Stories of Climate Change Education

Toronto District School Board - Climate Literacy & Leadership Program 2026

Be[leaf] In Yourself!
Boosting Student Confidence through Interdisciplinary Inquiry

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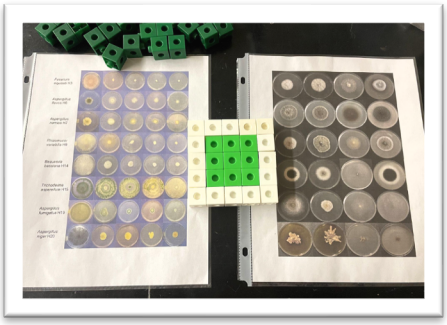
Grade 10 Math



Learning Outcomes:

Part 1 - Tkaronto Trees
Students will analyze systems of equations in the real world by researching the growth of a tree and writing an equation to represent the growth.

Part 2 - Quadratic Relations in Nature
Students will investigate and identify patterns in natural and scientific contexts by collecting data to determine if a relation is linear or non-linear and by using manipulatives to model quadratic relations.

Climate Concepts:

Multiple Ways of Knowing: Living systems respond to environmental conditions in patterned ways. Those patterns can be studied through both mathematics and local Indigenous knowledge systems to deepen ecological, cultural, and mathematical learning

Place-Based Learning: Starting with observations and direct interactions in local places enables students to make meaning of mathematical concepts as they relate to natural phenomena. Place-based learning provides opportunities to consider the relationships and responsibilities between humans and the more-than human world.

Holistic Learning: Engaging in inquiry-based, experiential, and interdisciplinary learning through embodied, sensory, and playful activities, moves climate education beyond cognitive understanding, fostering deeper connections and a stronger sense of agency.

Learning Activities:

Collaborative Inquiry Question: *How can inquiry-based and interdisciplinary learning support student confidence and creativity?*

Part 1 - Tkaronto Trees

- The activity was introduced through Birch Tree Knowledge video shared by Isaac Crosby, highlighting the significance of birch trees in the city of Toronto.

Part 1 - con't

- Students chose a tree from the City of Toronto Trees website and researched the growth rate and mature size of their chosen tree.
- After identifying the x and y variables for the linear system, they wrote an equation to represent the growth of their tree and graphed the line.
- Using information found on the City of Toronto Trees site, The Tree Atlas of Ontario, and the Greenbelt Indigenous Botanical Survey, students created a one-page visual report that included a picture of the tree, a physical description (leaves, bark, flowers, fruit, etc.), benefits and uses (wildlife and commercial), and interesting facts (Indigenous significance, interesting traits, etc.)

Part 2 - Quadratic Relations in Nature

- Quadratic relationships were introduced through an examination of various visuals including photos, diagrams, and graphs that depicted linear and non-linear patterns in nature.
- Students worked in small groups to complete 3 station activities set up around the classroom.

1. In the Palm of Your Hand - Investigate Non-Linear Relations

a) Students measured the length of their thumb and the area of their palm.
b) They graphed this data using a scatter plot and drew a curve of best fit.
c) This station also had various tree leaves and students were prompted to make observations about leaf shape, size, etc. in order to compare to their discovery regarding their hand measurements.

2. Mushroom Math - Quadratic Visual Patterns

a) Students were provided with information and images about fungal growth patterns.
b) They used math linking cubes to model the growth pattern of black mold.
c) Students were prompted to determine a mathematical rule that would help them make predictions about the fungal growth patterns (quadratic function).

3. Hop, Skip, Jump - Modelling Migration

a) Students considered what migration is and brainstormed what animals they know migrate.
b) Using wooden pattern blocks, students modelled how 2 species move between habitats.
c) Students were asked to look for a pattern between the number of animals on one side and the number of moves required and attempt to write an equation to model this pattern.

Lessons Learned:

- Challenging students to engage in higher-level thinking can encourage relationship building through collective struggle and cooperation.
- Drawing on previous knowledge and demonstrating to students what you think is cool can shift how students engage in learning.
- Real-life applications and hands-on learning create space for divergent thinking and universal design.

Key Resources:

1. Birch Tree Knowledge with Isaac Crosby, Ojibwe of Anderdon | https://youtu.be/qi6iWpE4_CE?si=vTFtsNOhPrkTeDXE
2. City of Toronto - Trees in Toronto: Species Planted on Street |https://www.toronto.ca/services-payments/water-environment/trees/tree-planting/species-planted-on-streets/
3. Everingham, Y.L., Gyuris, E., & Connolly, S.R. (2017). Enhancing student engagement to positively impact mathematics anxiety, confidence and achievement for interdisciplinary science subjects. International Journal of Mathematical Education in Science and Technology, 48(8), 1153-1165. https://doi.org/10.1080/0020739X.2017.1305130
4. Greenbelt Indigenous Botanical Survey: Indigenous Ethnobotanical Species | https://gibsurvey.ca/plants/grid
5. Let's Talk Science - Climate Math | https://letstalkscience.ca/educational-resources/backgrounders/climate-math
6. The Tree Atlas - Native Trees Ontario | https://www.ontario.ca/page/tree-atlas#list-native-trees-ontario
7. The University of British Columbia: STEM and Climate Wellbeing Toolkit | https://climateemergency.ubc.ca/stem-and-climate-wellbeing-toolkit/