

PLAYBOOK

➔ Using Climate Education to Support Student-Centered Learning Across Curricula



#StompOutCarbon



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INTRODUCTION

The Big Picture

The Importance of Teaching Climate Science for Our Shared Future

2023 has arrived, and the climate crisis is no longer a topic that can be ignored, particularly in the classroom. Raging wildfires, hurricanes, increased temperatures, polluted beaches, and fresh water shortages are just some of the evidence of humankind's mark on Earth. Research shows that students are keenly aware of the issue.

The good news is that climate education may very well be one of the keys to a better collective future. Climate education presents a perfect opportunity for cross-curricular, student-centered learning that is inquiry-based, real-world, and meaningful, while addressing a variety of academic skills and strengths. Even though student anxiety about the environment is high, educators can empower students and address their concerns while also meeting academic goals.

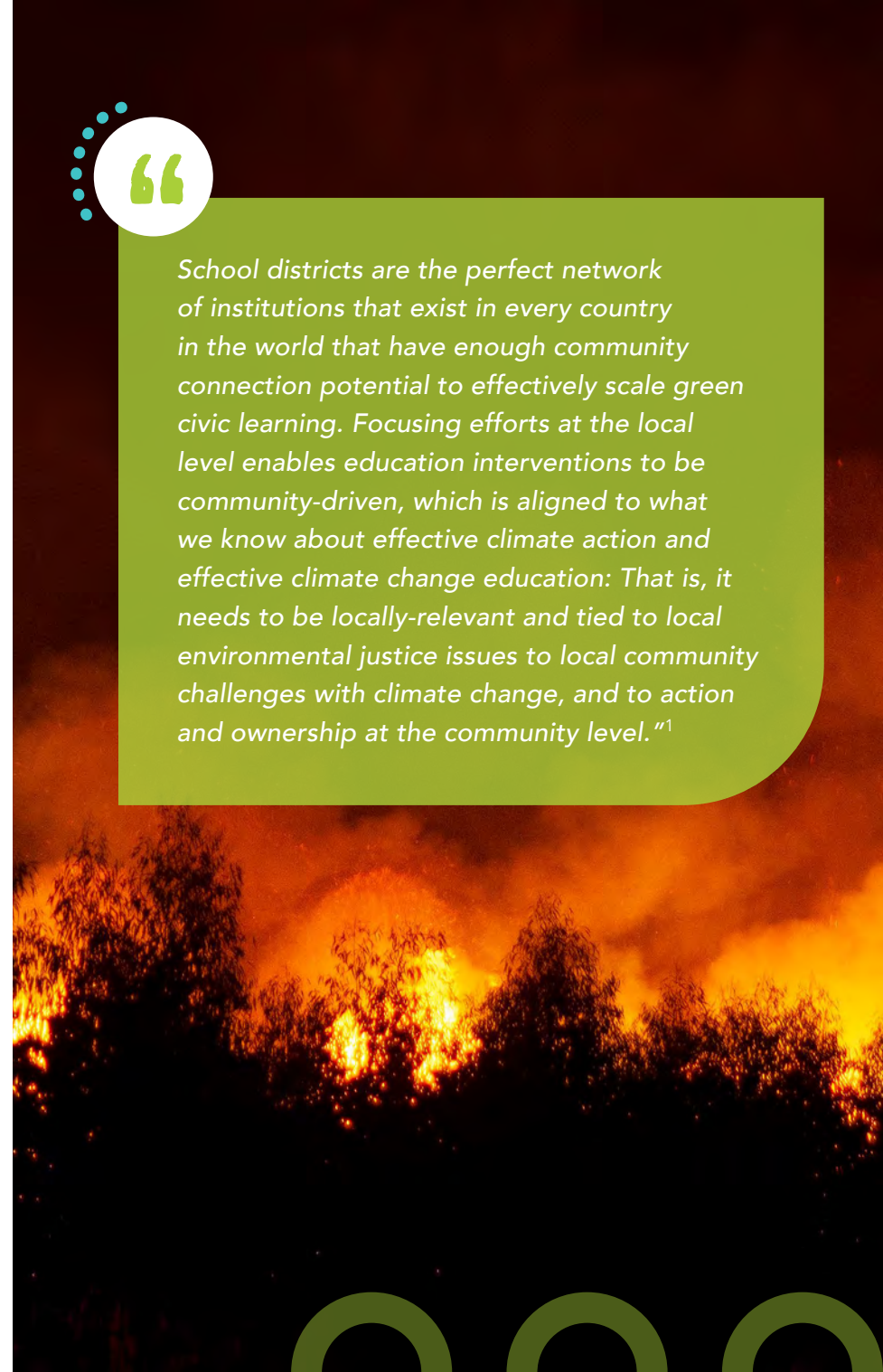


This playbook will act as a guide to help students and educators work together to #StompOutCarbon and make a positive impact on the planet.

We'll present you with innovative ways to incorporate climate education across curricula, along with strategies to engage students in powerful learning moments with practical tips and strategies for implementing school- and district-wide climate initiatives.

“

School districts are the perfect network of institutions that exist in every country in the world that have enough community connection potential to effectively scale green civic learning. Focusing efforts at the local level enables education interventions to be community-driven, which is aligned to what we know about effective climate action and effective climate change education: That is, it needs to be locally-relevant and tied to local environmental justice issues to local community challenges with climate change, and to action and ownership at the community level.”¹



The Impact of Climate Change on Students and in Schools

In school districts across the country, students and staff alike experience the effects of climate change, from natural disasters to overheated classrooms—which can result in sporadic and even permanent school closures. Climate change impacts us emotionally, academically, financially, and physically. That’s why parents and teachers are speaking out about the need to invest in and teach this crucial topic in the classroom.

Researchers at the University of Bath in England surveyed nearly 10,000 teenagers and young adults across 10 countries (including the U.S.) asking them how they felt about climate change.²

50%+

of students said that they felt afraid, sad, anxious, angry, powerless, helpless, and/or guilty.

60%

of students said that they felt very or extremely worried.

Since 2017, **more than 300 presidentially-declared major disasters have occurred across all 50 states** and all U.S. territories.

Many of these disasters have had devastating effects on K–12 schools, including those in socially vulnerable communities for whom disaster recovery is more challenging.³



If **16% of high school students** in high- and middle-income countries were to receive climate change education, we could see a nearly **19 gigaton reduction of carbon dioxide by 2050.**⁵



*Extreme weather is going to increasingly impact and disrupt learning. That is something that school leaders and administrators are going to have to grapple with and start to better plan for.*⁴

~ **Laura Schifter**,
senior fellow at the Aspen Institute and
leader of K12 Climate Action



FEMA Natural Threats Across the Nation.

A circular graphic with a green border. Inside, there is a thumbs-up icon and several leaf icons. The text is centered within the circle.

More than **80% of parents** and **86% of teachers** in the U.S. **support climate change education** in schools.⁵



STUDENT-CENTERED LEARNING

A Student-Centered Learning Approach

Using Climate Education Across Curricula to Tap Into How Students Learn Best

Initially, it might be easy to write off climate education as something relegated to science classrooms. But climate education can naturally utilize how students learn best, no matter the subject.

“

It's really easy to teach the gloom and doom. It's difficult to find the things where the students can answer the question, 'what can I do?'"

CRAIG MANGES
High School Teacher, King County CA



Students learn best when a curriculum is:



Inquiry-based: Learning starts with the posing of a question, a problem, or a scenario (versus a teacher simply sitting at the front of a class and lecturing.)



Experiential: The process of learning by doing! During hands-on experiences, students can reflect on, think critically about, and analyze what they are doing—connecting the content and learning objectives to something they can see and experience.



Situated in real, local context: Research shows when students learn about current problems happening today, they are more invested in learning, empathizing, and forming a deeper understanding of the topic or issue.

In addition, teaching and practicing metacognitive skills is essential and often missing in core subject areas. Climate education offers a powerful resource for developing the skill of learning to evaluate one's own thinking.

What are my personal beliefs and thoughts about this problem?

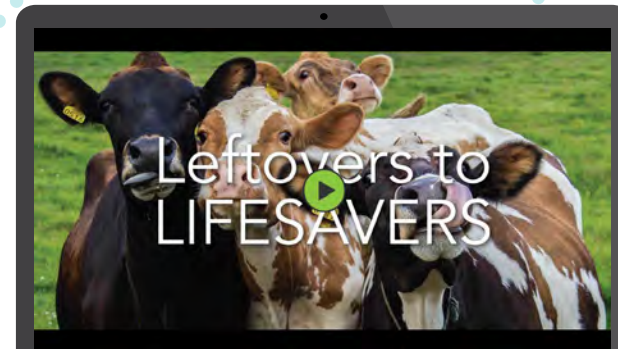
How can I take this new information and knowledge, and my values, to build a solution?

Tapping into purpose is key to motivating self-investment in learning and helping the broader community.

Take a look at this sample climate science lesson on the next page that puts these skills into action.






[Watch the Video](#)



One Step Sample Lesson: From Leftovers to Lifesavers

Leftovers become life-saving fuel with this revolutionary backyard super-composting system.

 <p>Inquiry-Based Learning</p>	 <p>Experiential Learning</p>	 <p>Situated in Real, Local Context</p>
<p>= Pose a question</p> <p>Americans waste approximately 119 billion pounds of food each year.⁶ Rotting food creates methane, a powerful greenhouse gas that traps 28 times more heat than carbon. What problems might this wasted food and methane cause? How could we address these problems?</p>	<p>= Hands-on, reflective</p> <p>Students will model the decomposition process, explore and discuss how methane is a powerful energy source, then learn how one organization has developed a backyard system that captures the methane released as food waste decomposes and turns it into cooking biogas and plant fertilizer.</p>	<p>= Using current day problems to teach broad content</p> <p>This "super composter" uses all organic matter, prevents additional methane from entering the atmosphere, and provides free renewable energy to empower people in remote and rural areas across the world.</p>

[Download the Lesson](#)

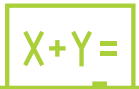
See how you can use this lesson in ANY classroom!

Cross-Curricular Lesson Suggestions



Science

Model food decomposition to determine what is left behind; explore how methane bubbles are a powerful energy source.



Math

Calculate and graph the amount of food waste that ends up in landfills each year. Ask: How much food does my own family waste?



Social Studies

Conduct interviews and research how local grocery stores dispose of excess food, including donations to those in need. What happens to expired food?



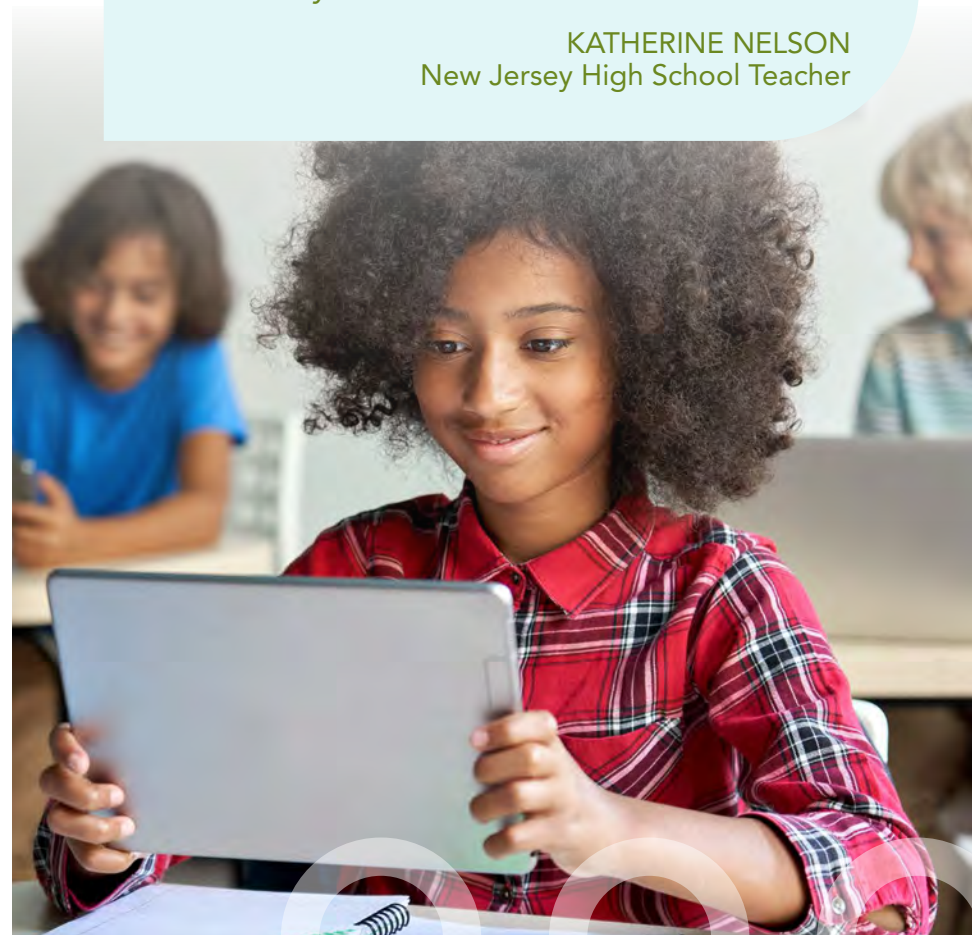
Arts

Design a PSA-style poster to encourage composting.



It's important to me that students walk away from class knowing that there is something they can do; knowing they can make a difference with choices later on down the road...In a class of juniors and seniors, they will be making their own decisions very soon, like voting, paying for electricity, buying new cars, buying groceries. They are now thinking about how they can make wise decisions."

KATHERINE NELSON
New Jersey High School Teacher



Tools to Incorporate Climate Science Across Curricula

Education Week recently released a special report sharing the findings from a nationwide survey of teenagers. It found students are “hungry to learn more about how climate change will affect the future of the Earth and society, and what they can personally do to lessen the effects.”⁷ The report also mentioned that the majority of states don’t require instruction on the subject of climate science or climate change outside of high school science.

The same report highlighted New Jersey as a leader in the movement to teach climate science across curricula. In fact, they are the first state to require that climate change be taught across grade levels and subjects, in every single school.



It was really easy to pull One Step content into what I had already created.”

KATHERINE NELSON
New Jersey High School Teacher



No matter the subject, here are practical strategies to keep in mind when teaching climate science.

3 Practical Strategies to Consider When Teaching Climate Science



Focus on the Local

This strategy helps in several ways:

1. It fits perfectly with how research says students **learn best** (using current day problems to teach broad content).
2. It makes content more relevant to students, which helps build the stamina students need to engage in the reflection required in experiential learning.
3. It alleviates concern that teachers are being “too political” by guiding students to explore and improve their own communities.



Choose a Relevant Cross-Curricular Project Theme

Infusing climate education across curricula certainly won't happen overnight. We recommend starting small—one classroom at a time, then across a grade band, next across a school, and eventually across the district.

No matter where you are in that journey, choosing a relevant cross-curricular project theme is a great way to organize your efforts. What that theme is will vary from community to community, but, generally speaking, exploring human **impacts on the environment** and **biodiversity** is a good place to start.



Focus on Solutions-Based Education

This doesn't mean that the truth of climate change is sugarcoated, but it means educators should find developmentally appropriate ways to convey the message that, yes, overwhelming evidence shows that humans are altering the planet, but also that there is still time to reverse or slow the impacts. Solutions-based education provides an opportunity for students to transform their anxiety about climate change into action.

Solutions-based education also alleviates concerns about becoming too political in a school setting, especially when coupled with the above-mentioned focus on the local. Furthermore, solutions-based education provides an opportunity to demystify some of the terms and concepts students have heard in the media and elsewhere and put them in context.

Putting Strategies Into Action

Here are steps you can follow to implement a climate education unit of study into the curriculum.

1.

Present the Problem: Identify a Real-World, Locally Relevant Problem — Introduce the Issue to the Class and Discuss Students' Thoughts/Feelings

Example: Drought

One of the biggest impacts of climate change is drought. In places like Morocco, India, and Africa, drought has a much more disruptive impact on people's daily lives than it might in the U.S. Most students are used to turning on the tap and instantly receiving water. What would their lives be like if they had to hike two miles a day, for example, to get just the water they need for drinking?

But drought isn't just a problem in *other* countries, drought is affecting many states in the U.S. today. Water restrictions in states such as Arizona and California are a clear reminder that water is a precious resource. New mandates in California, for example, ban using drinkable water on decorative or non-functional grass.⁸ And, in a suburb of Scottsdale Arizona, hundreds of homes can no longer access water from the city, forcing owners to scramble to conserve by flushing their toilets with rainwater, doing laundry at friends' homes, eating off paper plates, skipping showers, and more, all in the hopes their neighborhood doesn't turn into a ghost town.⁹



Ask students

How would a serious drought affect their local community, or how it is currently affecting family members and friends who live in areas like Arizona and California.

How does this impact of climate change students' daily lives?

2.

Choose a Theme That Will be Incorporated into Classes Across Curricula



Art: Study what makes visual campaigns effective. With the drought example above, how could imagery be utilized to induce an emotional reaction that might cause viewers to take action?



Social Studies: Broaden current and historical topics to include effects of human activities. Explore the legislative process of landmark environmental laws.



ELA: Create narratives based on feelings sparked by climate change and/or what students have learned. Explore persuasive writing by encouraging policy changes in the local community. Debate the pros and cons of new technology.



Math: Use statistical analysis to measure things like tree density in a local forest. Collect data on changes students notice in the community, such as an increase or decrease in the number of songbirds spotted in a park or in backyards.

3.

Identify an Innovative Solution and Activity

Example: Present students with a climate-change solution from a real-world company, community, or organization. For example, new technologies such as desalination, satellites, filtration of stormwater, anti-leak products, cloud seeding drones, and micro drip irrigation could hold the key to improving the drought catastrophe in the state of California.¹⁰ (See the sample lesson on page 13.)

Ask students

How would their lives be different if they were responsible for hiking two miles each day to retrieve water for their families, as some young people do across the world?

Lesson Outline Idea

Let's take a look at how to make a global issue locally focused...



Example: Water Scarcity

See how this sample outline based on a One Step lesson, *Thirsty for Change*, uses the strategy and steps on page 12!

Objective: Students will explore water scarcity and drought in the U.S., the people affected, and the technology being used to combat it.

- Using locally relevant photos, students will explore the many aspects of water scarcity and will explain the significance of the impact of environmental factors. Students will then work in groups to discuss the images and create personally meaningful categories to sort pictures into.
- Students will design and conduct experiments directly related to understanding how soil and groundwater impact the theme of water security. Students will then analyze data to explore the counterintuitive, yet incredibly important, connection between soil and water security.
- Students will explore the role that infrastructure plays in water security, and how student activism around the world influences infrastructure. *Learning about an example of how young people are affecting positive change is a powerful motivator!*
- Students will then look at solutions! Have students brainstorm ways to make their own community more water secure after learning about the innovative and sustainable technology around the world. Then, students can create their own classroom or school-wide campaign to affect positive change.

Cross-Curricular Lesson Suggestions



Math: Students can analyze the U.S. freshwater withdrawals from the following site: <https://www.epa.gov/watersense/how-we-use-water>, and research water usage in their state or the U.S. as a whole over the past 50 years.



Social Studies: Students can research the socio-economic and political issues surrounding the Three Gorges River in China, the James Bay Project in Canada, the Klamath River controversy in the U.S., or water restrictions in certain states such as California and Arizona.



ELA/Reading: Students can research the town of Rio Verde, Arizona, and write a paper on ways in which the town is combating water scarcity.



Fine Art: Students can create a piece of artwork based on their imagined vision of a future without water.



Even if they don't believe me, I want them to be able to have the tools to find the answers. I want them to know how much power they actually have — they are going to be the ones that will have to solve this."

CRAIG MANGES
High School Teacher, King County CA

REAL-LIFE SOLUTIONS

Real-Life, Innovative Solutions

How Technology and Innovation Around the Globe Are Reducing the Impact of Climate Change

Exposing students to real-world, global solutions and how they are changing the lives of people is a powerful way to inspire them. It gives students a glimpse of life in other parts of the world, and enables them to see the challenges we face, as well as the hope that science and technology can bring. The goal is to get students to view themselves as problem-solvers and innovative thinkers.

Encourage students to think about solutions that are being developed around the world in response to issues like drought, energy, and pollution. Use the real-world examples below to get students thinking about their own passions and interests.



“

Students really care about the environment. And it's also really important. I like that One Step has direct ties to their lives, and that is very engaging for kids.”

JESSICA SEMINELLI
New York Elementary School Teacher



PROBLEM → SOLUTION

Use these examples to inspire activities and projects in your school or district!



Problem: PLASTIC RIVER POLLUTION

Douala's rivers in Cameroon are so polluted with plastic bottles that it is difficult for fish to survive, and for fishermen to catch enough fish to support themselves. Decreased fish yields mean less profit for fishermen, which makes it harder for fishermen to invest in expensive wooden boats.



Solution:

Thanks to the resourceful people at Madiba & Nature, this problem has an innovative solution: **Use the plastic bottles to make boats!** These inventions, known as Ecoboats, clean the pollution and provide the local inhabitants with affordable boats for fishing. Ecoboats have also led to an increase in tourism, positively impacting the local economy.



Action:

Encourage students to create posters for a **school-wide recycling program** that targets plastic waste.



Problem: FOOD WASTE PRODUCES METHANE

72 billion pounds of food ends up in landfills and incinerators each year. When food decomposes, a colorless, odorless gas called methane is produced. Methane is a powerful greenhouse gas, trapping 28 times more heat than carbon dioxide.



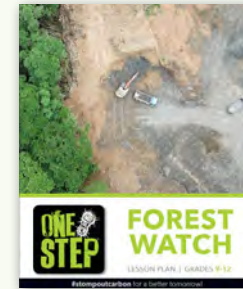
Solution:

Students will learn how one organization has developed a backyard system that **captures the methane released as food waste decomposes and turns it into cooking biogas** and plant fertilizer. This "super composter" prevents additional methane from entering the atmosphere, and provides free renewable energy to empower people in remote and rural areas.



Action:

Have students make a **compost system** at home or in their classroom, and then have them use the compost to plant a small garden.



Problem: DEFORESTATION

A football field-sized area of forest is destroyed every second. NASA predicts that if deforestation keeps going at this rate, the world's rainforests may be completely gone in 100 years—a world without forests would be catastrophic to humans and other organisms.



Solution:

Many different approaches are needed to help reforest our globe, and one way engineers can contribute is by designing and creating machines that plant seeds and trees more quickly.



Action:

Have students work in small groups to design and **create a seed planter machine prototype** that reduces the negative impacts of deforestation.

ADDITIONAL RESOURCES

Additional Climate Science Resources

Tools to Support a Climate Education Program in Your Classroom, School, or District

Exposing students to real-world, global solutions and how they are changing the lives of people is a powerful way to inspire them. It gives students a glimpse of life in other parts of the world, and enables them to see the challenges we face, as well as the hope that science and technology can bring. The goal is to get students to view themselves as problem-solvers and innovative thinkers.

Encourage students to think about solutions that are being developed around the world in response to issues like drought, energy, and pollution. Use the real-world examples below to get students thinking about their own passions and interests.

Climate Science Resources to Check Out:

Climate.gov

Includes guides for teaching about climate and energy for educators, up-to-date graphs of many climate change indicators, and the Collection of Climate and Energy Educational Resources (CLEAN), a library of 700+ free ready-to-use resources rigorously reviewed by educators and scientists. Suitable for secondary through higher education classrooms.

NASA

Provides educator- and student-friendly resources for a wide range of ages. Contains articles, videos, and simulations of climate change effects and solutions, from the individual to the policy level. Educators' resources include high-quality lesson plans from upper elementary to secondary. Climate Kids is made specifically for a younger audience (upper elementary to lower middle school) and provides games, interactives, and clear answers to the highest-level questions surrounding climate change ("Why is climate important?").

NOAA

Provides free, high-quality K-12 lesson plans for climate change, with a focus on the ocean and atmosphere.

EdWeek

With articles, op-eds, tools, and more related to climate science, EdWeek reports on K-12-friendly resources.

One Step

A video broadcast platform and curriculum for grades 4–12 that informs and inspires students to take action to reduce their carbon footprint and be stewards of the planet's resources. (See more on last page).

Stay up-to-date on current articles, tools, stories, and more! Bookmark the One Step website, where we share and update the latest and greatest information on climate science.



ONE STEP: A Video-Based Climate Science Curriculum for Grades 4–12

Educate & Inspire Students with Real-World, Solution-Focused Climate Education

Take the First Step Toward Implementing a Powerful Climate Education Program

We hope the resources and ideas we've shared inspire you to use climate education as a way to support student learning and engagement across curricula. The future of our planet depends on problem solvers and innovators in your classrooms today.

The unique One Step video-based climate science curriculum for grades 4–12 is an easy way to support educators in teaching climate and to help students take action now for a better future.

One Step takes your students around the world to explore green solutions and technologies that are being developed and implemented to address the climate crisis. Students are challenged to come up with solutions to problems impacting their own communities through built-in activities, projects, and a sustainable actions tracker.

One Step provides:

Solutions-Focused Topics

Available through an app or website, videos feature solutions-based climate and environmental science topics and innovative solutions. Fresh content is regularly uploaded.

Cross-Curricular Content

Lesson plans, projects, crafts, experiments, and much more to support teaching and learning.

Flexible Access, Anywhere And Anytime

Teachers and students have access 24/7 from mobile devices or computers.



One Step supports teachers with flexible resources that can be easily integrated into lessons across the curricula while supporting student-led action and learning outside the classroom.



TRY ONE STEP IN YOUR CLASSROOM, FREE FOR 30 DAYS!

Schedule a demo to learn more.

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