How to help K-12 teachers teach about climate change

Len Bloch
St. Andrew’s Episcopal School
Saratoga, CA
Boundary work is difficult

Have to play dual roles
- Teacher
- Scientist

Accountable to multiple communities
- \textbf{Children} demand intelligibility and engagement.
- \textbf{Scientists} demand rigorous accuracy.
- Different \textbf{parents} demand different things.
- \textbf{Administrators} want to meet demands of multiple communities—including bureaucracies.
- \textbf{Bureaucracies} respond to multiple communities and behave erratically.
Boundary Objects

“The creation and management of boundary objects is key in developing and maintaining coherence across intersecting social worlds.”


Susan Leigh Star and James R. Griesemer

Most scientific work is conducted by extremely diverse groups of actors—researchers from different disciplines, amateurs and professionals, humans and animals, functionaries and visionaries. Simply put, scientific work is heterogeneous. At the same time, science requires cooperation—to create common understandings, to ensure reliability across domains and to gather information which retains its integrity across time, space and local contingencies. This creates a ‘central tension’ in science between divergent viewpoints and the need for generalizable findings. In this paper we examine the development of a natural history research museum as a case in which both heterogeneity and cooperation are central issues for participants. We develop an analytical framework for interpreting our historical material, one which can be applied to studies similarly focused on scientific work in complex institutional settings.

What is ‘Climate Change’?
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**IPCC**

[...] a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings [...]. (p. 3)

**UNFCCC**

[...] a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. (Article One)
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[...] a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, with climate change impacts on comparable time periods. (Article One)
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Accountable to multiple communities

• Children demand intelligibility and engagement.
• Scientists demand rigorous accuracy.
• Different parents demand different things.
• Administrators want to meet demands of multiple communities— including bureaucracies.

• Bureaucracies respond to changing power dynamics and behave erratically.
The phrases “climate change” and “greenhouse effect” appear nowhere in the 1996 *National Science Education Standards*. 
“In areas where data or understanding are incomplete, such as the details of human evolution or questions surrounding global warming, new data may well lead to changes in current ideas or resolve current conflicts.” (p.201)
Climate change mentioned (but not tested) in 3rd grade.

Human impact on the Earth in Kindergarten.
What the teachers asked for

- Workshops
- Hands-on lab activities
- Videos
- Age-appropriate reading materials
- Recommended resources
- Locally-relevant educational materials
Workshops

- From a few hours to a few days.
- Close to home or school (not on University campus).
- Many Environmental Science, Meteorology, and Oceanography teachers are trained in biology and “lack background in physical [and Earth] sciences”.

Labs

• “Hands-on” and “kinesthetic” activities.
• Do-able within limited blocks of time.
• Low-cost materials, “like paper-towel rolls” (or provide kits that schools can borrow).
Videos

- Short to capture student interest and provide scaffolding for other learning activities.

- Maybe a video that would help students understand how “people can take the same data and make it mean different things”.
Reading Materials

- “Age-appropriate readings” that help students stay up-to-date on a changing field.
- Maybe something like “Astrobuddies” (in which astronomy professors agree to answer emails from students).

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**Word**

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After you enable this feature, open a file that you want to check, and **check the spelling**. When Outlook or Word finishes checking the spelling and grammar, it displays information about the reading level of the document.
Recommended Resources

- Categorize by appropriate age group.

- Help distinguishing legitimate materials from misinformation.

- Materials for teachers to educate themselves.
Locally Relevant

- Phenology, water cycle, GHG emission data, etc. that students can analyze.

- Labs they can do on site.
Local climate change
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5 Unnamed Teachers