

Growing Mathematical Success Through Nature-Based Mathematics 🌱

Emily Wang, Marta Raymond and Shannon Hill

What does the research say?

- Spending time outside can improve students' behaviour, sense of self, ability to deal with adversity and acquisition and application of knowledge (Flom, Hubbard, Johnson & Reidt, 2011)
- Learning math in and about nature helps students to understand practical implications of math and can reduce math anxiety (Din, 2016)
- Examining patterns in the natural environment provides knowledge of the connectivity of the world (Graham, 2014)

Today's world ... "requires the skills, knowledge, and perspectives to engage as an active, committed, and environmentally responsible citizen" (OME, 2007, p. 10).

"Teachers need to provide their students learning experiences that are genuine and lead to real and measurable improvements not only for their immediate community but hopefully for the larger community as well."
-Veronica Ingas, Canadian Journal of Native Education, Natural Curiosity

Challenges

Strategies



- Different students have different levels of comfort with being outside and handling animals
- Children are no longer connecting with the environment the way that they used to (Kemp, 2015).
- Many patterns in nature have such minute variations that students must have access to technology to count and recognize the patterns (Camazine, 2003)

- Have different roles for students that require varying levels of direct contact with nature (Brkich, Allen, Huffling, & Matthews, 2017)
- Spend time outdoors experiencing and exploring nature, including unstructured and spontaneous time in the outdoors (Kemp, 2015)
- Bring natural objects into the classroom for mathematical exploration to engage students' learning and when going outside is not an option

Adapted from "Environmental Education", Ontario Ministry of Education, 2017



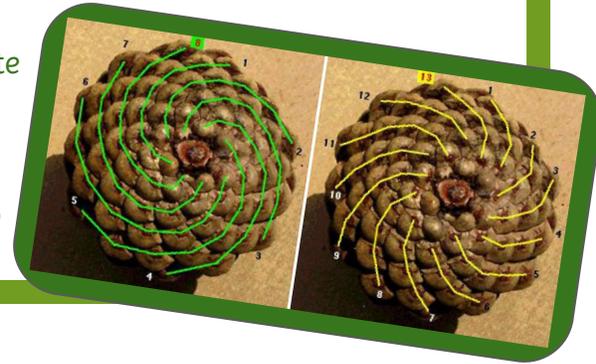
Incorporating Nature-Based Mathematics into your classroom!

Patterns in Nature

Activity for Junior

Have students investigate the relation between spirals of natural objects and the Fibonacci sequence (Garland, 1987). The fibonacci sequence is a series of numbers in which each number is the sum of the previous two numbers (1, 1, 2, 3, 5, 8, etc.)

1. Take students outside to collect pinecones and begin to explore the shapes and elements of pinecones.
2. Count the number of spirals going in one direction and record the number on chart paper.
3. Repeat by counting the amount of spirals that are going in the other direction. Have students record their answers on chart paper.
4. Read a book related to the Fibonacci sequence. Explicitly state the sequence as a class and have students compare their findings with the Fibonacci sequence.
5. Explore more pinecones, and other natural objects with spirals such as seeds in a sunflower, shells, and pinecones to continue their learning.



Measurement in Nature

Activity for Primary

Have students spend time in different areas in the city, a school yard, a street, or a park. Have them observe what they

notice in regards to the trees. The students can measure the circumference of the tree trunks.

1. Talk to students about having a consistent measurement. (For example make sure they measure the tree 1 metre above the ground.)
2. Measure the diameter of the tree trunk using a straight ruler.
3. Measure the circumference of the tree trunk.
4. Repeat steps 2 and 3 with other trees.
5. Students can collect data and record their questions.

Have a discussion with the students about their thoughts and observations.



Recommended Resources



For MORE activities, check out our link!
<https://goo.gl/QAP9YC>

