Ex-Tree-mely Important Lessons on Tree Identification
By Beth Rittenberg

Target Audience: 6th grade science students.

Unit Overview
This unit is part of an intensive study of the Cass River that runs through our community and is part of the Saginaw Bay Watershed. In this component of our study we will be identifying the types of trees that line the Cass River in our community. Students will learn to identify, measure diameter, height of trees and make observations about the undergrowth. Students will draw correlations between what grows in the riparian zone and how it has a direct affect on the health of the river. Students will be able to identify the impact humans have on the environment around us.

Sources Consulted

Koch, Rita “Tree, Plant, Shrub and Herbaceous Plant ID and Characteristics.” Lab and lecture from Forest Ecology and Resources Teacher Institute, Michigan Technological University, June 28, 2010


Michigan Grade Level Expectations
S.IP.06.11 Generate scientific questions based on observations, investigations, and research.

S.IP.0616 Construct charts and graphs from data and observations.

S.IA.06.13 Communicate and defend finding of observations and investigations using evidence.

L.EC.06.31 Identify the biotic and abiotic components of an ecosystem.

L.EC06.32 Identify the factors in an ecosystem that influence changes in population size.

L.EC.06.41 Describe how human beings are part of the ecosystem of the Earth and that human activity can purposefully, or accidentally, alter the balance in ecosystems.

L.EC.06.42 Predict possible consequences of overpopulation of organisms, including humans, (for example: species extinction, resource depletion, climate change, pollution.

L.EC.06.11 Identify and describe examples of populations, communities, and ecosystems including the Great Lakes region.
Lesson One-Tree Characteristics

Time: 1 class period (50 min.)
Materials: 5x7 Spiral bound notebook (science journal), pencil

This lesson will take place outside at the tree line in the back of our school playground. I will take the students on a walk and stop at the following types of trees:
- White Oak
- Sugar Maple
- Red Maple
- White Ash
- Honey Locust
- Beech
- Choke Cherry
- White Spruce

As we are walking I will point out various characteristics of the tree, such as: leaf or needle type, leaf attachment, leaf shape, bark, and seed. As we stop at different trees students will take notes in their science journals. They may want to take a leaf to press into their notebooks for future reference.

Vocabulary introduced: Simple, Lobed, Compound, Single, Clustered, Scaly, Simple Opposite, Lobed Opposite, Simple Alternate, Lobed Alternate, Compound Alternate, Compound Opposite, Conifer, Deciduous

GLCE:
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L.EC.06.31 Identify the biotic and abiotic components of an ecosystem.
S.IP.0616 Construct charts and graphs from data and observations

Lesson Two- Use of a Dichotomous Key to identify trees

Time: 1 class period (50 minutes)
Materials: 5x7 spiral bound notebook (science journal), pencil, Trees of Michigan Field Guide.

The purpose of this lesson is to teach students to use a dichotomous key.

1. As a class, we will identify a tree together using the dichotomous key that is located in the front of the field guides students will be using. The purpose of doing this together is to show students how to use the key and the field guide in general.
2. Students working in partners will practice indentifying trees in our playground area.
3. After groups have identified a tree, we will meet as a whole group again and have groups present their “tree” and tell what characteristics they used to identify the tree.
4. Formative assessment: Did each group give evidence for their identification of a tree? Was the identification correct?
Sources: Koch, Rita “Tree, Plant, Shrub and Herbaceous Plant ID and Characteristics.” Lab and lecture from Forest Ecology and Resources Teacher Institute, Michigan Technological University, June 28, 2010


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Day Three-Identification of Trees on Vassar’s Rail Trail, along the Cass River

Time: 1 class period (50 minutes)
Materials: Spiral notebook, pencil, Trees of Michigan Field Guides

Armed with their field guides and science journals students have been collecting data in, we will take a walk on the rail trail. Working in pairs, students will complete the Tree Scavenger Hunt.

Formative Assessment will be the completion of the scavenger hunt.

Source: Scavenger Hunt by Darrell Hendrickson, Washington Middle School, Calumet School

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Day Four-Every Tree for Itself

Time: 1 class period (50 minutes)
Materials: 12 tree cookies (1 per group of 3), 25 paper plates, pieces of blue, yellow, green paper cut-up or poker chips, markers

The purpose of this lesson is to simulate how trees compete for their essential needs. Students will describe how varying amounts of light, water, and nutrients affect a tree’s growth.

Procedure:
1. Distribute real tree slices and compare the width of the rings.
2. Distribute paper plates and draw their age in growth rings on the plate.
3. Have students stand on their tree rings, (plates), about 3’ from each other.
4. Ask students, “What do trees need to grow?”
5. Spread colored paper around “trees” so that it’s 1-2 feet apart. Blue=water, Yellow=sun, and green = nutrients.
6. First round (30 seconds), students use their roots (legs), branches (arms), to gather what they need to survive. One foot must always stay “planted” on their plate.
7. Students record each colored they collected at the end of 30 seconds.
8. Discuss with students:
   Did they get all the requirements they needed?
   What happens to a tree if it does not get all it requires?
   What causes too much or too little of a requirement to be available?
9. Rearrange into groups of 3-5 trees. Repeat activity.
   How are the results different? Why?
   Did any trees die? Does this happen in nature?
10. Discuss- How do foresters use their knowledge of competition in forest management?
    Modification:
    Use fewer blue pieces of paper-Drought
    Use fewer yellow pieces of paper-Shading
    Use fewer green pieces of paper-Poor soil quality
10. Formative assessment-Have students draw a cross-section of a tree that shows 10 years of growth and varying growing conditions for each of the years. Students then list the conditions that are represented in the rings drawn, such as drought, competition, fire, cool spring and summer, insect infestation, abundance or lack of basic needs, forest thinning, and animal damage.


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L.EC.06.42 Predict possible consequences of overpopulation of organisms, including humans, (for example: species extinction, resource depletion, climate change, pollution.

Day Five-Structure of a Tree

Time: 1 class period (50 minutes)
Materials: Tree Factory cards, paper sack, tape, yarn or string, 30 slips of paper

The purpose of this lesson is help students understand the structure of a tree and how different parts of a tree help the tree function.

Vocabulary: Heartwood, Xylem, Cambium, Phloem, Bark, Roots, Leaves, Photosynthesis, stomata

Preparation:
1. Write the following parts of a tree on separate slips of paper and put them in a sack.
   Heartwood (1) Xylem (3)
   Lateral Roots (3) Cambium (5)
   Phloem (6) Bark (8)
   Leaves (4)
2. Make four branches for your tree by cutting yarn or string into four 6-foot lengths.
3. Find a large open area where students can build the tree.

Activity:
1. Ask students what people need to survive. Identify parts of the body that help provide those basic needs (for example, nose to breathe, mouth to eat). Explain that trees are like people in many ways.
2. Ask students to think about trees and what they need to survive. List the ideas on the board. When students have completed the list ask them how the tree gets these things, especially since trees can’t move around the way animals can. For example, ask students how a tree gets the water it needs.
   Where does the water come from?
   How does the water get to the tree?
   How does the water get to all the parts of the tree?
   How does the tree get the food it needs?
   How does a tree keep from blowing over in the wind?
3. Tell students that they are going to create a tree by acting out the tree parts they just discussed. Have each student pick one slip of paper from the sack to find out what role to play in the tree. Take students to a place with lots of space to build the tree.
4. Ask students what part of the tree transports water to all the parts of the tree. (xylem) Have the xylem students join hands to form a small circle around the heartwood. Have these students chant, “Gurgle, slurp. Gurgle, slurp. Transport water,” as they raise their hands up and down.
5. Ask students where the water in the xylem comes from (it’s absorbed by the roots). Then have the taproot sit down with his or her back against the xylem, and have the lateral roots lie down on the ground with their feet toward the xylem and their arms and fingers spread out to represent root hairs. Have the roots make sucking noises.
6. Ask students where the water in the xylem travels (to the leaves). Then have the heartwood hold the ends of the four pieces of yarn. Give the other end of each piece of yarn to a different student that represents leaves. Ask the leaves what they do all day (make food through photosynthesis). Have the leaves flutter their hands and chant, “We make food; We make food.”
7. Ask the leaves what happens to all the food they make using sunlight, air, and water. (It gets transported to the rest of the tree.) ask everyone what part of the tree transports the food from the leaves to the rest of the tree. (phloem) Have the phloem students join hands and form a large circle around the tree. Then have them simulate the role of the phloem by reaching above their heads and grabbing (for food,) and then squatting and opening their hands (releasing the food) while chanting, “Food to the tree!”
8. Ask students if they have left out any important part of the tree. What layer produces new xylem and phloem to keep the tree growing healthy? (cambium) Have the cambium students form a circle between the xylem and the phloem. Tell them to sway from side to side and chant, “New phloem, xylem, and cambium. New phloem, xylem, and cambium.”
9. Ask students what the final component of their tree is missing—it’s something that
protects the tree. (bark) Have the students lock arms and form a circle that faces out from the center of the tree. Ask them to look tough. Have them march in place chanting, “We are bark. Please keep out.”

10. When the tree is completely assembled, have all the students act out and chant their parts simultaneously. End the session with the tree being so old it falls down (gently).

Formative assessment: After exploring how a tree works, have your students consider how they benefit from trees. Give students a blank piece of paper; have them draw a small tree in the center. Have students draw eight lines radiating from the tree like spokes on a wheel. On each line, have them write something the tree gives them (beauty, shade, apples, pencils, etc).


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Tree ID Scavenger Hunt

Two different tree species with opposite branching?
1) __________________________
2) __________________________

A tree with 5 needles per fascicle/bundle?
3) __________________________

A tree with 2 needles per fascicle/bundle?
4) __________________________

A conifer that loses its needles?
5) __________________________

A conifer that does not have a typical needle shape?
6) __________________________

Two deciduous trees with flaky bark. Circle the one that smells like wintergreen.
7) __________________________
8) __________________________

Two conifers that are good for deer? Why?
9) __________________________
10) __________________________

A deciduous tree with three buds on its terminal end.
11) __________________________

Find two different tree species with a 5-inch diameter, What are they?
12) __________________________
13) __________________________

Find 2 different tree species with a diameter larger than 12 inches?
14) __________________________
15) __________________________
Heartwood = Strength
- Stand tall and tighten muscles
- Chant: *I support! I support!*

Phloem = transports food from leaves to rest of tree
- Join hands and form large circle around tree. Reach above heads and grab for food from leaves.
- Chant: *Food to the tree! Food to the tree!*

Xylem (sapwood) = transports water and nutrients up from roots to leaves
- Join hands to form small circle around heartwood.
- Chant: *Gurgle, slurp! Gurgle, slurp!*

Cambium = thin layer of growing tissue that becomes new xylem, phloem or cambium to keep tree growing
- Form circle between phloem and heartwood. Sway from side to side.
- Chant: *New phloem, sapwood and cambium!*

Roots = absorbs water from soil for sapwood
- Lie down with feet next to sapwood. Fingers and hands spread out to represent root hairs.
- Make sucking noises!

Bark = protects the tree
- Lock arms around tree, and face outward. Look tough!
- Chant: *We are bark! Please keep out!*

Leaves = make food through photosynthesis
- Hold string attached to heartwood. Flutter hands.
- Chant: *we make food; we make food!*

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