. Odor Box - Saturate small pieces of sponge with various scents. Have students describe the scent to their classmates.

Motivation can be provided within the group process format by having each group try to guess what their representative is describing and awarding points on a 5 to 0 point scale, subtracting a point for each question or guess required before positive identification. The team having the most points after an equal number of "describers" from each team have participated would be the winner.

Similar games can be played with tape recorder and earphones for "sounds" and various tasting materials for "taste." Even "sight" games are possible if the "describer" is required to write down an imagined object or scene, and then to describe the situation as if he were actually seeing it.

Lesson 5 - Outdoors - Framing Part of the World

Have students bend wire coat hangers into a diamond shape. These should then be used as viewfinders, holding the hangers at arm's length so as to narrow the students' area of visual focus. Have them: 1. look straight ahead, 2. look up, 3. look down, and then make a rough sketch of what they see. Use 8 1/2" by 11" paper turned to form an appropriate diamond-shape for this sketching. The "looking down" activity will provide experience which will prepare students for the later quadrat or micro-quadrat studies, (see worksheet).

Lesson 6 - Indoors - Preliminary Discussion - (Object Characteristics)

Present students with a collection of material objects. Hold an informal discussion focused on:

1. What is an object?
2. What are some characteristics of objects?
3. What words do we use to name or describe these characteristics?

Have students point out various objects around the classroom that exhibit characteristics similar to those in the collection.

Lesson 7 - Outdoor-Indoor - Object Characteristic Hunt

Objects (pebbles, sticks, leaves, your dog Spot, cat, fish and others) have certain things belonging to them such as color, shape, feel, etc. These things are called the *characteristics* of the object.

Divide students into teams of two. Have each team choose one characteristic (e.g. all red, all round, all with points). They are to collect objects possessing this characteristic while on an outdoor hike. Caution them not to tell anyone what characteristic their collection possesses. Have each group display their collection and encourage other students to try guessing what the common characteristic is for each collection. Discuss what objects can't or shouldn't be brought back (for physical or conservation reasons). (see worksheet)

Lesson 8 - Outdoors - Choosing an Object for Study

Instruct children to choose an outdoor object which interests them and which they would like to learn more about. Tell them to first draw a rough picture of the object; then to "test" the object with each of their senses. Each child should list information obtained by the employing each of his senses, (see worksheet).

Lesson 9 - Indoors - Describing Your Object

This may be the time to stimulate students reading by suggesting that instead of writing their own descriptions of an object, they find an already-written description in the several books, articles, etc. which you will conveniently provide within the classroom.

In order to set the tenor of this lesson, the teacher should read some descriptions of outdoor objects or scenes. Include both poetry and prose. It might also be useful to provide some pictorial materials (color slides, paintings, sketches, etc.) around the room to stimulate mental "pictures."

Ask student to describe their "pet" object in their own poetry or prose, paying particular attention to the use of *sensory* words, (see worksheet).

Lesson 10 - Outdoor-Indoor - My Objects' Diary

Suggest to students that they play a "Let's Pretend" game. Tell them to pretend that they are their "pet" outdoor object. Have them write a short diary telling what happens to them during a one hour time period. This may require further outdoor observation or they may be able to generalize and predict on the basis of what they have already learned about the outdoors.

Specifically instruct students not to include name of object in the main portion of their diary but rather to place the name of the object at the end of their papers.

When students have completed their diaries, have them tape record them, leaving out the name of their object. The teacher can then play back the tapes and ask for guesses as to what the object is. (see worksheet)

Lesson 11 - Indoors - How Much Can We Learn About Birds?

Introduce students to the idea of an identification "key" by discussing some of the common birds seen on their previous field experiences. Develop some type of bird clue chart which will require students to discriminate among various colors, shapes, sizes, habitats, songs and flight characteristics. (See appendix) Have students list known characteristics of common birds under appropriate headings on their charts. Leave blank any unknown items for further field/library research. Show how someone would use a field guide or key to find the name of a bird when most of the characteristics are observed and recorded mentally or in a notebook. (see worksheet)

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Lesson 12 - Indoor-Outdoor - Extending the Senses with Observational Tools

In an indoor session, introduce children to the advantages gained by the use of such sense-expanding devices as the hand lens, binoculars and compound microscopes, and the nomenclature.

Take students on an outdoor observational hike using the bird clue chart format in Lesson 11 in order to give them experience in use of binoculars. Instruct them to collect interesting items for later microscopy work. Provide sufficient bird "keys" for identification work.

Lesson 13 - Indoor - Microscopy

Have students (working in teams of four or less) examine and sketch items and organisms gathered on previous lessons' outdoor hike. Depending on items collected, it may be possible to introduce the idea of food web, ecosystem or other pertinent ecological generalizations. If such be the case, encourage them to draw a partial food web including some of the organisms which they have collected. Extend use of "keys" to microscopic organisms and plant specimens gathered.

Lesson 14 - Outdoor - Studying a Microquadrat

Have students mark off a small outdoor area for intensive study by using the coat hanger from Lesson 5 to establish boundaries. Encourage identification by use of appropriate field guides,

1. soil or rock types
2. plant specimens
3. animal organisms
4. climatic factors

Lesson 15 - Outdoors - Study of a Rotting Log

The task of each student study group is to discover a log in an advanced stage of decay, to identify the organisms present and to describe conditions of the log and surrounding area in a "scientific" report for oral presentation to the class, (see worksheet).

Lesson 16 - Outdoors - Quadrat Study

Using the guide sheets in the appendix, have students establish quadrats of nine yards on a side or 81 square yards in area for continued study over relatively long periods of time, noting changes which occur within the area and analyzing the causes of such change.

Lesson 17 - Outdoor-Indoor - Individual Research Projects

Encourage students to choose some outdoor situation (e.g. birds in a nest, a ten-foot square area of the playground, a person outdoors, etc.) for further study and reporting. Continue the study for whatever period of time seems appropriate, then require a carefully detailed written report on the events which occurred to the chosen object or within the selected area. Request illustrations if deemed necessary for clarification.

A suggested form for the report is:

1. Problem - the reason for conducting the study.

2. Hypothesis - the generalization(s) to be tested.

3. Procedure - how the student carried out his investigation.

3. Conclusions - the reults of the observations and investigations in summary form.

Author's note - By now many of your students have become involved in personallly interesting studies. Encourage this, especially by rewarding them with your approval for unique collections or knowledgeable reports.

Materials and Equipment

1. a candle or popcorn and associated equipment
2. cardboard box
3. tape recorder and earphor
4. miscellaneous scents such as ammonia, syrup, animal musk (e.g. deer lure), sulfur, etc. and pieces of sponge
5. miscellaneous taste materials such as sugar, salt, lemon, tabasco, cola, etc.
6. wire coat hangers for each student
7. microscopes)
8. binoculars) as required for number of students or groups
9. hand lens)
10. worksheets where necessary - see appendix for samples
11. materials needed for quadrat - see appendix
12. poetry and prose selections about the outdoors (e.g. Robert Frost, Henry David Thoreau, Carl Sandburg and others.)

Identification Aids

Doubleday Nature Guides, Doubleday and Co., New York, N.Y.

Golden Nature Guide Series, Golden Press, New York, N.Y.

Peterson Field Guide Series, Houghton-Mifflin Company, Boston, Mass.

Putnam Nature Field Books, G.P. Putnam and Sons, New York, N.Y.

Audiovisual or Other Sensory Aids

Films:

1. "Life in a Pond," 11 min., color, Syracuse University Film Library
2. "Principles of the Microscope," 30 min., color or black and white, Encyclopaedia Brittanica Films, Inc.
3. "The World at Your Feet," (observing soil) 22 min. color, Audubon Society
4. "World In a Marsh," 21 min., 7 sec., color, National Film Board of Canada

Filmstrips:

1. Introduction to the Microscope, 42 frames, color, Society for Visual Education
2. Story of Lenses, 42 frames, color, McGraw-Hill Textfilms

Evaluation Procedure

Although the objectives for this instructional plan do provide some specific behaviors which can be interpreted as evidence of success in meeting objectives, the author suggests another somewhat unusual method to be used in conjunction with such behavioral evaluation.

If at all possible, try to arrange some highly charged situation occur in the classroom prior to Lesson 1. After the situation has been alleviated, ask students to describe just what occurred. File their description for future reference. A situation once used by the author was to have a fellow teacher from another district visit the classroom made up as an old sailor, dressed in outlandish garb, smoking a clay pipe and carrying a stuffed great horned owl under his arm. This visit occured when the author had just been

called to the principal's office for "important business." Such a situation may be difficult to duplicate. But, if two such experiences (differing totally in character) are provided, one prior to and one following the lesson series, and a written description is called for in each case, then the teacher will have examples of the students descriptive skills. Hopefully, the teacher will be able to recognize some improvements after the use of this Environmental Instruction Plan.

Bibliography

1. Bale, Robert O., Conservation for Camp and Classroom, Burgess Publishing Co., Minneapolis, Minnesota, 1962.

2. Hug and Wilson, Curriculum Enrichment Outdoors, Harper and Row, Evanston, Ill., 1965

3. Navarra, Zafforoni and Garone, Life and the Molecule, Harper and Row, Evanston, Illinois. 1966

4. Science Curriculum Improvement Study, National Science Foundation, Material Objects - A Teacher's Guide, D.C. Heath & Co., Berkeley, Calif., 1966

Tuning up the Five Senses

Lesson 2 Worksheet

ACTIVITY - "SENSE IMPRESSION HUNT"

Instructions - Find 7 ways to use each of your senses to learn more about the outdoors. List them under appropriate columns. (Example: Hear bird's songs - See animal tracks, etc.)

	SEE	*HEAR*	*TOUCH*	*SMELL*	*TASTE*
1.					
2.					
3.					
4.					
5.					
6.					
7.					

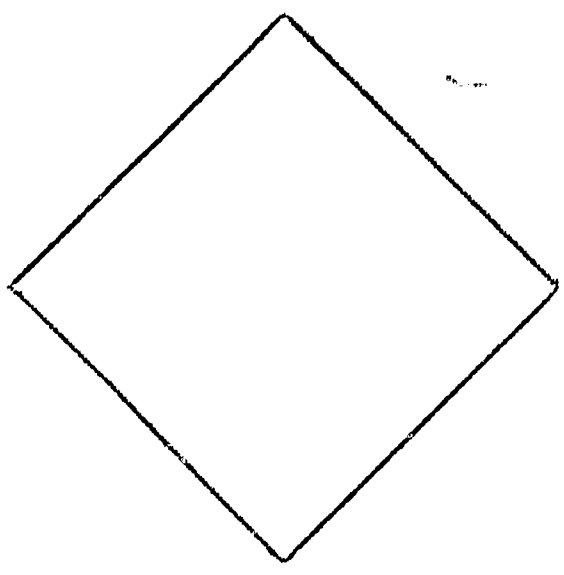
ACTIVITY - "USING SENSORY WORDS"

Instructions - In the space below, tell what you saw on your sensory impression hike. Try to use words which tell what you saw, heard, felt, touched or tasted (words like *fluffy* fur, *sticky* leaves, *pillow* clouds, etc.)

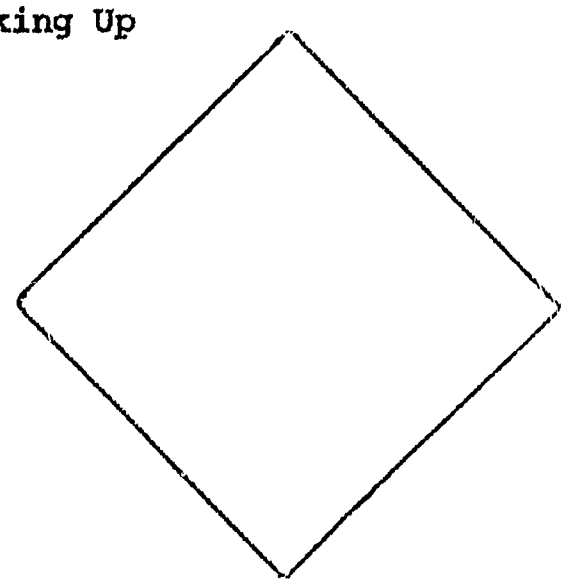
ACTIVITY - "FRAMING PART OF THE WORLD"

Instructions - Bend a wire coat hanger into a diamond shape (◇). While holding the hanger at arm's length, LOOK: 1. straight in front of you, 2. at the sky overhead, 3. at the ground beneath you. In the spaces below sketch what you see framed by your coat hanger.

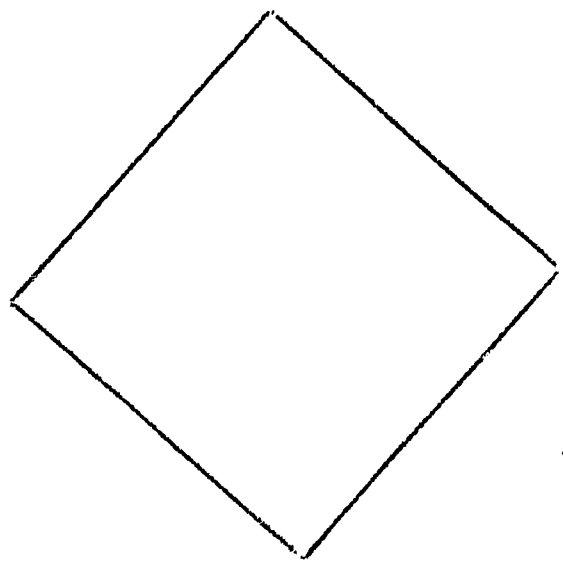
1. Looking Straight Ahead



2. Looking Up



3. Looking Down



ACTIVITY - "OBJECT CHARACTERISTIC HUNT"

Instructions - Objects (pebbles, sticks, leaves, your dog Spt, your cat Tabby, and others) have certain things distinctively theirs such as color, shape, feel, etc. These things are called the *characteristics* of an object.

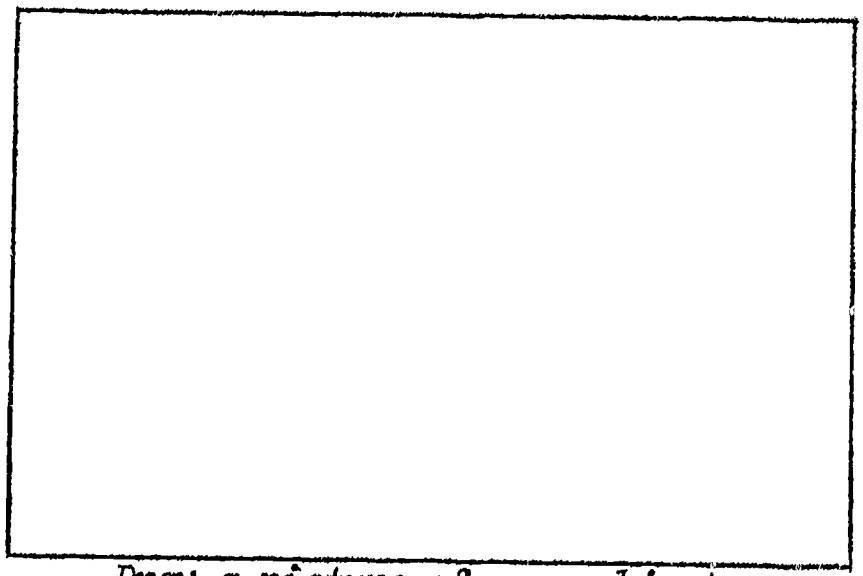
You and your teammate are to choose one characteristic (for example: all red, all round, all with points). Collect objects showing this property. Don't tell anyone but your partner what characteristics the objects you are collecting show. Bring back your collection so that we can try to guess what characteristics you were looking for.

In the space below, sketch objects which can't or shouldn't be brought back.

ACTIVITY - "CHOOSING AN OBJECT TO STUDY"

Instructions - Find an object in the outdoors which interests you and which you would like to learn more about. Use each of your senses to test this object. List information obtained by using each of your senses. Find out as much as you can about your "pet" object.

SEE



Draw a picture of your object

HEAR

TOUCH

SMELL

TASTE - only under supervision of your teacher

ACTIVITY - "DESCRIBING YOUR OBJECT"

Instructions - Write a brief paragraph which describes your "pet" object. Use *sensory* words. What does *sensory* mean?

(*Sensory* words - words conveying sense data or impressions of what was heard, felt, touched, tasted, or seen; e.g. sticky liquid, bumpy rock, etc.)

ACTIVITY - "MY OBJECT'S DIARY"

Instructions - Pretend that you are an outdoor object (tree, flower, animal, etc.) Write a short diary telling what happens to you during a one-hour time period. You may have to go out and actually watch your object for an hour or you may be able to guess what will happen from what you have already observed about your object in the outdoors.

CLUE CHART FOR BIRDS

Size	*Shade*	*Shape*	*Surrounding*	*Sweep*	*Song*

Bird Characteristics

SIZE - Is the bird larger than a sparrow (6 inches) or a robin (10 inches) or a crow (20 inches)?

SHADE - Areas of the body where colors are located (variations) in color at the throat, belly, wings, tail, and markings of feathers.

SHAPE - a) body shape (plump, sleek, thin, short and stubby, or streamlined),
b) head and bill shape (bill thick or thin or long or short),
c) tail shape (rounded, wedge, square, notched),
d) wing shape (rounded, pointed, ragged),
e) leg shape (long or short).

SURROUNDING - Where was the bird located (tree top, vertical position on trunk of tree, in a wooded area, meadow, telephone wire, fence post, along the country road, swimming or floating on water, other)?

SWEEP - What were the flight characteristics (jerky, darting, swooping, irregular flight)?

SONG - Are there phonetic sounds such as raspy, chip-chip, peter-peter, or a trill?

ACTIVITY - "STUDY OF A ROTTING LOG"

Instructions - 1. Locate a rotting log.
2. Answer the following questions about the log which you have found

*Name*_____ *Date*_____

*Locale*_____ *Weather*_____ *Temp*_____

	Yes	No
1. Is the bark still on the tree?	___	___
2. Can a nail be pushed into the wood?	___	___
3. Are borings apparent in the wood or on the surface?	___	___
4. Are nests of birds and other animals apparent?	___	___
5. Is tree standing or fallen?	___	___
6. Estimate how long the tree has been dead:	___	___
7. How many invertebrate (animals without backbone) have you seen?	___	___
8. Are vertebrates (animals with backbones) living in or on the tree?	___	___
9. Have you collected or recorded all the organisms observed?	___	___
10. Did you see or collect any salamanders or lizards?	___	___
11. Are any mammal runways apparent?	___	___
12. Is the wood moist or dry in this specimen?	___	___

List all organisms (plant and animal) collected *or* observed -

Species	Estimate of number present

(Source: Techniques for Teaching Conservation Education by Brown & Mouser, Burgess Publishing Co. , 1964)

CONSERVATION AND ENVIRONMENTAL SCIENCE CENTER
FOR SOUTHERN NEW JERSEY

QUADRAT STUDY GUIDE

Purpose:

To study a natural area in an organized way; to learn what kinds of plants and animals can live together in a small community environment.

To have children work together in a team. Assignment should be designated for each member.

Materials Needed for One Team:

The following materials are needed for a team no greater than 12 children -

- 1 ball of string
- 12 wooden stakes
  - (4 stakes, 2 feet long)
  - (8 stakes, 1 foot long)
- 4 yard sticks
- 1 Silva Compass
- 4 hand lenses
- soil testing kit(s)
- soil borer(s) or auger(s)
- 2 soil thermometers
- weather station to include a barometer and a hygrometer
- a small field library which should include Keys for trees, shrubs, mosses, ferns, insects, animals and etc.
- 1 small hammer
- 1 pair of binoculars
- 1 herbarium press
- data sheets including:
  - Grid Form
  - Profile Diagram
  - Soil Profile Chart
  - Weather Analysis Summary Sheet

Procedure for Laying Out the Quadrat:

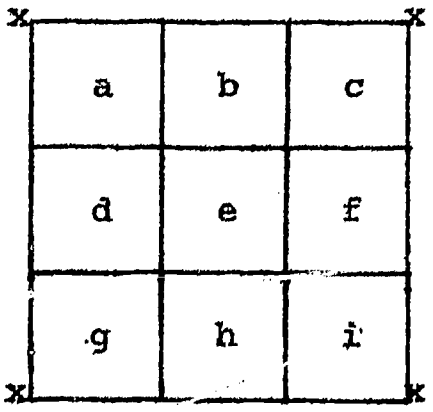
Select a natural area - it may be:

- a field,
- in a wood lot,
- at the edge of the woods,
- near a stream,
- in a burned over area,
- near a lake shore.

Quadrat Study Guide

Instructions:

You are asked to lay out a large square area within the location you have chosen. Use the four large stakes to make the corners. Run the string along the ground from corner to corner. Make sure the corners are square. Use the compass to line up the quadrat like the diagram below. Each side should be 9 yards long.



Questions:

What is the area of the quadrat?

What is the area of an individual section?

Multiply the second answer by 9. Your answer shoud be the same as the answer to the first question.

After you have set up the outside lines, you should lay out what is called a grid in your quadrat. Use the short stakes and the rest of the string. If time and equipment are a ilable, set up the weather station.

Activities in and Around the Quadrat:

Identifying and Recording Plants in a Quadrat with the help of the teacher and a field library.

The Grid - Try to identify many of the plants in the quadrat. You should try especially hard to identify all trees and shrubs. As you do this, locate or record them on the paper Grid Form.

Locate each plant, by number, on the paper Grid Form which is a map of your quadrat.

Once a plant is given a number, that number should be used for that kind of a plant only, every time that plant is found and recorded.

The Profile Diagram - is used to make a record of the kinds of trees and shrubs in each layer of your quadrat. The profile should be done after the grid is completed.

Trees and shrubs should be located in four layers:
the canopy - the roof or top of the forest,
the understory - below the canopy to 10 feet above the ground
the saplings - from 3 to 10 feet above the ground,
the seedlings - from ground level to 3 feet above the ground.

Quadrat Study Guide

The Profile Diagram - cont'd

Record each plant (only once) by name, in the left column; then, every time you record one of the same name just place a stroke (/) in the layer column.

When all trees and shrubs are recorded, total the strokes for each plant in each layer.

After you total each column, complete the statements a. through g. at the bottom of the diagram.

Soil Analysis -

There are 3 things you can find out easily about the soil in your quadrat:

1. the depth of different layers of the soil,
2. the soil acidity or pH of the different layers,
3. the temperature of the different layers.

The Soil Profile Chart - Using the soil borer or soil auger only go down about one foot and remove a sample of soil. You may see color and texture changes easily from the top to the bottom of the sample. These colors help you to locate the different layers. Measure the depth of each layer and record it on the Soil Profile Chart. By following the directions at the bottom left hand side of the Chart, draw a sketch of the sample. Do this once in each section of the grid. When finished you should have nine samples recorded. On the reverse side of the chart answer the questions found at the bottom right hand corner of the chart.

Ask your teacher to show you how to use the soil testing kit to find the soil acidity or pH of the soil. What can pH tell us about the soil?

With the help of your teacher learn how to use the soil thermometer. Is the temperature underground the same as the temperature of the air just above the ground? How do you explain the answer to the last question?

Quadrat Study Guide

The Study of a Micro-Quadrat

Lay out an area within your 10 yard quadrat which measures 6 inches long by 6 inches wide by 1 inch deep.

What is the surface area?
What is the volume?

Use a hand lens to find out:

How many different kinds of living organisms are present?
How many you can name?
How many are plants?
How many are animals?
What kinds of decaying things are present?
How big you do you think the soil particles are?

How to Make a Herbarium Collection

Choose leaf samples of some plants you may want to preserve. With the help of the teacher, open the herbarium press and neatly lay the leaves between two pieces of blotter paper and some pieces of newspaper. Be careful to lay the samples flat, next to each other, not on top of each other. Make sure there are two pieces of cardboard between the blotters and newspapers. After you have all samples placed neatly, put the outside pieces of the press back on and tighten the belts as tightly as possible. After two days, open the press and see what has happened to the samples. Mount the samples on herbarium pages and complete the information asked for.

Weather Analysis

If you have placed a weather station near your quadrat area, some team member should be assigned to take weather instrument readings 3 times each day. Use the Weather Analysis Summary Sheet to record your findings.

For your quadrat study it is good to know:

the relative humidity of the air above your quadrat,
the temperature of the air above your quadrat,
the daily amount of precipitation at your quadrat.

SOIL PROFILE CHART

Section A	Section B	Section C	Section D	Section E	Section F	Section G	Section H	Section I

Sketch the profile:

a. record the depth in inches
b. record the temperature of each layer
c. record the pH of each layer
d. on the reverse side, write a description of the things you find in the top or humus layers.

Answer why or why not to the following questions on the reverse side:

a. are all layers the same thickness in each sample?
b. are all temperatures the same at each layer of each sample?
c. are all top layer temperatures the same?
d. are all bottom layer temperatures the same?

SAMPLE HERBARIUM PAGE

Specimen Number _____

Genus _____

Species _____

Common Name _____

Locality _____

Habitat _____

Remarks _____

Date _____

Collector _____