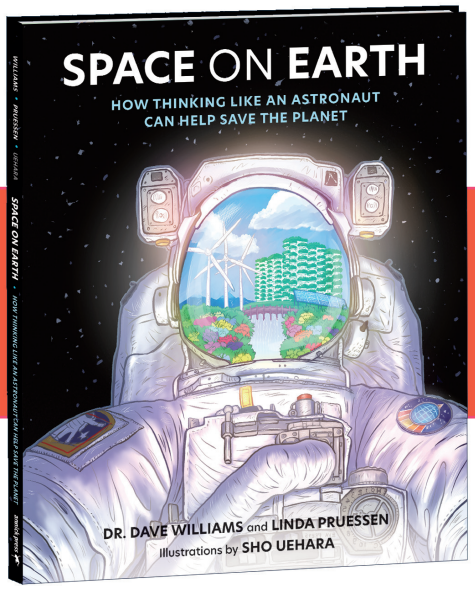



# EDUCATOR GUIDE

## SPACE ON EARTH
### How Thinking Like an Astronaut Can Help Save the Planet

by Dave Williams with Linda Pruessen

illustrated by Sho Uehara

**GENRE:** middle grade non-fiction

**THEMES:** aeronautics, astronautics & space science, environmental conservation & protection, experiments & projects, environmental science & ecosystems, sustainability, technology

**SUITABLE FOR:** Grade 5–8, Ages 10–14

**GUIDED READING LEVEL:** Fountas and Pinnell Q

**LEXILE:** 1090L

**COMMON CORE STANDARDS:** RI.6.1,2,3,4,5,6,7,8
W.6.1,1a,1b,1c,1d,1e,2,2a,2b,2c,2d,2e,2f,4,5,6,7,8,9,9b
SL.6.1,1a,1b,1c,1d,2,3,4,5,6
L.6,2,2a,2b,3,3a,3b,4,4a,4b,4c,4d,5,5b,5c,6

**NEXT GEN SCIENCE STANDARDS:** MS ESS3-1,2,3,4,5. Earth And Human Activity

**SUMMARY:**

Really “high” tech to inspire us for sustainable solutions on Earth.

Who could imagine an idea born on a space station would help sustain our planet? Astronauts living on the International Space Station have to protect their resources because their lives depend on it. They learn to conserve water, air, food, energy, and waste.

These efforts have in turn led to amazing and innovative ideas for air quality, food production, and water purification here on Earth.

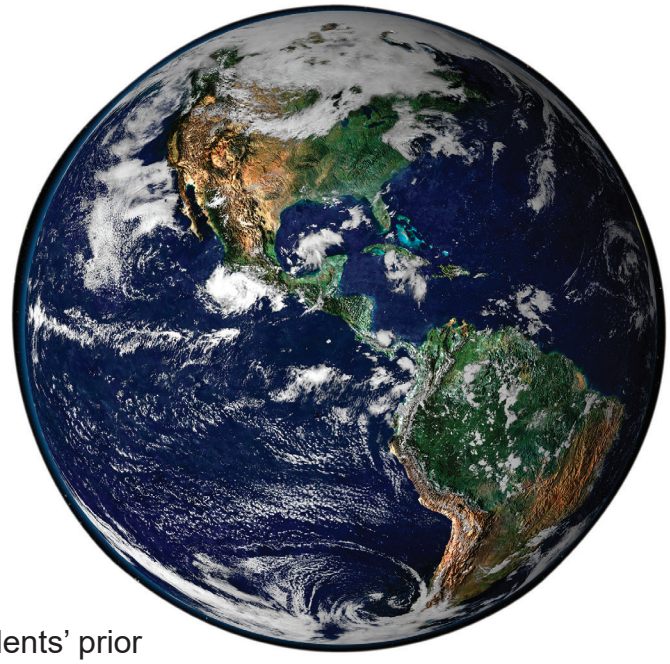
With vivid, energetic illustrations, photographs, and Dr. Dave’s experiments on key topics, readers learn about technological innovations such as waterless toilets and the world’s tallest air purification tower.

**Please remember that the suggested questions and activities within this educator guide are meant to serve as a starting point. Educators are encouraged to select items from each part of the guided inquiry process that work best for their style of teaching and will help them meet their goals when covering the topics in this book. Activities and prompts should be tweaked and/or reformatted to best fit your students, context, and community to ensure equity and inclusion.**

# Before Reading the Book

These activities build the context, introduce the topic of the book, and establish prior knowledge and interest.

1. Begin the lesson by asking your students the following questions:
    - What is air?
    - What are some things you have noticed about air?
    - How do people, animals, or plants use air?
    - Why do we need air?



2. Have students define *water scarcity*. How is water scarcity affecting women and girls in developing nations?

3. Ask students how the water cycle impacts the water crisis. Have students identify sources of fresh water available for consumption.

4. Ask your students if they think that the world has a problem with food insecurity.

5. Start a discussion about garbage to assess your students' prior knowledge. Ask them the following questions:
    - What is garbage?
    - What happens to garbage that can't be recycled?

6. Introduce the terms *compost*, *recycling*, and *landfill*.

7. Discuss with students:
    - Can you feel energy?
    - Can you see energy?
    - Can you hear energy?

# While Reading the Book

These activities check on comprehension, stimulate interest, involve readers in reflection as they read, and encourage consideration of other readers' reactions.

## WATER INSPIRATION

1. What is water waste? When and how is water wasted?

2. Water is a resource that is necessary for all living creatures. For the survival of every species, the preservation of water is crucial. Have students investigate:
   - The amount of water they use on a daily basis.
   - Analyze their water use both directly and indirectly.
   - Explore ways they can save water in their daily lives.
   - What are some negative impacts of pumping too much groundwater?

3. Which of the suggestions listed in "Think Like an Astronaut" would students incorporate into their lives? Which ones are they already doing?

4. What results did students observe from the experiment?

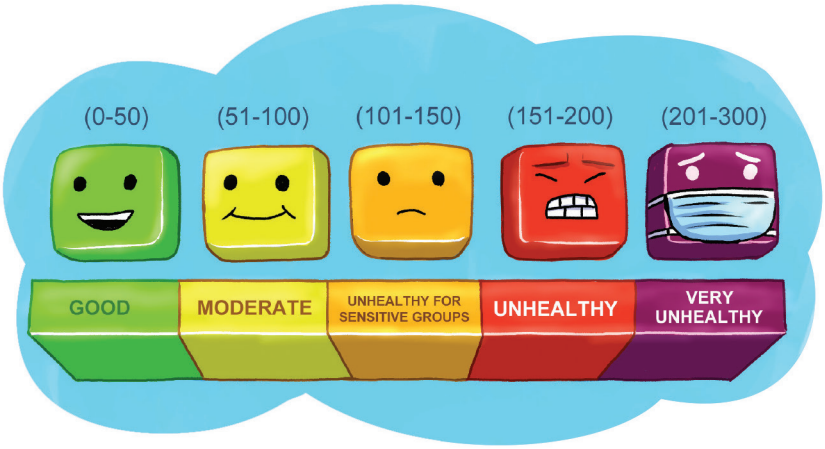
## AIR INSPIRATION

1. How do trees clean our air? Why are trees natural air purifiers? How do trees make oxygen and improve the environment?

2. Have students identify some of the main causes, effects, and sources of air pollution.

3. How can trees help combat air pollution?

4. Have students define Air Quality Index (AQI). Conduct an air quality activity as a class. Have students pick a card to show the AQI and the numerical value for the day. Talk about whether the values have changed from the day before. Compare the numerical values to the previous day.




5. Which suggestions listed in "Think Like an Astronaut" would students try to do?

## Food Inspiration

1. What is the difference between food deserts and food swamps?
2. What is food insecurity? What areas is food insecurity rising? What are the causes that contributed to this problem?
3. Divide students up into groups. Ask each group to answer the following question, “Who should be responsible for addressing hunger and food insecurity?” Discuss each group’s answers.
4. Have students conduct a lunchroom and at-home food waste audit. This activity will enable students to access food waste. After analyzing the data, have students come up with suggestions on how to avoid food waste.
5. Which suggestions listed in “Think Like an Astronaut” would be possible for students to undertake?

## WASTE INSPIRATION

1. What is recycling? Is recycling truly beneficial for the environment? What are the challenges of recycling?
2. How do astronauts dispose of trash in space? What sustainable ways can the trash be disposed of in space?
3. What is space junk and why is it a problem? How does junk get into space? What risks does space junk pose to the next space exploration?
4. After reading about the Great Pacific Garbage Patch, ask students the following questions:
    - Why is so much trash out in the middle of the ocean?
    - Would the patch be smaller if we recycled more?
    - What is the trash mostly made of?

5. Instruct students that they will be collecting data to learn about their own food waste after a meal. Assign a mealtime students will be looking at their food waste (breakfast, lunch, or dinner). Have students write down the patterns they notice in the foods they wasted and the reasons why they discarded them.
6. Which suggestions in “Think Like an Astronaut” would students advocate for in their communities?

### ENERGY INSPIRATION

1. What is renewable energy? What are the main types of renewable energy? How are we supposed to store all the energy produced by renewables?

2. What kind of energy will people be using in the future? Why don't people use more renewable energy now?

3. Where are solar panels used today? Why isn't everything powered with solar energy?

4. Have students compare and contrast the challenges and benefits of using renewable energy in their community.

5. Discuss with students:
    - What are some of the problems associated with using fossil fuels?
    - What are some things students can do in their lives to use fewer fossil fuels?
    - Which suggestions in "Think Like an Astronaut" would students be willing to put into their daily or weekly routines?

## After Reading the Book

These activities inspire continued reflection and response to the text, bring conclusion to the experience of reading this particular text, and stimulate further extensions.

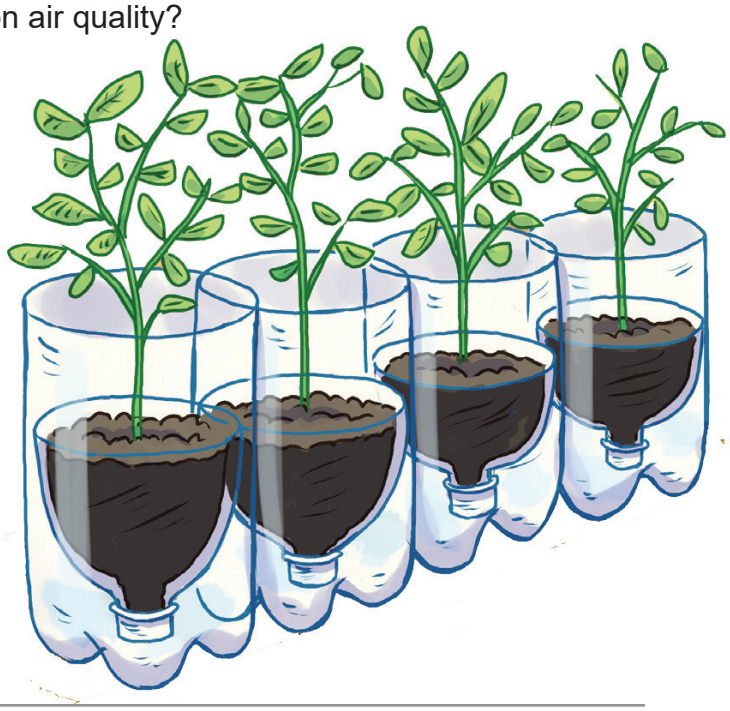
1. What are some things we can do to help prevent air pollution?

2. Check students' comprehension by asking students the following questions:
    - What factors contribute to poor air quality events?
    - What effects can air pollution regulations have on air quality?
    - What can be done to reduce or manage pollutant emissions?

3. Have students locate food deserts in their area by using the USDA's food desert map.

4. How did Dr. Dave's experiences add to your understanding of saving the planet? Why do you think Dr. Dave included students in the book?

5. Ask students if the experiments that were presented in the book helped them understand air and waste inspiration.



# Extension Activities

These activities are only a start. They are designed to support the goal of helping students explore the story and their own creativity.

1. Create a water conservation page on the school website.

2. Discuss the impact food deserts have on communities and the lasting problems they create. Have your students brainstorm some possible solutions.

3. Invite guest outreach speakers from your local community food banks or anti-hunger organizations to speak to your class about food insecurity and what students can do to help.

4. Research an organization that helps the community reduce, reuse, or recycle in some way. What services do they provide? How do they help reduce environmental impacts?

5. Visit a local power company that uses renewable energy resources.