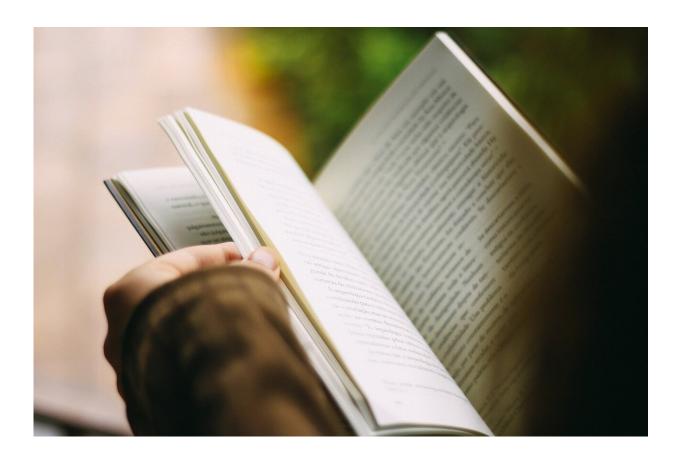# Examining the portrayal of climate change in history textbooks

May 25 2023, by Josie Garthwaite

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California and Texas textbooks have their differences when it comes to teaching teenagers about American history and the way that subjects like race, gender, and immigration weave through it. But a new Stanford

University study has found the two states' U.S. history textbooks are surprisingly similar when dealing with climate change and environmental topics.

Published May 23 in *Environmental Education Research*, the study analyzed each word and sentence in 30 of the most popular U.S. history textbooks in California and Texas. The results suggest widely used history textbooks in the two states, which strongly influence textbook content nationwide, tend to emphasize controversy in discussions of climate science and prompt students to think about our planet's rapid warming as a matter of opinion or a two-sided issue.

Teaching complexity

"When teaching history, it's an important skill for students to be able to consider alternative viewpoints," said senior study author Patricia Bromley, an associate professor at the Stanford Doerr School of Sustainability and Stanford Graduate School of Education. "But the way that this skill is being applied to climate change falsely suggests that the science is undecided."

Scientific evidence unequivocally shows human activities, mainly through emissions of greenhouse gasses, have caused global warming. The planet's surface temperatures are now 1.1 Celsius (2 Fahrenheit) hotter on average compared to when burning fossil fuels for energy took off in the 1800s.

Bromley and lead study author Hannah D'Apice, a Ph.D. student in international comparative education, say a better approach—found in a few of the popular textbooks they analyzed—is to invite students to consider the complex social dimensions of climate impacts and political processes for creating policies, without misrepresenting the scientific consensus around climate change.

"It matters how students are taught to see climate change as a civic issue and integrate scientific information into their understanding of what it means to be an engaged community member and citizen," said D'Apice. "Scientific literacy is really important for social issues, public health, and long-term public well-being."

Collective action

Both states' textbooks shared a tendency to mention corporations' contributions to climate change and environmental damage only in passing, gloss over potential environmental risks of major dams and other public works, and present what the authors describe as an overly limited view of who holds the power to create change.

"Perhaps unsurprisingly, the textbooks primarily discuss government and prominent individual figures as the primary agents that can take action in relation to climate change," said Bromley, who also leads the Global Civil Society & Sustainable Development Lab in Stanford's Center on Philanthropy and Civil Society. As future voters, the authors write, students have collective power to elect leaders that seek to address climate change and pressure big polluters to change.

"History and civics curricula are some of the most important tools we have for teaching students to be thoughtful and engaged citizens," D'Apice said. "If we want collective action around climate change, students need to understand not only the scientific consensus, but also the political and social mechanisms they themselves can use to create change."

AI trained on a new climate dictionary

To analyze the content, D'Apice and Bromley used a type of artificial

intelligence known as [natural language processing](), which enables computers to perform tasks like measuring sentiment and the relative prevalence of different parts of text.

To select relevant text, the researchers first generated a broad list of terms and sentences related to climate change, drawing on glossaries and documents such as the United Nations' Sustainable Development Goals. Then they reviewed any words that appeared more than 150 times in the [textbook]() data for additional possible terms. To clean the text, they culled terms such as "nature" and "Industrial Revolution" that can be related to climate or environment, but which also appeared very frequently in sentences unrelated to those topics.

They ultimately came up with a list of 141 terms, ranging from "greenhouse gas" and "pollution" to "asthma," "footprint," and "levee failure." After an initial scan to remove irrelevant sentences (when "exhaust" referred to tiring out, for example, rather than the stuff from a tailpipe), the authors had a final sample of nearly 6,400 sentences. "In the big picture, when we can computationally look at the whole corpus, there are very few differences between the two states in how climate change is depicted," Bromley said.

The broad "climate dictionary" and the method for refining and analyzing it is now a resource that can be adapted and scaled to measure environmental education worldwide, said Bromley, who is collaborating with groups including the United Nations-backed Mission 4.7 to develop global indicators around education for sustainable development. "We need more people to start thinking about climate change as something that should be integrated throughout all other aspects of society," she said. "It's not just an issue for science."

More information: Hannah K. D'Apice et al, Climate change discourse in U.S. history textbooks from California and Texas,

Environmental Education Research (2023).

Provided by Stanford University