Instructor Background: Scientific Evidence for Anthropogenic Climate Change

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Focus Questions

• How have people influenced the Earth’s climate?
• How has our understanding of anthropogenic climate change shifted over time?
• How certain are we that anthropogenic climate change is occurring?

Learning Goals

• Read and understand scientific reports
• Write a research report with citations
• Develop expertise in a climate change topic
• Present research results visually and orally

Background Information

• For this project, students will create a consensus scientific report similar to the Climate Change Assessment Reports developed by the Intergovernmental Panel on Climate Change (IPCC).
  o Background information on the IPCC is available at: http://www.ipcc.ch/organization/organization.shtml
  o As of 2012, there are four assessment reports (AR1-AR4) and the fifth report is scheduled for completion in 2013. The preface for AR4 gives a brief introduction to the history of IPCC reports: http://www.ipcc.ch/publications_and_data/ar4/syr/en/frontmattersforeword.html
  o Each of the four assessment reports represents the scientific consensus on climate change at the time the reports were written (AR1: 1990; AR2: 1995; AR3: 2001; AR4: 2007).
  o The four assessment reports, along with other IPCC reports, are located on the IPCC website: http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml
• The students will need to cite sources in their research papers. The IPCC reports are written using citations, so they provide a good example to students on how to cite sources.
• We recommend that the students use APA style citations, since there is a lot of background information about this style on the Purdue OWL website (http://owl.english.purdue.edu/owl/resource/560/1/).

Resources and Materials Needed

• Access to the internet and word processing software
• Materials to create poster or video presentations of the research
Procedure

The following procedure is a suggestion that includes ideas from teachers participating in the 2011 UWHS/NASA Climate Science Workshop. Other options and suggestions for modifying the procedure are listed below. Overall, we recommend that teachers modify the student instructions/expectations based on what fits best with their class.

1. The students will work in groups of 3-4. Each group will pick a climate research topic from the provided list.
2. Each group will read the assigned reading for their topic and write an 8-10 page research report.
   a. The assigned reading includes excerpts from each of the four IPCC assessment reports. Therefore, it will give the students perspective on how scientific understanding of their topic has changed over time.
   b. The groups should write a first draft of the report and get comments from another group and/or the teacher before turning in the final draft.
   c. After finishing the reports, each group will prepare a poster describing the main points from their paper.
3. At the end of the unit, each group will present their topic to the rest of the class using their poster. (This is very similar to a poster presentation at a scientific meeting.) Presentations should be about 20 minutes, with 10 additional minutes for discussion.
   a. The discussion will be led by the students and should focus on further scientific research that should be done on the topic. The group presenting should take notes on what the class decides.
4. Finally, the class will compile its consensus report on climate change. This could be a binder with a page for each topic. Each topic’s page would include the abstract copied from the students’ paper and a bulleted list of the future research ideas brainstormed by the class.
   a. Note: no class has completed the “consensus report” part of this project yet, so there is no feedback on how it works in an actual classroom situation.

Other options and suggestions for modifying this procedure:

1. Grading could be mostly focused on the consensus report and presentation, with the full report just graded for completeness.
2. Students could be required to find and read 1-2 additional papers or articles outside of the assigned reading.
3. It was suggested that students could take field trips to shadow scientists at their work.
4. If more than one school is working on the project at the same time, it was suggested that it would be educational to bring all the students together for the presentations, to make the experience more like a scientific meeting.
5. It was also suggested that UW graduate students might volunteer to “grade” or provide feedback on the poster presentations.
6. During the 2012 school year, one teacher implemented this project in his class. He had each group pick one of the topics and create a video or give a PowerPoint presentation on their topic, in addition to turning in a written report. (And, many of the students prepared AMAZING videos!)