Educator's Guide

Make a Splash!

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Curriculum Connections

Climate change is a significant challenge for Canada and the rest of the world and students need to think critically about this challenge and what can be done. All jurisdictions across Canada have entry points and curriculum expectations related to climate change, sustainability and environmental issues. Climate change appears in policy documents in courses such as Science, Geography, Social Studies, Travel and Tourism and others and is being incorporated by teachers into other areas such and English, the Arts and Interdisciplinary Studies.

Curriculum connections for this activity are dependent on the educator.

Unit Summary

Grade Level

Suitable for Grades 6 to 12

Time Required

5 - 7 periods to conduct the inquiry

Overview

This Module will immerse classes across Canada in Inquiries into "Climate Change Where I Live". Climate change is not a future possibility - it is a present reality. What impact is this having on Canadian lakes, rivers, creeks, ponds and streams? How will recreation change? What are the economic consequences? In this Module you will use the GreenLearning spiral inquiry method to research a personal and or a local focus for these broader challenges.

This activity was created by GreenLearning Canada with support from ConocoPhillips Canada

Activities Outline

Learning Outcomes

By the end of this unit, learners will:

- Use the spiral inquiry process to discover the implications of climate change on freshwater resources
- Investigate various topics surrounding the impact of climate change on Canadian bodies of water, and present their findings to the class
- Collaborate amongst peers to develop their own focus question(s) and inquiry plan

Planning Notes

a. *Materials*

Internet-enabled device
Make a Splash! Inquiry Worksheet
Marking Rubric

b. *Prior Learning*

Learners should have an understanding of the spiral inquiry model.

Spiral Inquiry Process

Using inquiry in a classroom can be seen on a continuum. Some inquiries are totally open-ended, some very proscribed. Our approach to outlining a Teaching Process is to be comprehensive — providing detailed instructions that you can draw on as you need to in facilitating student inquiries and their work in this project. We see inquiry as a spiral - a constructivist vision of student learning that helps empower students to follow interests, local relevance and action-related learning.

Step #1: The Spark

The "spark" is the key to igniting student curiosity and drawing students into thinking critically about a topic or an issue. The "spark" peaks the student's interest in a particular topic or question and becomes the starting point for student investigation into something that engages them. As the key facilitator of the inquiry, the teacher will provide an enticing spark to help ignite student curiosity. This could be

anything from a scenario or case study to a video, editorial cartoon or a story from the media that helps them see the many possible avenues of investigation within the topic.

Young people are naturally drawn to freshwater and recreation so finding a spark should be fairly straightforward. The more local it is and the more relevant to their lives as you know them, the better.

The following spark helps students connect this topic to their lives:

Imagine if you had to drastically change your summer vacation because of climate change and water. Maybe water levels are down, beaches are closed or water quality is compromised

1. What would a holiday celebration be like without enough clean water?
2. What would be different?
3. How would you feel?
4. What alternative arrangements could be made?
5. How would it be worse in winter?
6. Are some people affected by water and recreation more than others?

What have you Noticed, Observed, Wondered about: Discuss as a class the changes in weather/climate that you have noticed (water levels in cottage areas change, beaches are affected by water quality, bird and frog populations are in decline, the outdoor skating season is shorter, storms are more erratic and frequent ...).

Other Sparks:

1. A guest speaker expert connected with the issue of climate change at the local level — just to get ideas rolling. Intended only to start a further discussion from which students can identify their own questions and direction.
2. Tourism and hunting/fishing in rural communities is among the primary sources of income for the local economy. In terms of a hook for students a presenter or guest speaker in the tourism industry or local MNR might be more interesting than a website or video. A video or website would be great as a supporting element.

After the initial spark and discussion, students brainstorm how climate change is and might affect freshwater recreation in general and your community (municipality) in particular.

Step #2: Hypothesize and Plan

After the initial activities and before they launch into their research consider showing them the list of possible topics they can explore. What this Module calls the Investigations. Some teacher might want to assign these, some might want to give students choices limited to this list. Consider also using this list to get the class thinking and be open to them suggesting topics to investigate. These are often topics that pick up on personal interests or issues in their local community.

Some teachers have students 'pitch' new ideas to the rest of the class. This ensures that they have tested the idea's relevance to the assignment and the possibility of getting research information.

Possible Investigations:

- Algal blooms
- Beaches
- Birds and Bird Watching
- Boating
- Camping
- Citizen Science
- Cottage Life
- Fishing
- Flooding
- Frogs
- Gardens
- Hunting
- Invasive Species
- Ponds and Wetlands
- Skating and Ice Sports
- Snowmobiling
- Stream Studies
- Summer Camp
- Swimming
- Tourism Industry
- Water Quality

Supporting students in this phase of inquiry:

1. value student thinking — listen, observe and talk with students to assess interests, knowledge and needs;

2. model wondering, questioning and make predictions, especially around this topic (including how you as a teacher might grapple with climate change and freshwater recreation
    1. "I would like to take my family on a vacation to a cottage area, but the weather and water quality are unreliable and I am not sure whether it is worth it.";
3. facilitate student discussion and brainstorming, helping them develop clear inquiry question(s) (hypothesis).

Check-In Sheets

In the Student Inquiry section, each phase of the inquiry has a Check-In Sheet that can be used. These are optional, bur serve various purposes:

New: Check In sheet

1. Serve as record of students working independently
2. Basis of the teacher conferencing with each group
3. Accountability for time in class or elsewhere (library, computer centre, etc.)

Step #3: Explore and Research

Each section has starter resources and leads that can point the student to research directions without giving them all the answers. These links are designed for students and will be much more helpful than the problematic "Google gives me everything I need" habit.

Experts

GreenLearning modules emphasize the importance of using Experts as a support in the research process. One of our participating teachers explains: CCWIL teacher interview

Supporting students in this phase of inquiry:

1. assist students in finding information and in assessing that information;
2. extend student thinking with open ended questions;
3. help students to use this information to challenge their prior knowledge and beliefs;
4. encourage students to share their ideas and knowledge.

Step #4: Analyze and Check

At this point students need to look back at where their inquiry began and to re-assess what information they have gathered - do they have enough, is it the right kind and do they need help from the teacher.

Supporting students in this phase of inquiry:

1. facilitate discussions in which students make connections between prior knowledge and new discoveries, describe characteristics and note patterns, and, draw conclusions;
2. challenge and extend students' understandings and skills.

The key support from the teacher in this section is facilitation, helping the students dig deeper in their analysis, helping them see where the data takes them and helping them to prepare to report on and communicate their findings. Ensure that they are open to the possibility or rethinking their inquiry or their inquiry question as a result of what they find.

Step #5: Communicate and Act

GreenLearning modules culminate in activities that can be used as assessment by teachers, but are also activities that encourage students to take action. These activities can make a difference and they can give students hope that change can happen in the issue being studied.

Additional References

The following resources are credible websites, publications and videos learners and educators can reference to further their learnings.

a. General Information on Climate Change

1. NASA's Global Climate Change http://climate.nasa.gov/
2. Climate Change 101 with Bill Nye https://www.youtube.com/watch?v=EtW2rrLHs08

3. Al Gore — climate action guru — video on 15 ways individuals can address climate change, right now! http://www.ted.com/talks/al_gore_on_averting_climate_crisis

b. Inquiry Learning

1. Inspiring Science Education Project, "What is Inquiry-Based Learning?" https://www.youtube.com/watch?v=u84ZsS6niPc
2. Ontario Ministry of Education, "Capacity Building Series: Inquiry-Based Learning" http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/CBS_InquiryBased.pdf
3. Ontario Ministry of Education, "Capacity Building Series: Getting Started with Student Inquiry" http://www.edu.gov.on.ca/eng/literacynumeracy/inspire/research/CBS_StudentInquiry.pdf

c. Resources for All Inquiries

1. Canada's Way Forward on Climate Change http://www.climatechange.gc.ca/default.asp?lang=En&n=72f16a84-1
2. Climate Change and Freshwater http://www.climate-and-freshwater.info
3. Climate Change and Other Threats to World's Freshwater https://www.youtube.com/watch?v=piA1iYc7PUk
4. "The Effects of Climate Change on Water" David Schindler, Walrus Talks https://www.youtube.com/watch?v=p7prLRFOEq4
5. Extreme Weather Fact Sheet http://www.climateforum.ca/wp-content/uploads/2014/02/Issues-Paper-Final-CCF-1f.pdf
6. How Will Climate Change Impact Water Resources http://blogs.ei.columbia.edu/2017/06/06/how-will-climate-change-impact-water-resources/
7. WWF Freshwater Health Assessment https://www.youtube.com/watch?v=Tv9FHurS2IQ
8. *Resources for All Inquiries*
9. *Youth Action*

d. Youth Action

1. Prime Minister's Youth Council https://www.canada.ca/en/campaign/prime-ministers-youth-council.htm
2. iMatter http://www.imatteryouth.org/
3. Decarbonize, Mobilization of Youth Perspectives on Climate Change http://decarbonize.tigweb.org/
4. Environmental Youth-Adult Partnership Project http://ecosource.ca/wp-content/uploads/EYAP-Booklet-Final.pdf
5. Canadian Youth Climate Coalition http://www.ourclimate.ca/
6. Our Canada Project http://ourcanadaproject.ca/
7. Climate Reality Project https://www.climaterealityproject.org/sites/climaterealityproject.org/files/Activist%20Toolkit_US_0.pdf