Chapter 2 : How Does Climate Change Affect Our World?
Inquiry 1: Systems in Our World

- **Provocations** – *Artifact*
- **Question Generation** – *"I Wonder" Wall, Question Formation Technique, Video Question Lesson*
- **Knowledge Building** – *Knowledge Building Circle*
- **Determining Understanding** – *Small Group Activity, "is/can/has" chart*
- **Pursuing Learning** – *Art, Drama, Home Extension, Video*
- **Consolidation –** *What's All True*
- **Assessment –** *Illustrate a system, Video*
- **Take Action**

A. Provocation

To hook student interest, use the following provocation to initiate student thinking.

Artifact

Bring in a bike as an **Artifact** or look at this picture of a bike and explain to the students that the bike is a **system**. Have the students explore and manipulate the different parts of the bike.

Possible Questions:

- Why is the bike a **system**?
- How does it work?

Note: If you have a bike, you can spend some time moving the different parts, take it apart so that students see how a system is made of interdependent parts. If you use the picture, also print off **bike parts** so you can talk about how they work together.

B. Question Generation

At this point in the inquiry, we want to harness students' curiosity and build off of the provocation that has captured their interest by generating meaningful questions to continue to drive the learning process. This section will outline an idea for question generation based on the provocation that your class engaged with.

Create an **"I Wonder" Wall**.

Start with these two questions or a couple of your own and post them around the bike.

- *I wonder how one part impacts the other parts of the bike?*
- *I wonder what would happen if we took the tire off?*

Have the students come up with their own "I Wonder" questions. In groups, create as many questions as possible.

To generate questions, use the **Question Formulation Technique** to guide you:

- Ask as many questions as you can
- Do not stop to answer, judge or to discuss the questions
- Write down every question exactly as it is stated
- Change any statement into a question

Once the board is filled with many questions, group the duplicate questions together.

Next, watch this video: "Put The Quest in Questions" to help identify different types of questions to ask, inspire questions by developing tools and vocabulary to pose questions. Teach the students the difference between open and closed questions. Using an "O" for open and an "C" for closed, sort the questions into those that can be answered with some simple research (closed) and those that may lead to further investigation or a deeper inquiry (open). Review the questions together and prioritize those that they think will help the class better understand systems.

C. Knowledge Building

At this stage, students may be ready to engage in a group knowledge building activity. It will encourage students to open their minds to many alternative ways of thinking about the provocation and ideas that have been generated thus far in the inquiry process.

Engage in a class **Knowledge Building Circle** (outside is recommended if possible) using one of the questions that you generated from the bicycle activity or the "I Wonder" wall or the example below.

Possible Umbrella Question: "What is a system?"

D. Determining Understanding

At this stage of the inquiry, use responses to inform and guide the learning process. They can provide insight into which concepts need clarity, what students are already well informed about, and a general direction that students want to pursue.

Small Group Activity:
Divide the class into groups of 3 or 4. Ask each group to identify another system in the real world. Each group must be able to share their evidence of why it is a system.
Examples: car, solar system, human body, community, school, etc.

After completing the activity, complete this chart to help determine students' understanding of systems.

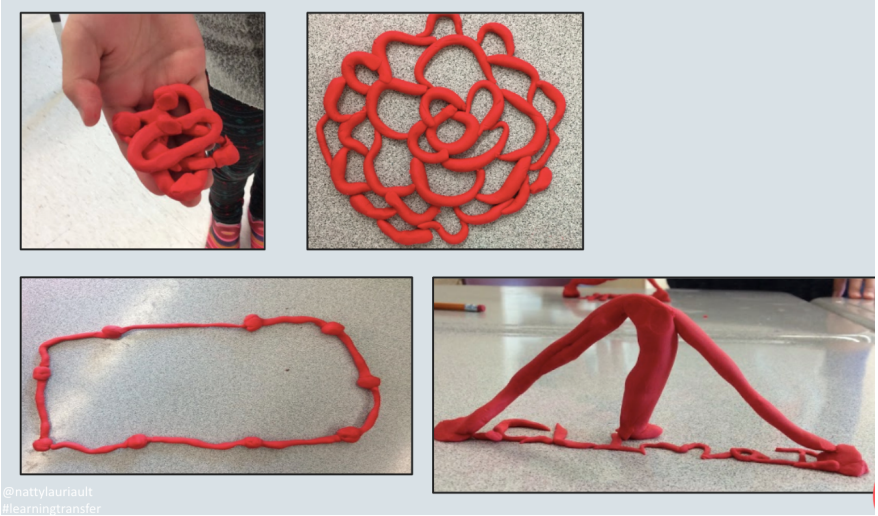
A SYSTEM…		
is	**can**	**has**

E. Pursuing Learning

At this point, students can begin researching to answer their general questions, or some of the following activities can be incorporated into the process to ensure that students understand basic concepts of systems and the relationship to climate change. The activities listed below will enrich the understanding of the concept of a system and the relationship to climate change.

Art: In pairs or independently, have students interpret what a system is using plasticine or pipe cleaners.

Example:



Drama: Create a People System *(adapted from: source: Tribes Learning communities by Jeanne Gibbs)*
One person begins the activity by assuming an interesting position and making a repetitive movement with a repetitive sound. The next person connects physically in whatever creative way he or she chooses, making a different movement or sound. People keep adding themselves to the system. Once the system is working, lightly tap one of the students (on the shoulder) or pass them a bean bag or other object to indicate to the student to sit up. Explain that this part is broken, notice what happened to the system. How does one faulty part of a system affect the whole system?

EXTENSION Video
What Are Systems?
"Systems educator Linda Booth Sweeney considers what is a system and what's not, what systems do, and why understanding systems is important."

Home extension: Encourage students to go home and look for other systems in their world. Invite them to share their findings and evidence of why it is a system.

F. Consolidation

This step is designed to encourage students to integrate and synthesize key ideas. When students make connections and see relationships within and across lessons, this helps them to solidify knowledge and deepen understanding.

Use the "All True" strategy from Learning that transfers. Some additional information is found at What's All True Explanation? Students brainstorm while the teacher notes all the things they know that are true about the concept of systems.

Possible Question: What is all true about systems?

And

Explain how the bicycle is a system that helps the world. It reduces the carbon footprint and is a healthy system. Encourage students to find other systems in the world that are healthy systems.

Assessment Idea

Teachers will assess learning at different points throughout the inquiry using multiple methods. The following assessment provides an alternative evaluation method to standard quizzes and tests, that can be used after consolidation or at any point in the lesson to check for understanding.

Illustrate a System

Students will demonstrate their understanding by showing how a tree is a system. They are encouraged to present their understanding using the medium of their choice. As a class, make a list of the different presentation media (e.g., dance, visual art, concept map, film).

Extension

This first video: "Trees | Educational Video for Kids" and a second video: "Mangroves as a System" are great examples of a tree system. Watch one or both of the videos and have the students compare and explain how a tree in their schoolyard/ neighbourhood is also a system.

Take Action:

Allowing time for students to take action is an essential part of the learning process on climate change, as it empowers students and eases their eco anxiety. Remind students that even when things get hard and seem so big they can always do something by taking an action. Their actions will create an impact.

These ideas for action can be utilized at any point in the learning process, whether it's now or after completing more guided inquiries. Please note that the suggestions are consistent in each chapter.

Ask the students what things can be done to make sure that all of the systems we talked about are working well and will help climate change?

Are there any projects that your students could partner with a community expert to increase biodiversity or help to restore a specific habitat?

One system that was talked about was a bicycle. What can we do with a bicycle that will help climate change? What can we do to encourage other students and people in our community to ride their bikes more often such as to school and work?

Other Ideas for Taking Action:

- Habitat restoration
- Conduct a clothing drive
- Collect food donations for the local food bank
- Innovate sustainable solutions for school or community questions and problems
- Share your learning within your school and share your learning outside the class

Action Project Examples

How could you use these great examples to come up with action projects with your K-2 students?

“POLLINATOR GARDEN” – Algonquin Public School- Woodstock, ON (2017) K-2

- The main focus of the project is to inform and support young children in developing their understanding of insect life cycles and the interconnectedness of the beautiful creatures to our lives and to begin to foster an appreciation for nature and how they can have a direct impact on their local and national environment. They learned about the decline in the Monarch Butterfly populations during a professional development workshop and decided to plant a pollinator garden. See their project here.

- Ten Canadian Schools’ stories of Climate Action

    - This document outlines a collection of promising practices of climate action taking place in 10 Canadian UNESCO Associated Schools. These 10 schools participated in a worldwide UNESCO pilot project to implement climate action as recommended in the UNESCO (2016) publication, *Getting Climate-Ready: A Guide for Schools on Climate Action.* https://bit.ly/3mpPtiY
- Young Voices for the Planet
    - This website documents youth speaking out, creating solutions and leading the change. These youth solutions to the climate crisis include stories of California kids banning plastic bags, Florida students saving their school $53,000 in energy costs, an 11-year-old German boy planting millions of trees and other young people changing laws, changing minds and changing society as they reduce the carbon footprint of their homes, schools and communities.Young Voices for the Planet
    - Resources for Kids Taking Action: Young Voices for the Planet | Award-Winning Film Series and Civic Engagement & Democracy Curriculum | For Kids
- The Great Plant Hunt from Ecoschool Global
    - The campaign aims to educate students about biodiversity, its importance and encourages them to take positive action. About the Campaign — Eco Schools
- Warming, Waste, Water, Watts, Wildlife (W5)
    - Through this project, thousands of students will be given opportunities to assess, design, and build innovative solutions to environmental challenges. Warming-Waste-Water-Watts-Wildlife (Alcoa W5) — Eco Schools
- Community Conversations for Climate Change
    - In this activity, students talk to members of their community about some of the environmental and climate changes they have noticed since they were young. Community Conversations for Climate Change | The World's Largest Lesson