



Alaska Oil (Spill) Education Spiral Curriculum

This Alaska Oil (Spill) Education spiral curriculum includes two tracks: “Ecosystems & Oil Pollution” and “Oil Resources & Energy Cycles.” As a spiral curriculum, lessons within each track build upon previous learning and prepare students for future lessons. The information is reinforced and solidified each time the student revisits the subject matter. The spiral curriculum also allows a logical progression from simplistic ideas to complicated ideas. The two tracks may be approached separately, or combined into a larger curriculum on “Ecosystems, Energy, and Oil.”

In its spiral form, a teaching team within schools or informal educators at learning centers can implement the curriculum year by year, building upon previous years’ lessons. On the other hand, most activities were designed with a broad audience age-range in mind. All lessons have the target age-range listed, and many include suggestions for adjusting the lesson for older or younger students. This allows educators to link 5-10 lessons together to create a cohesive unit plan for use during a single school year or quarter. The “Ecosystems and Oil Pollution” track is particularly easy to split into an elementary unit on ecosystems and a middle/high school unit on the effects of oil pollution on ecosystems.

Please bear in mind when choosing lessons for your students: this curriculum was created specifically for students that have no firsthand experience with oil spills. For this reason, great care was taken to ensure the activities were age-appropriate and would not induce undue fear in students. The lessons for younger ages begin with simple understanding and appreciation of ecosystems and energy. The potentially frightening topics related to oil spills should not be introduced until students are a bit older. However, in an unfortunate situation where students are directly affected by an oil spill, some of the activities designed for older students may be appropriate to help younger students process and understand what is unfolding around them.

Track 1: Ecosystems & Oil Pollution

Grades K-2

Sensory Exploration of Natural World

Ocean Literacy Principle: The ocean supports a great diversity of life and ecosystems.

- Micro Hike
- Meet a Tree
- Natural Object Memory
- Touch/Smell/Taste Test



Title: Micro Hike

Adapted from *4-H Earth Connections*, by permission of the University of Maine Extension Services.

Theme: You can find living things of all sizes if you look closely.

Objectives:

- Students will build a miniature nature trail to highlight interesting living organisms.
- Students will understand that shelter, space, air, and water are essential to living organisms of all sizes

Duration: 45-60 minutes

Age Range: Kindergarten-6th Grade

Materials:

- one 20 foot length of string or yarn for every 2 students
- 8 popsicle sticks for every 2 students
- Scratch paper
- 1 magnifying glass or bug cube for every 2 students
- Magic Dust pouch (optional)

Background:

This activity is meant to encourage students to look closely at the environment around them, increasing their awareness and perception of the natural world. By gaining personal experience of the diversity of living things in an area, students will be prepared for future lessons about ecosystems and environmental effects of oil spills.

Preparation:

When looking for a suitable site, choose one with a diversity of ground cover, but avoid areas of thick or dangerous vegetation. Prepare sets of 20-foot sections of yarn and popsicle sticks for every two students.

Introduction:

Have the student sit near the micro-hike site and think about some of the smallest organisms they have seen. Then, have them imagine what the world would look

like if they were the size of those animals, less than an inch tall. Ask students how big their school, house, and parents would seem.

Activities & Procedures:

Explain that there are many creatures and plants that are less than an inch tall. Ask the students to find one from where they are sitting. Share some of the findings. Explain that they are going to have a chance to discover and explore an uncharted section of the miniature natural world.

If you'd like, bring out your special "Magic Dust" pouch and explain that the magical dust will make them all small. Quietly tell the children to lie back and close their eyes (the dust will not work if they peek). Use guided imagery or a short fantasy trip to bring the children into the miniature world. As you spread the dust on them, speak quietly and slowly. Explain that they are getting smaller and smaller. Use your creativity to set the scene.

Have students open their eyes and slowly examine the ground. Ask them what kinds of plants and animals they can see now. Slowly crawl to the micro-hike site, preparing the children for observing closely.

Ask the students if they've ever been on a nature trail and ask them to describe it. Explain that they are going to build a nature trail to mark all of the interesting miniature things they discover. Provide a few examples of possible stops along the trail (broken egg shells, ants, beetles, colored sand grains, plant sprouts, etc.)

Divide the naturalists into pairs and give each group a string (to create the nature path), popsicle sticks (for trail markers), and a magnifying glass (to look more closely). Explain that the magnifying glass is a special scientific tool for looking closely and needs to be treated carefully. Set a 40-yard radius boundary and set each group out on hands and knees to create their trail. As they work, crawl around and check in with each group to make sure they understand the concept and encourage students to come up with a catchy name for their trail (i.e. The Great Ant Parade).

Give students about 15 minutes for trail making, reminding them throughout that they are very small. Then, have each pair lead the group down their trail on hands and knees, interpreting points of interest.

Wrap-up:

Tell the students that at the snap of your fingers they will suddenly return to full size. Briefly review the discoveries of the micro-trails. Make a list of all the plants and animals found along the trails. Ask students what these plants and animals need to survive (food or sunlight, water, air, shelter, space.) Ask students to brainstorm how these organisms get these necessities. Have students think about

what survival needs might be hardest for these organisms to find in this area and then have them “help out” a plant or animal by giving a plant a few drops of water or placing a tiny bit of water near, but not on, an animal.

Note: This activity can be adapted for older elementary students by having them write and illustrate a trail guide for their nature hike.

Evaluation:

Crawl around and observe students during the planning process of their trail. Assess student understanding, cooperation, and participation during trail presentations.

Micro Hike Standards

Science As Inquiry and Process: Students develop an understanding of the processes and applications of scientific inquiry.

SA1

Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments

The student demonstrates an understanding of the processes of science by:

[3] SA1.2 observing and describing the student's own world to answer simple questions

[4] SA1.2 observing, measuring, and collecting data from explorations and using this information to classify, predict, and communicate

Concepts of Life Science: Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.

SC2

Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by:

[3] SC2.2 observing and comparing external features of plants and of animals that may help them grow, survive, and reproduce

History and Nature of Science: Students develop an understanding of the history and nature of science.

SG4

Students develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.

The student demonstrates an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base by:

[3] SG4.1 asking questions about the natural world



Title: Meet A Tree

Adapted from *Glacier Teacher's Guide: Glacier National Park*, National Park Service.

Theme: It is important to use all of your senses when observing the natural world.

Objectives:

- Students will use senses other than sight to observe, describe, and recognize a tree.
- Students will become familiar with differences and similarities between trees.

Duration: 30-45 minutes

Age Range: Kindergarten-8th Grade

Materials:

- Blindfolds (1 per student)
- Scratch paper (optional)
- Pencils (optional)

Background:

This activity is meant to foster sensory exploration of the natural world and encourage students to use all of their senses to increase their awareness of the environments around them. By gaining hands-on experience with natural objects, students will be prepared for future lessons about ecosystems and habitats.

Preparation:

Choose an area with a diversity of trees and few or no hazards (large roots, holes, etc.)

Introduction:

Ask students to think about their favorite tree. It could be a type of tree (i.e. apple tree if they love to eat apples), a specific living tree (i.e. their favorite climbing tree), or a tree from a movie or book. Have students describe their tree to the group. You may also choose to have them quickly sketch their tree. Ask students to think about what that tree feels, smells, sounds, and maybe even tastes like – not only what it looks like. Explain that sight is only one of our senses and it is important to use other senses when observing nature.

Activities & Procedures:

Have students sit in a circle. Explain to students that they are going to explore a new tree today and that you are going to test how well they can examine a tree without their sense of sight. Choose a volunteer and demonstrate how you will lead blindfolded students carefully to their trees. With the volunteer, show the students how to carefully and slowly move about a tree, always keeping one hand on its trunk. Remind students to touch the tree, smell the tree, listen to the sounds of the tree and surrounding area. This will only be possible if students remain quiet throughout the whole activity. Tell students that when they have memorized the feel, smell, and sounds of their tree, they will need to sit quietly at the base of the tree with their blindfold on and think of a descriptive name for their tree (i.e. Fuzzy Bark).

Once you have given the above directions and addressed any student questions or concerns, have all students put on blindfolds; check the blindfolds to make sure they are secure and comfortable. Carefully lead each student to a tree. This activity will be easier for the students if you lead them to unique trees – multiple trunks, mossy spots, exposed roots, holes in the trunk, skinny trunks, wide trunks, etc. Place each student's hands on his or her tree and warn him or her of any hazards like low-hanging branches. Remind students to stay quiet, keep their blindfolds on, and memorize the details of the tree, and that when they are done they should quietly sit at the base of the tree and think of a name for it. Give students a few minutes to sit at the trunk before carefully bringing them back to your beginning circle. Once all students have returned have them remove their blindfolds.

(Note: If the group can handle it, you can expedite the activity by having students work in partners. Have each group designate "Partner A" and "Partner B." Instruct all of the Partner B students to put on their blindfolds and all of the Partner A students to carefully lead their Partner B to a tree. At this point, all of the Partner B's will be quietly observing their trees. Partner A's should then put on their blindfolds and you will carefully need to lead them to their own trees. Once this is complete, you can start bringing Partner B's back to the beginning circle and then bring Partner A's back.)

Send students back out to find their tree. Give hints to students that are having trouble. Ask students to make sure it is their tree by sitting in the same spot against the trunk – does it feel, smell, and sound right? Confirm that all students have found their tree, and then assign students to partners or small groups. Each group should tour the trees in their group, with each student describing his or her tree, pointing out special aspects of it, showing where he or she sat, and explaining the tree's name.

Wrap-up:

Have students share what they noticed about the forest and individual trees when they were blindfolded. Ask them to explain how senses other than sight helped them to understand their tree. Talk about how trees are different based on type of tree, age, where it is living, what is eating it, etc.

Evaluation:

Use student observations of their trees as a formative assessment. Note student behavior during the activity to assess their following of directions.

Meet A Tree

Science As Inquiry and Process: Students develop an understanding of the processes and applications of scientific inquiry.

SA1

Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments

The student demonstrates an understanding of the processes of science by:

[3] SA1.2 observing and describing the student's own world to answer simple questions

SA2

Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by:

[3] SA2.1 answering "how do you know?" questions with reasonable answers

History and Nature of Science: Students develop an understanding of the history and nature of science.

SG4

Students develop an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base.

The student demonstrates an understanding that advancements in science depend on curiosity, creativity, imagination, and a broad knowledge base by:

[3] SG4.1 asking questions about the natural world



Title: Natural Object Memory

By Katie Gavenus, Children of the Spills, <http://childrenofthespills.org>.

Theme: Diverse plant parts and objects are part of the natural world.

Objectives:

- Students will recognize that there is a wide variety of things that can be found in nature.
- Students will learn the purpose of different objects in nature.

Duration: 10-20 minutes

Age Range: Kindergarten-8th Grade

Materials:

- piece of fabric or bandana
- 5 unique natural objects
- tarp or large, shallow box (if indoors)
- 5-10 natural objects per student (if indoors)

Background:

This activity has students look closely at objects from the natural world, increasing their awareness of the variety that exists in nature. This will help to prepare them for future learning about ecosystems.

Preparation:

It is easiest to conduct this activity in an outdoor place with easy, safe access to a variety of natural objects (leaves, seeds, rocks, shells, flowers, etc.) Open forests and beaches work very well.

If you choose to conduct it indoors, you will need to collect a large number of natural objects. Students are going to try to match the 5 objects you reveal, so if you are going to reveal a clamshell, it is best to have at least one clamshell per student in your collection. Also include objects that are somewhat similar to what you reveal. For example, if you will be revealing a clamshell, you may also want to add some mussel shells, egg shells, or other objects similar to clam shells to the collection. Your goal is to make sure that every student could find objects to match your 5 teacher objects but that there are some other objects in the mix to keep it interesting. Spread these objects on the tarp or large shallow box. Secretly place

your 5 objects underneath a piece of fabric at the front of the class. If you are not familiar with your objects, use books or the internet to learn more about them.

Introduction:

Have students brainstorm some of the coolest objects they have found in nature. Ask them if they have gone beachcombing before, or looked for leaves in the forest in fall.

Activities & Procedures:

Tell your students that you have gathered 5 very special natural objects. You will reveal these objects for a few brief seconds (5-15 seconds works well, depending on your group), and then they will set out to find similar objects, one for each of the 5 shown. They will have two minutes to look for these objects in nature if you are outside or one minute to look for it on the tarp if you are inside. Be sure to warn them of any hazards, like not picking stinging plants, etc.

With a great flourish, pull back the piece of fabric and reveal the natural objects for the designated length of time. Ensure all students are able to see before you recover the objects. Send students out to collect objects as similar to yours as possible.

Once students have finished collecting their 5 objects, have each student sit in a circle around you with his or her natural objects arranged in front of the student.

Dramatically pull one object at a time out from under the fabric. Hold it up for everyone to see, and have students hold up their parallel objects. Explain how you can identify the object (i.e. it is white and chalky, curved, with ridges on the outside), what it is used for (i.e. this shell keeps clams protected from waves, drying out, and getting eaten) and how it came to be (i.e. this shell was created by the clam). Identify and describe some of the other objects students found that didn't quite match yours. Then pull out and discuss the second object. Repeat this process until you have revealed all five of your objects.

Wrap-up:

Discuss with students how there are many similarities and differences in nature. Some parts of plants or animals may look very different but exist for the same purpose (i.e. leaves & needles, cones & acorns, different types of shells, etc.) and some parts may look very similar but have different purposes (i.e. ferns & feathers, acorns & shells, etc.)

Evaluation:

Use student observations of their objects as a formative assessment. Note student behavior during the activity to assess their following of directions.

Object Memory Standards

Concepts of Life Science: Students develop an understanding of the concepts, models, theories, facts, evidence, systems, and processes of life science.

SC1

Students develop an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution.

The student demonstrates an understanding of how science explains changes in life forms over time, including genetics, heredity, the process of natural selection, and biological evolution by:

[3] SC1.1 sorting Alaskan plants and/or animals using physical characteristics (e.g., leaves, beaks)

[3] SC1.2 describing how some traits (e.g., claws, teeth, camouflage) of living organisms have helped them survive as a species

SC2

Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by:

[3] SC2.1 sorting animals and plants into groups based on appearance and behaviors

[3] SC2.2 observing and comparing external features of plants and of animals that may help them grow, survive, and reproduce



Title: Touch/Smell/Taste Test

By Katie Gavenus, Children of the Spills, <http://childrenofthespills.org>.

Theme: All five human senses are important in observing nature.

Objectives:

- Students will use senses other than sight to observe natural objects.
- Students will become familiar with differences and similarities between natural objects.

Duration: 10-30 minutes

Age Range: Kindergarten-6th Grade

Materials:

- 3-5 cloth bags
- 3-5 natural objects to feel (shells, fur, feathers, etc.)
- 3-5 small, opaque containers (film canisters work well)
- 3-5 natural objects to smell (spruce needles, soil, algae etc.)
- Blindfolds (1 per student)
- 3-5 natural objects to taste (mint, spruce needles, berries, etc.)

Background:

This activity is meant to foster sensory exploration in a classroom environment when outside exploration is not possible. It works well in conjunction with outdoor activities.

Preparation:

Place one "feely object" in each of the cloth bags. Place one "smelly object" in each of the opaque containers. Keep the "tasty objects" hidden for now. Check student allergies to make sure that the "tasty objects" are okay for the students to consume.

Introduction:

Tell the story of the elephant in the dark, based on an ancient Indian parable and widely adapted throughout the world. An elephant was brought into a dark room and a group of people that had never seen or experienced an elephant before were brought in to describe it. The person who touched the elephant's tail described the creature as a rope. The person who touched the elephant's leg said it was like a

pillar. The one who touched the trunk described a tree branch. The one who felt the elephant's ear thought of it as a fan, and the one who touched the tusk described the elephant as a water pipe. Explain how everyone will have a different understanding of an object depending on his or her own observations, and that it is important to use many senses when exploring nature. The more senses a person uses, the more they will discover in the natural world.

Activities & Procedures:

Begin with the feely bags. Have all students sit in a circle. Before you pass around the first bag, ask students to use their sense of touch to observe the object in the bag. They should not look into the bag, and should keep their observations to themselves rather than saying anything out loud as the bag goes around. Once the bag has been passed completely around the circle, ask the students to describe – not identify – the feel of the object with one word. Students can share their descriptive words one at a time or everyone can say it at the same time. Reveal the object to the group and pass it around. Ask students if it feels different once they can see it. Pass around the remaining 2-4 bags.

Move on to the smellies. Have students sit or stand in a circle. Remind students not to look in the canisters (you may want to poke holes in the tops so you can leave them on and reduce the temptation to peek) and to make their observations silently. Pass the first smelly around. Once it has gone all the way around the circle, have students share a descriptive word about the smell. Reveal the object to the world and pass it around. Ask students if it smells different now that they can feel and see it. Pass around the remaining 2-4 smellies.

End with the taste test. Have students wash their hands. Sit in a circle. Explain that they do not have to taste anything that they don't want to, but that everything is safe to eat. Have each student put on a blindfold. Give each student a sample of the first food to taste; ask them to think, without speaking, of a word to describe the taste of the food. Then have the group share their descriptions. Tell the students what the food is. Continue with 2-4 more things to taste.

Wrap-up:

Asks students if they were surprised by the taste, smell, or feel of anything. Remind them how important it is to use all of their senses when observing the natural world. Give examples of how senses are important to understanding the whole picture – the sound of birds calling, the smell of sap from a freshly cut tree, the feel of spongy ground beneath your feet.

If you would like to include sensory exploration of hearing, ask students to construct a "sound map." This activity works best outdoors, but can be conducted in a classroom as well. Spread students out as much as feasible and have them sit quietly with an index card and pencil. Instruct students to put an "x" in the middle

of the card to represent themselves and mark the sounds they hear on their map over the next 2-3 minutes. Each student should use their own symbols (exclamation point, bird, star, etc.) to mark the sounds on the map, arranged around the "x" based on the location of the sound relative to the student. If a similar sound is heard from different directions, the student should use the same symbol in both locations. Ask students to share their sound maps at the end.

Evaluation:

Use student sensory observations as a formative assessment. Note student behavior during the activity to assess their following of directions.

Sense Test Standards

Science As Inquiry and Process: Students develop an understanding of the processes and applications of scientific inquiry.

SA1

Students develop an understanding of the processes of science used to investigate problems, design and conduct repeatable scientific investigations, and defend scientific arguments

The student demonstrates an understanding of the processes of science by:

[3] SA1.2 observing and describing the student's own world to answer simple questions

SA2

Students develop an understanding that the processes of science require integrity, logical reasoning, skepticism, openness, communication, and peer review.

The student demonstrates an understanding of the attitudes and approaches to scientific inquiry by:

[3] SA2.1 answering "how do you know?" questions with reasonable answers