



Education and Research: Testing Hypotheses

Microplastics- A Major Problem?

Leslie Revel & Kristen Perez

Summary

Students will analyze data collected from an actual research excursion in Antarctica. Students will apply knowledge learned about ocean currents, gyres, and garbage patches, to make inferences about the presence of microplastics in Antarctica. Students will address the problem of microplastics and design a solution on a school level to raise awareness of the threat of plastics in the oceans.

[TAGS: Oceans, Gyres, Human Impacts.]

Key Concepts

- Ocean Currents/Gyres
- The Great Ocean Garbage Patch
- Macroplastics/Microplastics

Objectives

Include clear, measurable statements of what students will be able to do, such as:

- Ask questions and construct explanations
- Define problems and design solutions
- Develop and use models
- Analyze and interpret data
- Engage in argument from evidence
- Obtain, evaluate, and communicate information

Materials

- Polar Ice Stories <https://polar-ice.org/focus-areas/polar-data-stories/where-are-those-microplastics-coming-from-and-going/>
- Raw data from Antarctica excursion <https://drive.google.com/open?id=12n47a1tedJCDC0zCgaQ2ljU6NFPY-SLdm6iRQHKp2U4>
- Poster paper, markers, pens

Procedure

1. Students complete quick, bell ringer question activity, Kahoot, or Quizizz activity to address misconceptions about ocean currents and garbage patch. <https://quizizz.com/admin/quiz/5acae39267bf32001a124009/ocean-currents>
 - a. Common Misconceptions: <http://assessment.aas.org/items/1/CL/314/CL007002#/0>,

<http://assessment.aaas.org/misconceptions/1/CLM038/314>

- b. Teacher addresses misconceptions and show the currents and gyres on the globe
<https://earth.nullschool.net/>
2. Teacher poses the question about how these plastics have reached the isolated areas of the gyres.
3. Record student responses on board or chart paper.
4. Teacher asks what other isolated areas could be impacted by plastics. Allow time from student responses.
5. Share with students that microplastics have made an impact on isolated places as far as Antarctica.
6. Review with students the different types of microplastics and vocabulary needed for data.
 - a. microfibers: plastics created from synthetic fibers from clothing
 - b. microbeads: spherical, plastic beads manufactured in products like toothpaste, sanitizers, and face wash
 - c. microfragments: the breakdown of larger plastics into small, irregular shaped micro debris
 - d. benthic: bottom of the ocean
7. Share the raw data from an actual Antarctic excursion and maps of the areas where the data was collected.
<https://drive.google.com/open?id=12n47a1tedJCDC0zCgaQ2ljU6NFPY-SLdm6iRQHKp2U4>
8. Students will graph the data from the two different locations and using the maps, make inferences as to why the amount of microplastics vary from location to location.
9. Share and discuss student inferences.
10. Pose the questions:
 - a. Why are there more microfibers than microbeads present in Antarctica?
 - b. Relate what you know about ocean currents to the presence of microplastics Antarctica.
11. Students will develop an idea to spread awareness at the school about the threats of plastics to the oceans (ex: video, infographic, powerpoint, etc)

Assessment

- **Formative assessments-** Instructor questioning, Kahoot or Quizizz or Bellringer type of formative assessment to test understanding or misconceptions.
- **Summative assessments-** formal summative assessment performed at end of unit with 70% mastery. An exit ticket question will work before the unit test is given. Address exit ticket misconceptions in the next day's bell ringer.

Additional Resources

- Interactive World Map <https://earth.nullschool.net/>
- NOAA Marine Debris <https://marinedebris.noaa.gov/info/patch.html>
- Ocean Garbage Patch <https://oceanservice.noaa.gov/podcast/mar18/nop14-ocean-garbage-patches.html>
- Ocean Garbage Patch <https://www.theoceancleanup.com/great-pacific-garbage-patch/>
- Rubber Ducks and Gyres
<https://www.tandfonline.com/doi/abs/10.1080/19338341.2014.945609?src=recsys&journ>

[alCode=rget20](#)

Extensions or adaptations

Create an art piece interpretation of the data presented in this excursion.

<https://www.mbari.org/what-is-the-bigger-picture/>