



You Should Teach About Climate Change: Why and How Every Teacher of Science Should Teach About This Important Topic

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Abstract

Teachers from Kindergarten through grade twelve who cover science in the curriculum should find a way to include teaching about climate change. The reasons why this is so important and some suggestions for ways to do so are discussed in this article.

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You, Yes You, Should Teach About Climate Change.

Every teacher of science in Indiana from pre-K through college should teach about climate change. If you are reading *The Hoosier Science Teacher*, that includes you. You may ask two questions: why and how?

Why?

According to the [Yale Program for Climate Communication](#), climate change can be summed up in five facts and ten words: "It's real. It's bad. It's us. Scientists agree. There's hope." As a high school chemistry and environmental science teacher who has been teaching about climate change in both classes for years, I would sum up students' thoughts on learning climate change in eight words: It's interesting. It's important. We're curious. We care.

Topics that get students talking, thinking, and engaged are those that are relevant to students' lives, have multiple avenues for interest, and have a component of social intrigue. It is relevant because the younger generation will be the ones to feel the deepest effects of a warming planet. Climate change is a very large topic and can be interesting to students who are concerned about the conservation of endangered species, students who have migrated to Indiana from other parts of the country or world, students who are interested in weather and storms, students interested in economics

and business, students who want to become engineers, students who are interested in marine biology and love Finding Nemo, students who want to travel and have cultural experiences, and students who want to become farmers. Can you think of a student who has any of those interests? Climate change is something kids hear about on social media or when their parents watch the news. They often think there is some controversy surrounding the subject. Politically, this may be true, but scientists are in close agreement about it ([AAAS, 2018](#)). They are intrigued that they hear two sides to the story, but they really want to know which one is *right*. Of course, for a science teacher, right and wrong, or true and false, are often better phrased as "which side's view is better supported by the evidence?"

We are responsible for bringing up the next generation of citizens who will vote at the ballot box and with their wallets. The world must act on climate change decisively and soon ([IPCC, 2022](#)). Change will only come when the public debate about climate change moves from questions about if it is happening or what is causing it, to debates about what we should do about it. The first step in making that transition is to ensure all citizens have a basic understanding of the issues. Since environmental science is not a required course for graduation in Indiana, many students never take a class that directly addresses climate change. For this reason, every teacher in Indiana who teaches any science subject should include climate change in their course.

Full listing of authors and contacts can be found at the end of this article.



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As Greta Thunberg said, “We teenagers and children shouldn’t have to take the responsibility, but right now the world leaders keep acting like children and somebody needs to be the adult in the room” (Smith & Breaux, 2019). The adults making decisions that could do something to stop climate change are not getting the job done. The least we teachers can do is provide the students with the information they need to understand the situation they will face as they become adults.

How?

1. Learn more about climate change yourself. Not all science teachers, myself included, took many environmental science classes in college. Do you understand the evidence for, and consequences of, a destabilized climate? The members of the Scientist Rebellion wrote a letter explaining their demands. In it, they said, “Self-reinforcing feedbacks within the climate system, in which hotter climates cause additional heating (e.g., increased forest fires, thawing permafrost, melting ice) threaten to drive the Earth irreversibly to a hot and uninhabitable state. These effects are being observed decades earlier than predicted, in line with the worst-case scenarios predicted.” Do you understand why thawing permafrost is of such concern? If not, do a little research to learn more using the links provided in this article.
2. Find ways to tie it into your curriculum. Seek out reading assignments, activities, or labs related to climate change, or just have class outside and discuss weather versus climate. NASA has a good section for younger kids and older ones, too. NOAA also has great resources for children and adults.
3. Check out some curricular connections that might work for you below. For younger grades that cover a broad array of scientific content, this might be easier to imagine how the standards can be taught to include climate change. High school physics or anatomy teachers might find including climate science to be more challenging, but connections can be made.

Indiana’s Science and Engineering Process Standards (SEPS, [IDOE, 2022](#)) can obviously be applied to climate change. For example, SEPS.1 says, “A practice of science is posing and refining questions that lead to descriptions and explanations of how the natural and designed world(s) work and these questions can be scientifically tested.” A teacher could ask students to pose a testable question about what ice melting into a container of water will do to the water level in the container, then after an experiment, explain that melting glaciers (on land) makes sea levels rise.

Kindergarten teachers could discuss climate change after students have collected most of a year’s weather data and covered the standard, “K.ESS.3 Investigate the local weather conditions to describe patterns over time.” They could compare data from past decades and see an increase in average temperatures.

Fifth grade teachers could teach the standard, “5.ESS.3 Investigate ways individual communities within the United States protect the Earth’s resources and environment” by researching how renewable and non-renewable resources are used to generate electricity in Indiana. Then they could research the long-term consequences of each.

An anatomy and physiology teacher might teach, “AP.13.4 Describe how the body monitors changes in blood pH and carbon dioxide using specialized receptors and how the respiratory system adjusts in order to maintain homeostasis” with a demonstration of water’s pH changing with added dry ice. Then mention that this decrease of pH happens in both blood and sea water as carbon dioxide is increased. A short discussion of how atmospheric carbon dioxide can be affected by deforestation and burning of fossil fuels causing ocean acidification would be interesting to students. This would help to clarify that the chemistry of the body is no different than the chemistry of the larger world.

A physics teacher can use global heat balance as an example when teaching HS-PS3-2. “Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).” Show students a diagram of how thermal energy from the sun is absorbed causing gas particles to move faster and re-radiated into space. Then discuss how excess carbon dioxide changes that balance.

Chemistry classes provide many ways to incorporate discussion of climate change. A reactions or stoichiometry unit could allow a teacher to talk about the combustion of various fossil fuels and the carbon dioxide produced. Here is an example of one standard that could apply: “C.4.5 Use a balanced chemical equation to calculate the quantities of reactants needed and products made in a chemical reaction that goes to completion.” Doing this with methane would give an opportunity to discuss the differential warming potential of various gases and why methane flaring at a landfill is an important way of reducing our climate impact ([EPA, 2022](#)). Gas laws, gas solubility, pH, thermochemistry, solution properties, and other topics lend themselves to at least brief mentions of the climate system and the changes it is undergoing.

A biology teacher will cover ecology and evolution, both of which are great opportunities to tie in climate change. (Will species be able to adapt, or will they go extinct?) Photosynthesis and respiration provide another one, as deforestation is a major driver of climate change.

No matter which age group you work with, you should take some time to see how a lesson or two about climate change could help you connect with your students and prepare them for their future. Use the links provided above to get started. We owe it to this generation to acknowledge and explain the problems humanity has created and help them find hope to create change.

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