A Local Action Grade 3-5 Lesson

A Next Generation Science Standard-congruent, STEM/STEAM lesson to be used in conjunction with the STRAWS documentary film

Seeking Alternatives to Single-use Plastic
This lesson was made possible with funding by:

Seeking Alternatives to Single-use Plastic is a peer-reviewed, Next Generation Science Standard (NGSS)-congruent lesson created by Margaret Holzer, PhD. Dr. Holzer, an award-winning veteran science educator and curriculum developer, who has extensive experience in designing learning opportunities for students and educators which connects them to the science of phenomena.
Lesson Summary:
After watching STRAWS, students investigate the characteristics of their waste, and why plastic makes up a large majority of it. Using the results, they create a school and/or community campaign to assist others with identifying and using alternatives to single-use plastics to reduce the impact of plastics on our environment.

Lesson Background:
Review the content of the STRAWS screening guide, including the infographics which contain easily adaptable statistics that can be used in this 5-E lesson (Engage, Explore, Explain, Elaborate, Evaluate). Key to this STEM lesson, is that students understand that single-use plastics have physical properties engineered to solve problems based. After students investigate these properties, they identify alternatives to single-use plastics and create a campaign to communicate these alternatives to others to reduce the quantity of plastics in our waste stream. This lesson follows a problem-based learning (PBL) format. If you have not used PBLs in your teaching, please refer to these links for guidance:
- https://cmsce.rutgers.edu/resource/problem-pbl
- https://teaching.cornell.edu/teaching-resources/engaging-students/problem-based-learning

Grade Level: grades 3-5

Time: 5 class periods and time outside the classroom if the suggested solutions reach beyond the class/school.

Lesson Format: 5-E Problem-Based Learning (PBL) format where students design solutions to a problem.

Phenomena: Why does our trash and litter include so much plastic?
**Lesson Overview** *(a material list and detailed directions are below)*

1. **Engage** - *What’s in our trash? (pages 6-7)* Within this portion of the lesson, students engage with the phenomena by making observations of trash collected from the school trash bins over the course of a few days and/or from a walk around the school during a brief clean-up. Their quantitative observations are categorized on a class KWL Chart (What I know, What I want to know, What I learned) which will be used throughout the lesson. Students reflect on why plastic makes up the largest portion of the trash/litter they observed. In addition, students reflect on the fact that some waste will degrade rapidly, and yet others (plastics) will remain intact. Both reflection questions and others are recorded in the “What I want to know” column of the KWL chart for further investigation.

2. **Explore** - *Why is most of trash made of plastic? (pages 8-9)* In this part of the lesson, students explore why plastic makes up the largest portion of the trash/litter they observed by using their ideas from their reflections in “Engage.” A class discussion ensues about the role of single-use plastic in our daily lives, and problems plastics solve. Why do we use so much plastic? Students select a plastic item, identify the physical properties of the material making up the item, and research the problem and solution they hold. They present their findings to the class and in the third column of the KWL chart.

3. **Explain** - *What are the properties of plastics and are there alternatives? (pages 10-11)* Students use the information in the third column of the KWL chart to begin experimenting with alternative materials to single-use plastic. The constraints are recyclability, reusability or degradability. Students document their progress, which also lists physical properties of the materials they are replacing and the new items. They also list the pros and cons of the both materials. They share their results in a classroom forum. Document thoughts on a chart.

4. **Elaborate** - *How can we get the word out about alternatives to single use plastic? (pages 12-13)* Using the data and information they found in “Engage,” “Explore,” “Explain,” students brainstorm methods of communicating their data-driven findings to community members. The methods can take many forms, but they all need to agree on the messaging - what is it they want to say. They can create posters, brochures, info graphics, or factsheets. They gather feedback from their classmates and use the feedback and an iterative process to create the most effective communication tool(s) possible.

5. **Evaluate** - *What were the results of our efforts? What can we do next? (page 14)* They use the communicative tool they created in “Elaborate” to share their findings with others in their school, families, communities. When students use their communication tool, they keep track of the responses of those with whom they speak. These responses are brought back to class and are used to evaluate the effectiveness of their campaign to eradicate single-use plastic. In addition, another waste audit could be used a few weeks later to determine the local effectiveness of their campaign.

**Overall Student Learning Outcomes**

SWBAT: Ask questions and plan and carry out an investigation to identify the details of a problem
SWBAT: Evaluate the solution to the problem single-use plastic solves
SWBAT: Identify alternatives to single-use plastics that fit design constraints
SWBAT: Communicate technical information about single-use plastics and alternatives orally and written using various media
SWBAT: Analyze the effectiveness of their communicative tool, and make recommendations for changes