

The SustainableED Series

EVIDENCE-BASED PRACTICES FOR TEACHING ABOUT PLANETARY HEALTH AND ENVIRONMENTAL CHALLENGES

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A COLLABORATION BETWEEN



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EVIDENCE-BASED PRACTICES FOR TEACHING ABOUT PLANETARY HEALTH AND ENVIRONMENTAL CHALLENGES

ABOUT THE PROJECT

EdResearch for Action
edresearchforaction.org

EdResearch for Action is an initiative based at the Annenberg Institute at Brown University that brings together researchers and education leaders to improve how evidence is used in decision-making. The initiative synthesizes rigorous research into clear, actionable guidance designed for school, district, and state leaders.

EdResearch for Action briefs draw on a wide range of studies, including randomized controlled trials, quasi-experimental research, and descriptive evidence, to identify practices that improve student outcomes. Rather than focusing on individual studies, the briefs highlight patterns across the research base and translate those findings into practical strategies that can be implemented in real-world contexts.

A core component of the EdResearch model is collaboration with practitioners. Through an advisory board of school, district, and state leaders, EdResearch works to ensure that each brief addresses high-priority challenges, reflects the realities of implementation, and provides guidance that is both evidence-based and actionable.

The EdResearch For Action X SustainableED Series

SustainableED

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This brief is part of the EdResearch for Action X SustainableED Series, which examines how schools can prepare students to understand and act on the interdependence of environmental and human wellbeing.

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AT A GLANCE: EVIDENCE-BASED PRACTICES

TEACHING ABOUT PLANETARY HEALTH AND ENVIRONMENTAL CHALLENGES

PROFESSIONAL DEVELOPMENT

- 1 Professional development tends to improve instruction on Planetary Health when it helps teachers practice and enact specific strategies with ongoing support.

RELEVANCE & PERSONAL CONNECTION

- 2 When instruction makes Planetary Health content personally and locally relevant, students show greater understanding and engagement.

SOLUTIONS, EFFICACY & COLLECTIVE ACTION

- 3 Teaching that emphasizes real-world solutions, collective impact, and shared possibility is associated with increases in student motivation to act on climate issues.

DIALOGUE & PERSPECTIVE TAKING

- 4 Classrooms that emphasize understanding others' viewpoints, structured dialogue, and psychological safety better prepare students to productively engage with controversial issues, such as Planetary Health.

OUTDOOR & NATURE-BASED LEARNING

- 5 Nature-based outdoor learning is associated with benefits for students' wellbeing, social development, and academic outcomes, with the strongest evidence among elementary students.

PRACTICES TO AVOID

- 1 Steering students toward predetermined “right” answers on complex Planetary Health issues misrepresents the world's realities.
- 2 Education focused solely on scientific knowledge largely fails to change students' attitudes or behaviors.

BREAKING DOWN THE ISSUE

CENTRAL QUESTION

How can educators effectively teach Planetary Health, the interdependence of environmental and human wellbeing, in ways that build understanding and collective action?

What is Planetary Health, and why should schools teach it?

Planetary Health refers to the interdependence between human health and the health of Earth's natural systems, including climate, biodiversity, land, water, and food systems. Human activity has transformed these systems at an unprecedented scale over the past century, and rising temperatures, biodiversity loss, and pollution are already affecting human health, economic stability, and social systems worldwide.

Schools reach nearly all young people during the years when they develop the knowledge and problem-solving skills that shape their participation in society. That puts schools in a strong position to prepare students to understand these challenges and act on them. Doing so asks more of students than traditional environmental science instruction, since they must reason about complex systems, evaluate evidence, weigh ethical and equity questions, and work with people who hold different views.

ABOUT THE EVIDENCE IN THIS BRIEF

This brief synthesizes research on practices to use and practices to avoid in Planetary Health education. Research on Planetary Health in K-12 settings is still emerging, so we also draw on the related literature of environmental and climate change education. Planetary Health is broader than either field. Its focus on human health may also make it more compelling for students, who can connect the state of their environment to their own health and that of their families and friends.

Most of the available evidence is correlational and comes from climate rather than Planetary Health instruction. It also measures knowledge, attitudes, or intentions more often than behavior, so we note study designs and populations throughout. Each section closes with illustrations of how district leaders and teachers might apply the findings.

Planetary Health as a “Grand Challenge” Subject

Schools increasingly teach a category of subjects sometimes called “grand challenges,” which include responsible use of AI, public health, and contested social issues. These are complex problems with real consequences, and solving them requires collaboration among people with divergent worldviews. [Planetary Health is among the most urgent](#) of these subjects.

Planetary Health is hard to teach because it asks students to reason about complex, uncertain systems, engages material that can provoke doubt and strong emotion, and measures success by what students do as well as what they know.

1 The content requires unfamiliar kinds of reasoning.

Students need to [understand feedback loops](#), delayed effects, and probabilistic outcomes in interdependent systems. They also have to hold several competing considerations at once: action is urgent, simple solutions carry their own risks, and the populations most affected by climate change contributed least to causing it. Few traditional subjects combine systems thinking with this degree of uncertainty and moral complexity.

2 This material can generate resistance and is emotionally heavy.

Rarely has an algebra teacher faced a student who thinks the quadratic formula is a hoax, yet Planetary Health teachers regularly encounter [students who doubt core scientific findings](#). Teachers must also judge how much of the [material’s emotional weight their students are ready to process](#).

3 Success is defined by what students do as well as what they know.

English teachers rarely expect students to behave differently after reading a novel. Planetary Health education, by contrast, [aims to change personal behavior and spark collective action](#), including students teaching their own families and communities. Conventional measures of mastery therefore need to be complemented by assessments of these outcomes.

Limited teacher preparation, no shared definition of the subject, and only a few hours of instruction a year make these challenges harder for schools to meet.

1 Teachers are asked to teach content they were never taught, without a shared definition of what it includes.

[A scoping review](#) identified two primary obstacles to scaling Planetary Health education: variability in frameworks, competencies, and teaching methods, and limited faculty expertise. In a 2014 national survey, roughly two in five U.S. middle and high school science teachers [said they did not consider the human causes of recent warming legitimate](#), which may reflect gaps in their preparation.

2 Key topics receive limited, though growing, instructional time.

Among middle school science teachers, average instructional time on global warming rose from [4.4 hours per year in 2014 to 6.5 hours in 2019](#). Over the same period, the share of teachers who spent zero hours on the topic fell from 30% to 24%. That growth was concentrated in states that had adopted Next Generation Science Standards (NGSS) or Framework-based standards, which numbered 13 at the time of the study and number about 44 today. Even at current levels, a few hours per year leaves little room for systems reasoning, deliberation, and action-oriented work.

EVIDENCE-BASED PRACTICES

1

PROFESSIONAL DEVELOPMENT

Professional development tends to improve instruction on Planetary Health when it helps teachers practice and enact specific strategies with ongoing support.

- A review of [climate change teacher professional development](#) identified two capacities teachers need. The first is knowledge of complex, interdisciplinary science, including atmospheric processes, system dynamics, mitigation, and adaptation. The second is the ability to teach a topic that students and communities perceive as controversial. These needs are likely greater for Planetary Health, which also draws on public health, social science, and ethics.
- Syntheses of the broader PD literature find that programs linked to changes in teaching and student outcomes share several features. They focus on [specific content, engage teachers in active learning and collaboration, model effective practice, and provide coaching and feedback over time](#).
- A meta-analysis of STEM professional development found larger effects on student achievement when programs gave teachers [curriculum materials, trained them in how to use those materials, and included follow-up meetings during implementation](#). [Partnering with universities and educator preparation programs](#) can help districts share knowledge and reduce the burden of building expertise alone.

Note: Below we illustrate how leaders might enact these practices. The examples follow logically from the researched practices above. They have not necessarily been evaluated for their effects on student outcomes, school operations, or costs. Accordingly, leaders can treat them as ideas to consider, adapt, and monitor in their own contexts.

APPLICATIONS FOR PRACTICE

Leaders

- Organize PD around the specific classroom practices in this brief, such as structured controversy, local data investigations, and solutions-focused units. Give teachers the materials for each practice and time to rehearse it before using it with students.
- Schedule follow-up sessions after teachers have tried a practice, so they can bring back what happened and adjust it together. Both the content and the pedagogy are likely to be unfamiliar, and a single session is unlikely to be enough to change practice.
- Include rehearsal of contested discussions, especially the moments teachers most fear, such as a student disputing the science or a parent objecting to the topic.

APPLICATIONS FOR PRACTICE (CONTINUED)

Leaders (continued)

- Build cross-subject cohorts, since Planetary Health draws on the humanities, arts, natural sciences, and social studies.
- Partner with universities, educator preparation programs, and regional service agencies to share the cost of building content expertise. [Washington State](#) built a statewide climate science learning network through its regional education service districts and community partners. In [New York](#), the Climate & Resilience Education Task Force offers professional development aligned to state climate goals.
- Cross-sector collaboration can also support coalition building to codify teacher preparation and climate literacy policy change at scale. The Coalition for Climate Education Policy published a [toolkit](#) to support advocacy for this type of programming as well as [case studies](#) and [policy summaries](#) on actions at the district- and state-level nationwide.

Teachers

- Use existing curricular resources to reduce design burden, such as [Subject To Climate lesson plans](#), [Climate Lit's catalog of climate literature](#), and the [Planetary Health Alliance's catalog of courses and materials](#).
- Draw on programs from universities with Planetary Health centers, such as [Brown](#), the [University of Vermont](#), and [Johns Hopkins](#). To stay current, follow teacher-facing publications such as Climate Literacy in Education.

2

RELEVANCE & PERSONAL CONNECTION

When instruction makes Planetary Health content personally and locally relevant, students show greater understanding and engagement.

- A [systematic review of 49 climate change education interventions](#) found two features common to effective programs: they made information personally relevant and meaningful, and they used active, engaging teaching methods.
- Connecting content to students' own lives can increase interest and achievement. In a randomized experiment in high school science classes, students who wrote about how course material [related to their own lives](#) reported more interest and earned higher grades, especially students who had low expectations of success. Research on public engagement with climate change similarly finds that [abstract, distant framings tend to reduce engagement](#).
- Partnering with affected communities can change how students understand environmental harm. In a community-engaged environmental engineering course, students shifted from seeing environmental injustice as harm to the environment toward [seeing it as structural harm to communities](#). The shift came as they connected infrastructure, structural racism, and environmental injustice.

- Analyzing real environmental data is associated with gains in knowledge and engagement. In one study of project-based climate literacy units, [students who worked with real environmental data and models showed increases in climate knowledge and affective engagement](#), and older students also reported stronger intentions to act.
- In one experiment, [pairing images with text strengthened students' emotional response to biodiversity loss](#). Students who viewed photographs of biodiversity loss alongside informational text reported stronger negative emotions, placed higher value on biodiversity, and reported more pro-environmental actions and intentions than students who read the text alone.

APPLICATIONS FOR PRACTICE

Leaders

- Adopt or adapt curriculum that anchors units in local phenomena. Identify local environmental data sources (heat days, air quality, water quality, land use) so teachers do not have to source them independently.
- Establish standing agreements with community partners, including municipal agencies, health departments, watershed and land organizations, and local employers, so that community-engaged projects do not depend on individual teachers' personal contacts.
- Schedule and fund the logistics that community-engaged work requires, including transportation and class blocks long enough to leave the building.

Teachers

- Pair a tangible local example with a global one. For example, connect students' experiences with the frequency of hot days and their effects on recess, local weather warnings, or the need for air conditioning, to broader global patterns, like severe heat waves in Europe or South Asia that pose major health and infrastructure risks. Teachers can collaborate with colleagues in geographically distinct places: a teacher in Paris, TX might share local heat wave data with a teacher in Paris, France.
- [Project Drawdown](#) provides a [library](#) of local climate examples to catalyze Planetary Health conversations in the classroom.

3

SOLUTIONS, EFFICACY & COLLECTIVE ACTION

Teaching that emphasizes real-world solutions, collective impact, and shared possibility is associated with increases in student motivation to act on climate issues.

- A meta-analysis of 46 studies found that [greater hope is linked to greater climate engagement](#). The association was strongest for hope about personal action, compared with general hope about climate change.

- Belief in a group's capacity to act can raise individuals' belief in their own. In an [experiment on collective efficacy](#), participants who received messages about a group's capacity to address environmental problems reported stronger pro-environmental intentions. The effect worked partly by increasing their confidence in their own ability to act. This suggests that presenting environmental challenges as requiring both individual and collective action may be more motivating than emphasizing either alone.
- Solution-oriented messages tend to support engagement more than messages of doom. [Research on climate communication](#) finds that messages emphasizing solutions encourage engagement, while messages emphasizing catastrophe can discourage it.
- Problem-focused instruction without attention to solutions may leave students unprepared. A study of [undergraduate geography students in the UK and Ireland](#) found that courses emphasizing climate change problems, without gradually building students' ability to identify and evaluate solutions, left students unprepared to address real-world environmental challenges.

APPLICATIONS FOR PRACTICE

Leaders

- Create venues where student action carries authority, such as a student sustainability council with a modest budget and a standing report to the leadership team or board. Students are more likely to see their work as consequential when adults act on what they produce.
- Replace one-off assemblies and awareness days with sustained structures such as capstone requirements, service-learning credit, or a recurring project cycle, which give students repeated chances to act on what they learn.

Teachers

- Pair an honest account of the scale of the challenge with concrete examples of progress, such as recovery of the ozone layer, successful ecosystem restoration, and the growth of renewable energy.
- Give students direct experiences of their own capacity to act, such as planting trees, reducing school energy use, running public communication campaigns, or collecting local data.
- Help students advocate for school-level change with resources such as the [Youth Climate Action Toolkit](#).

Classrooms that emphasize understanding others' viewpoints, structured dialogue, and psychological safety better prepare students to productively engage with controversial issues, such as Planetary Health.

- Structured discussion is associated with better understanding and greater confidence. In a [study of secondary students in ten countries](#), students who took part in structured discussions of controversial public issues showed improvement in three areas: their understanding of the issues, their ability to express their own views, and their confidence addressing difficult topics with peers. Relatedly, students who participated in Structured Academic Controversy deliberations also demonstrated [stronger perspective-taking skills than students in comparison classes](#).
- Classroom climate shapes who participates. In a study of secondary students [discussing controversial issues](#), students were more willing to participate when teachers created a warm, structured classroom climate. In those classrooms, individual factors such as identity threat and personality traits were less predictive of who spoke up.
- Perspective taking is linked to empathy and prosocial motivation. A study [synthesizing research on social perspective taking](#) reports that encouraging people to imagine and articulate others' viewpoints is associated with greater empathy, less polarization, and stronger prosocial motivation, including motivation toward environmental action.

APPLICATIONS FOR PRACTICE

Leaders

- Protect common planning time for cross-disciplinary teams, since coordinated teaching across subjects depends on teachers having time in their schedules to plan together.
- Give teachers institutional backing for discussing contested issues. Issue a stated position on why students discuss contested public issues, name who responds to a family or community complaint, and make clear that teachers will not handle outside pressure alone. Teachers are likely to be more willing to lead difficult discussions when they know how the school will support them.

Teachers

- Establish norms before introducing contested content, including expectations for evidence-based argument and respectful disagreement.
- Use structured formats such as Structured Academic Controversy, in which students argue one position, switch sides, and then work toward a shared understanding.
- Coordinate with colleagues in other subjects through team teaching or complementary assignments, so students can examine more dimensions of a problem. Explicit instruction in [strategies for understanding others' points of view](#) can support this work during cooperative group work.

Nature-based outdoor learning is associated with benefits for students' wellbeing, social development, and academic outcomes, with the strongest evidence among elementary students.

- Outdoor learning in natural settings is linked to benefits across several domains. A systematic review of [147 studies of nature-specific outdoor learning programs](#) found measurable benefits for students' wellbeing, social development, and academic outcomes. Most of the evidence came from elementary students, so the findings are less certain for secondary students.
- Time in nature is associated with better mental health in the general population. A synthesis of research on nature and mental health found [associations between contact with nature and a range of mental health benefits](#). These studies mostly involve adults and do not test outdoor instruction specifically, but they suggest one reason outdoor learning may support student wellbeing.
- Outdoor learning may give Planetary Health instruction a direct, local anchor. No studies in this review tested outdoor learning's effects on Planetary Health knowledge or engagement. However, learning in natural settings lets students observe the ecosystems and environmental conditions the subject asks them to understand, which connects to the evidence on local relevance described above.

APPLICATIONS FOR PRACTICE

Leaders

- Establish relationships with parks, land trusts, or local nature centers, many of which offer space or programming at low or no cost to schools.
- Build master schedules with blocks long enough to make leaving the building feasible, particularly at the secondary level, where period length is usually the binding constraint. Budget for the transportation that off-site learning requires.

Teachers

- Use the schoolyard or a nearby green space for recurring observations of local phenomena, such as tracking plant life cycles, bird activity, or temperature differences between shaded and paved areas across a season.
- Design assignments that students complete outdoors, such as field journals, photojournalism projects, or local data collection that feeds into classroom analysis.

PRACTICES TO AVOID

Steering students toward predetermined “right” answers on complex Planetary Health issues misrepresents the world’s realities.

- Planetary Health issues involve trade-offs, conflicting values, and competing evidence, rather than clear-cut correct answers. When lessons lead students to predetermined conclusions, they can undermine crucial skills for Planetary Health literacy (e.g., tolerating uncertainty, weighing evidence, recognizing complexity). A review of [climate change education interventions](#) found that when students were guided to investigate their own assumptions, compare their perspectives, and work through ideological tension, rather than converge on a teacher-supplied answer, they developed stronger scientific understanding and greater capacity to reason about competing claims.
- A [systematic review of open inquiry in science education](#) found that when students develop their own questions and design their own investigations (rather than following a teacher-provided procedure), they gain conceptual understanding, motivation, scientific thinking skills, and hold more positive attitudes toward science. To realize these benefits, substantial teacher support and appropriate levels of scaffolding for students are likely required.

Education focused solely on scientific knowledge largely fails to change students’ attitudes or behaviors.

- A [systematic review of climate change education literature from 1993 to 2014](#) found that student knowledge was limited and particularly reliant on media-based sources. Didactic education had limited effects on student attitudes and behaviors. The review concludes that participatory, interdisciplinary, creative, and emotion-driven approaches better empower students to address climate change.
- Descriptive findings from a small, private middle school in Washington, D.C., found that 6th-grader students who learned about climate change through a humanities curriculum (covering energy, movement, and collective action) equaled or surpassed [8th-grade students who had learned about climate change only through science class](#) in their academic achievement. Moreover, they were more likely to talk with their families about climate change. This suggests that how students engage with the topic, not just the scientific content, drives both knowledge and engagement outcomes.

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