Upham Woods
4-H Environmental Education Center

Tree Friends

Program Purpose
The purpose of this program is to introduce students to tree structure and use.

Length of Program
1 - 1½ hours

Age
Grades 2nd – 5th

Maximum Number of Participants
20

Objectives
After completion of all activities, students will be able to:

- Identify their special tree using all senses other than sight.
- Compare and contrast the value of a standing tree to a harvested tree.
- Identify six different internal parts within a cross section of tree trunk (bark, phloem, xylem, cambium, heartwood, and roots).
- Compare and contrast a fictional story of tree use to actual tree use
- Explore their feelings and values related to trees and tree use.

Preparation
Before the class arrives:

- Obtain "Tree Friends" kit from the storage room.
- Make sure exhibit room ("Tree of Life") is available.

Basic Outline
I. Introduction *(5 minutes)*
II. "Meet-A-Tree" *(15-20 minutes)*
III. "Tree Factory" *(25 minutes)*
IV. Exploring the "Tree of Life" (5-10 minutes)
V. Reading of *The Lorax (15 minutes)*
VI. Discussion & Conclusion *(5-15 minutes)*

Materials
10 Blindfolds
Nametags for "Tree Factory"
Triangular tree cookie exhibit
The Lorax book, video or slide show
3 different noisemakers

Introduction
Introduce yourself and the class. Briefly overview the activities of the class: Meeting your own personal tree friend, learning the internal parts of a tree and becoming a functioning tree factory, and hearing a fun story about the importance of trees, followed by a discussion of your own feelings and values towards trees.

"Meet-A-Tree"
This activity can be conducted from the sandlot, but may also be used as a trail activity (try to pick a spot with a diverse stand of trees). Pair up students and hand each pair one blindfold (in the winter, hats and scarves may be used). The seeing partners will carefully guide their blindfolded partners to any tree. Once there, the blindfolded partner should explore the tree as completely as possible, using all senses except sight. Encourage the students to feel the bark and try to put their arms around the tree. Reach high for the lowest branch (can they touch any leaves?) and crouch low to explore the roots. Is there moss or lichen growing on the trunk of the tree? Can they feel any insects on the tree or holes where insects might live? What does their tree smell (taste?) like? They can even name their tree. When the blindfolded partners are sufficiently acquainted with

their trees, the seeing partners should lead them back to the starting point, remove the blindfold, and challenge their partners to find their trees again. The students can play "warmer or colder" if their partners need help. Once the trees have been successfully found, the partners switch.

When everyone has finished, students may share the names of their trees. Ask what value do their trees have in the forest?

- Provides shade in summer for people and animals
- Provides shelter and homes for insects, birds, and animals
- Provides food for insects, birds, and animals
- Creates oxygen
- Absorbs carbon dioxide, a greenhouse gas
- Holds soil to prevent erosion
- Trees that drop their leaves add fertilizer to the soil
- A tree left standing can continue to grow to be harvested at a later date

What value do their trees have if harvested?

- Wood can be burned for warmth and light
- Wood can be made into paper, furniture, and lumber

How would the students feel if they knew their trees would be cut down? How would they feel if their trees were do die naturally and tip over? What value does a dead or rotting tree have in the forest?

- Provides shelter and homes for microorganisms, insects, birds, and animals
- Adds fertilizer to the soil as the wood decays

After this activity, students should understand that trees, living or dead, standing or harvested, have many different uses.

"Tree Factory"
Remain in the sandlot for this activity. Introduce the concept of a cross section of wood, and show the tree cookies as an example. Tell the students that in the next 20 minutes, we will magically become a fully functioning cross section of tree, complete with all the parts. Each student will play a role and receive a nametag. Each role has a different sound and action to make. Explain that we will start in the center of the tree and work our way out. (Numbers of students playing each role will vary with the size of the group.)

Heartwood (1 person)
The heartwood supports the tree and is made up of dead xylem cells. A tree that has had its heartwood hollowed out by insects or disease may bend and break during high winds.
ACTION: Stand in the center of the circle and beat chest. Look tough and strong.
SOUND: "Boom boom, boom boom…" (heart beating)

Roots (2 people)
The roots take up water, minerals, and nutrients from the soil. They also help to hold the tree in place by firmly holding onto the soil.
ACTION: Sit at the feet of the heartwood, on opposite sides. Pump knees up and down. Look thirsty.
SOUND: Slurping noises

Xylem (3 people)
The xylem transports water, nutrients, and minerals from the roots to all parts of the tree. The xylem also makes up the bulk of the trunk of the tree. Dead xylem becomes heartwood. Living xylem is also called *sapwood.*

ACTION: Form a ring holding hands around the heartwood (may have to straddle the roots). Still holding hands, crouch down and make the sound while standing up.
SOUND: Musical "xylem" climbing note

Cambium (4 people)
The cambium is a single layer of cells that produce new xylem and phloem cells.
ACTION: Form a ring around the xylem, but don't hold hands. Wiggle butts while making the sound.
SOUND: Chant: "We make cells!"

Phloem (5 people)
The phloem transports the sap made in the leaves to all parts of the tree, including the roots. It also transports sap up from winter storage in the roots to the buds in the spring so new growth can occur. Dead phloem becomes part of the outer bark. Living phloem is also called *inner bark.*
ACTION: Form a ring around the cambium, holding hands. Make sound while crouching down.
SOUND: Musical "phloem" descending note

Bark (remaining students, minus 1, and adults)
The bark protects the tree from invading diseases and insects. Dead phloem cells become bark.
ACTION: Form a ring around the phloem, holding hands.
SOUND: Chant: "We protect, *arf!*"

Before you bestow the final role on the last student, take the tree through the four seasons. (Make sure to tell the last student that you have a very special role that you are saving for him/her.)

Spring: The tree factory comes to life, very slowly. Each person makes the appropriate sounds and actions in slow motion.
Summer: The tree factory is in full swing! Everyone plays their roles loudly and vigorously.
Fall: The tree factory slows down again. Each person makes the appropriate sounds and actions in slow motion.
Winter: The tree factory is dormant. No one moves or makes a sound.

Instruct the tree factory through 1 ½ cycles, to the second summer. Then introduce the final role:

Wood boring beetle (1 person)
Many insects, including this one, attempt to burrow into trees to eat the sap, lay eggs, and make a home inside the tree. Once holes are made, they become entry points for disease and other insects.
ACTION: Attack the tree to reach the heartwood. Attempt to find a weakness in the bark and enter the tree.
SOUND: Gnawing sound

Exploring the "Tree of Life"
Head to the exhibit room in the nature center. Have the students take off their shoes before entering the "Tree of Life." Before you allow them to enter, tell them to look for a particular poster inside the tree which will show the locations of all internal parts of a tree on a cross-section, or tree cookie. Tell them they will have a test after they are done exploring. Give them about 5-10 minutes inside the "Tree of Life." (This is also a good time for the instructor to take a break.)
Call the group back together. Roll out the triangular tree cookie exhibit. As an assessment, ask the students to form a ring around the triangular exhibit and point to the different internal parts of the tree cookies as you list them. For example, "Everyone please point to where you think the xylem is on any tree cookie." Walk around to check if students are pointing correctly. After you

have listed off all the internal parts of the tree, ask the students to find insect damage on a tree cookie. After the assessment, have all the students sit on one side of the exhibit and show them the correct positions of the internal parts on several tree cookies. This is also a good time to talk about the process of **girdling** trees. Girdling occurs when an animal or person removes the outer layers of the woody stem, including the bark, phloem, and perhaps cambium. When a ring of tissues is stripped off from the entire circumference of the tree, the phloem can no longer conduct sap down to the roots, and the tree will die. Once students know the position of phloem (right underneath the bark), it should become clear why girdling can cause tremendous damage to trees.

Reading of *The Lorax* (or showing the video or slide show)

Have the students sit in a semicircle on the floor while you read *The Lorax* or show the video or slide show. If at least 30 minutes remain in the class, ask students if they would like to take turns reading. You can also ask the teacher or a parent chaperone if they would like to read. A fun adaptation to add is to assign roles to different students. The Lorax character stands with a fist in the air and says, "I speak for the trees!" Give different noise makers to the Swomee-Swans, Brown Bar-ba-loots, and Humming-Fish. Afterwards, use the following discussion questions to help students explore how the characters in this fictional story are similar to and different from us.

1. Why did the Onceler cut down the truffula trees?
2. Are thneeds good?
3. Did the others in the story care that the truffula trees were disappearing?
4. Who valued the thneeds?
5. Who suffered as a result of thneed production?
6. Did the Onceler care about the negative side effects of thneed production?
7. What happens to the Onceler after the last truffula tree is cut down?
8. What should the Onceler have done differently, if anything?
9. What should the consumers of the thneeds have done differently, if anything?
10. What are our 'thneeds'?
11. Are you a Onceler in any way?
12. Are you like the Lorax in any way?
13. What other things have no tongues, like the truffula trees? Would you speak for them?

Conclusion

If time permits, review questions can be used as the end to once again reemphasize the knowledge covered in this lesson.

REFERENCES

Cornell, Joseph. *Sharing Nature with Children,* Nevada City: Dawn Publications, 1979, pgs. 26-27.

Wolf Ridge "Forest Ecology" lesson plan.