Microplastic Investigation

Grade 10 Learning Experience

MI'KMAWEY GREEN COMMUNITIES PROGRAM
THE CONFEDERACY OF MAINLAND MI'KMAQ

Objectives

Students can investigate microplastics, bioaccumulation, and the interconnection of the environment. Students will refine their research and communication skills while creating innovative solutions to microplastic pollution.

Timeline

Pre-Activity: 1.5 to 2 hours
Activity: 2 hours
Post-Activity: 1 hour

Materials

White board and markers
pencils/pens
K-W-L Chart (provided)
Computers and internet access
Fish
Spotter's Guide (provided)
Dissecting diagram (provided)
Baking sheets
Fine mesh strainers
Coffee filters
Scissors
Knifes
Tweezers
Water bottle
Small dishes
Rubber gloves
Small garbage bags
Magnifying glasses or microscopes

Pre-Activity

1. Create a K-W-L chart on the board as a visual tool for students. This can be filled in as the lesson progresses.
2. Hand out K-W-L charts to students.
3. Introduce microplastics to the students. Ask them to share what they already know with the class, write their contributions in the K column. If they have any misconceptions, leave them in the column for discussion later.
4. Ask students what they would like to know about microplastics, write this in the W column.
5. Give students time to research microplastics.
6. Have students share their findings with the class. Write their answers in the L column.

Learning Outcomes

Science 10

- 213-7 select and integrate information from various print and electronic sources or from several parts of the same source
- 214-3 compile and display evidence and information, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, graphs, and scatter plots.
- 215-1 communicate questions, ideas, and intentions and receive, interpret, understand, support and respond to the ideas of others.
- 318-2 describe the mechanisms of bioaccumulation, and explain its potential impact on the viability and diversity of consumers at all trophic levels.
- 331-6 analyze the impact of external factors on an ecosystem.

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Pre-Activity Cont'd

Questions to Ask Students:

1. Is there anything we should remove from the K column?
2. Is there anything in the W column that wasn't addressed? Why do you think this is?
3. What is the most interesting thing you learned?
4. Why do you think microplastics are a concern for scientists?

Enrichment Activity

Students can make an educational display showing what they learned about microplastics to share with others.

Activity

1. Ask students to predict the outcome of the dissection based on their research in the Pre-Activity. Will there be plastics? What kind? How many? Students can write down their hypothesis for comparison to their results.
2. Follow the directions for fish dissection and analysis protocol developed by the CLEAR.
3. Using the Spotter's Guide, ruler, and magnifying glass, categorize the plastic debris.

Detailed directions to dissect the fish digestive tract and analyze the contents can be found here: https://civiclaboratory.files.wordpress.com/2017/12/citizen-scientists-marine-plastics-in-fish.pdf

Questions to ask students:

1. Did you expect these results?
2. What types of plastic did you find? What products are these types of plastic used for?
3. How do you think this plastic made it to the ocean/lake/river? How do you think these plastics made it into the fish's digestive tract? (hint: bioaccumulation)
4. What impacts do you think they could have on the fish? Other aquatic species?
5. What implications do your findings have on food fisheries?
6. How can we prevent microplastic pollution? (beyond the consumer level)

Learning Outcomes

Science 10

- 212-4 state a prediction and a prediction based on available evidence and background information.
- 117-3 describe how Canadian research projects in science are funded.
- 118-1 compare the risks and benefits to society and the environment of applying scientific knowledge or introducing a technology.
- 118-5 defend a decision or judgement and demonstrate that relevant arguments can arise from different perspectives.
- 118-9 propose a course of action on social issues related to science and technology, taking into account human and environmental needs.

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Activity Cont'd

Enrichment Activity

Species at Risk Deep Dive:

1. Students can think about how microplastics might impact a local species at risk and their environment.
2. Students can identify ways microplastics can enter this plant/animal's environment and how it may impact this species and others in the same environment.
3. Students can suggest actions to mitigate the effects of microplastics on this species.

Post- Activity

1. Students are now equipped with the background knowledge and hands on experience to create an action plan. Students can create an innovation, invent a plastic alternative, suggest a policy change, create an educational campaign, create a lesson or activity for students, or another action that tackles the issue of microplastics.
2. Students can write an essay or make a power-point presentation describing their action plan in detail. They can use class time to create their outline and begin to work on their essay or power-point. Some work outside of class time may be required at the discretion of the teacher.
3. Students will need to keep the following in mind when creating their action plan:
    - How will you shift the views of the public?
    - What are the risks and benefits to society?
    - What critiques will you receive? What other opinions are there that might pose a risk to your success?
    - How will you find financial support?
4. Students can present their idea to the class if they wish.

Check for Understanding

1. Collect K-W-L charts and monitor laboratory dissection to assess students' ability to state a prediction and to asses learning journey
2. Monitor class discussion and collect essays to evaluate research skills and microplastics' impact on the environment and society.

Learning Outcomes

English Language Arts 10

- 1.1 examine the ideas of others in discussion to clarify and extend their own understanding.
- 1.4 listen critically to analyze and evaluate ideas and information in order to formulate and refine opinions and ideas.
- 5.1 research, in systematic ways, specific information from a variety of sources.
- 5.2 select appropriate information to meet the requirements of a learning task
    - analyze and evaluate the chosen information
    - integrate chosen information, in a way that effectively meets the requirements of a learning task and/or solves personally defined problems.

What do you KNOW?	What do you WANT to know?	What did you LEARN?

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