Teaching With Trees

Using Schoolyard Trees to Teach Disciplinary Core Ideas

Bridget K. Booth
Middle School Science Teacher
MAEOE Board Member

What is MAEOE?

For more information on how to become a member, the Environmental Education Certification, EE Grants and more, visit our booth in the Exhibitor Hall!

www.maeoe.com
Why Do Trees Make Good Teachers?

“Trees are poems the Earth writes upon the sky.”
- Kahlil Gibran

- They are available
- They are inspirational
- They encourage fun
- They provide ongoing phenomena
- They are outside!

Studies Show...Smart Kids Learn Outdoors!

Students who play and learn in outdoor settings perform better on tests, have higher grade point averages (GPAs) and cause fewer classroom disruptions.
- Chawla & Escalante, 2007

Students attending schools that have developed outdoor learning opportunities “green school yards” were more enthusiastic and engaged in learning.
- Dymen J., 2005

Studies have shown that stress levels fall within minutes of seeing green spaces. Even a view of nature helps reduce stress in highly stressed children and increases attention capacity.
- Wells, N.M. & Evans, G.W., 2003

Spending time in the open air and learning outside increases students’ ability to think creatively and improves problem solving skills.
- Lieberman & Hoody, 1998

Michigan No Child Left Inside Coalition
Teaching Outdoors Creates Literate Citizens

Scientific
- The knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. It also includes specific types of abilities.

   National Academies

Environmental
- The knowledge of Michigan’s natural resources, the principles and systems that govern the natural world, and how human actions affect that natural world. This knowledge is used to identify and address environmental issues and work, both individually and collectively, toward environmental stewardship and healthy lifestyles.

   Michigan Environmental Literacy Plan

We NEED Literate Citizens

- Taken as a whole, the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time.

  - Intergovernmental Panel on Climate Change
Connecting to Place

- Find your trees – Schoolyard Walk
- Admire beauty - Sketch
- Acknowledge what trees teach – Advice from a Tree
- Observe with more than your eyes – Meet a Tree

Connecting to NGSS

- Observation prompts questions
- Modeling tree parts & function
- Data Collection/Analysis
- Sharing Results with school and scientific community
- Students become citizen scientists
Citizen Science Tool – Project Budburst

- Introduce Phenology
- Establish year-long data collection strategies
- Decide on observation protocol
- Prepare the notebook

“Keeping records enhances the pleasure of the search and the chance of finding order and meaning in these events.” - Aldo Leopold
Teach Disciplinary Core Ideas Through Phenology

Summer Phenomenon/Activity | DCI | Resources
--- | --- | ---
Tree Diversity - Identification Using Dichotomous Keys | Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. (MS-LS2-5) | Field Guides/Tree Finders Leafsnap App

The tree as a system | In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3) | Project Learning Tree – The Tree Factory

Plant cells Tabletop Cell Models | Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2) | Microscope Work Dr. Dave’s Teaching Manual – The Cell

Photosynthesis/Respiration - Air Cycle Relay | Some chemical reactions release energy, others store energy. (MS-PS1-6) Plants, algae, and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6) | Photosynthesis Minds on Activities and Labs – Serendip Studio
# Autumn

<table>
<thead>
<tr>
<th>Phenomenon/Activity</th>
<th>DCI</th>
<th>Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Monitor % color change</td>
<td>Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2), (MS-PS1-3), (MS-PS1-5)</td>
<td>Scientific American Find the Hidden Colors of Autumn Leaves</td>
</tr>
<tr>
<td>-Is color change a chemical reaction?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Explore pigments with chromatography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitor % leaf loss</td>
<td>Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)</td>
<td>Project Budburst – Phenology Defined</td>
</tr>
<tr>
<td>-What environmental factors contribute to leaf loss?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaf decomposition</td>
<td>Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)</td>
<td>The Green Team Compost Lesson</td>
</tr>
</tbody>
</table>

# Winter

<table>
<thead>
<tr>
<th>Phenomenon/Activity</th>
<th>DCI</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interdependency: Lookin’ for Lichen Tracking Activities</td>
<td>Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)</td>
<td>Science Friday Video – For the Love of Lichen</td>
</tr>
<tr>
<td>Food Webs Michigan Ecosystems</td>
<td>Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. (MS-LS2-3)</td>
<td>It’s All Connected Lesson - Michigan Environmental Education Curriculum Support- DEQ</td>
</tr>
<tr>
<td>Reading the Rings</td>
<td>Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)</td>
<td>Tree Rings: Living Records of Climate Activity - EPA</td>
</tr>
</tbody>
</table>
### Spring

<table>
<thead>
<tr>
<th>Phenomenon/Activity</th>
<th>DCI</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look for Buds!</td>
<td>The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)</td>
<td>Project Budburst</td>
</tr>
<tr>
<td>Submit Data to Budburst!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flowers and Fruit</td>
<td>Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4)</td>
<td>Flower Anatomy Diagram – Ask a Biologist</td>
</tr>
<tr>
<td>Seed Variety and Dispersal</td>
<td>In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)</td>
<td>Seed Dispersal – Trees for Life</td>
</tr>
<tr>
<td>Maple Seed Mix Up Game</td>
<td></td>
<td>Ranger Rick's Naturescope Series – Trees are Terrific!</td>
</tr>
</tbody>
</table>

### Share Data with School Community
Trees are good friends...

...don’t forget to celebrate them on Arbor Day!
Join us at the beautiful Kettunen Center, near Cadillac, for more environmental education activities!

Thank you for joining me today!

- Questions?
- Please feel free to contact me...
  Bridget Booth
  boothjb@gmail.com

“Trees are sanctuaries. Whoever knows how to speak to them, whoever knows how to listen to them, can learn the truth. They do not preach learning and precepts, they preach, undeterred by particulars, the ancient law of life.”
  - Hermann Hesse