Connecting Climate Change Education with the “Teacher Behind the Closed Door”

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Paper 2.1
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Earth2Class Workshops for Teachers
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After most high school and middle school teachers close the classroom door, they become the “expert” for their students.

- But when teaching about climate and climate change, many rely heavily, if not solely, on textbooks or highly-produced media, in lieu research-based journals or participation in investigations.

- Consequently, they are often limited in what they know and can present to their students. Not good enough for the future!
Effective PD for teachers now

- Requires **multifaceted approach** combining **curriculum development**, understanding the **nature of science**, applications of **engineering and technology**, integrating **reading and writing**, and other pedagogical components.

- **E2C workshops** provides **one model** for creating effective training to meet the NGSS challenges.

- More than 140 workshops since 1998 bringing together research scientists, classroom teachers, students, and others to learn about wide range of investigations conducted at LDEO.
Earth2Class Workshops at the Lamont-Doherty Earth Observatory of Columbia University (E2C) provides one effective strategy to connect cutting-edge research with teachers and students.

Monthly workshops held at the LDEO campus bring investigators, teachers, and students together to share discoveries that may not get into textbooks for years.
E2C approach

- During workshops, participants interact with scientists to gain understanding of:
  - What stimulated the research questions
  - How scientists coordinate components of investigations
  - Learn how results are disseminated

- Aligns strongly with NGSS goals: mastery of the disciplinary core ideas, science and engineering practices, understanding the nature of science, and cross-cutting relationships
General E2C workshop format

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>08:45 – 09:30</td>
<td>Arrival of Participants and General Announcements</td>
</tr>
<tr>
<td>09:30 – 10:00</td>
<td>Background Information on Today's Topic</td>
</tr>
<tr>
<td>10:15 – 12:00</td>
<td>Guest Scientist(s) Presentation(s)</td>
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<tr>
<td>12:00 – 13:00 (noon - 1 pm)</td>
<td>Lunch with the Scientist</td>
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<tr>
<td>13:00 – 15:30 (1 pm - 3:30 pm)</td>
<td>Designing curriculum to meet NGSS and your State Standards</td>
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Dr. Taro Takahashi – Ocean Acidification

Connections with NGSS

- DCI ESS2.D: Weather and Climate
- PE HS-ESS2-6: Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere
- NoS: Scientific knowledge is based on empirical evidence
- SEP: Engaging in Argument from Evidence
- CC: Cause & effect, stability & change
Dr. Joaquim Goes & Annette DeCharon –
Alternations in the Indian Ocean ecosystems

http://earth2class.org/site/climate-snow-caps-and-the-arabian-sea-with-
joaquim-goes-and-annette-decharon-apr-2014/
ESS2.E: Biogeology

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

Changes in Himalaya snow cover affects nutrient flow to Indian Ocean, marine ecosystems, and climates

Teleconnection (Skype) with co-presenter
The Effects of Snow Melt on Monsoon-driven Primary Productivity

Snow Cover in the Himalayas

Temperature

Atmospheric Pressure

Indian Subcontinent [land]

Indian Monsoon Winds

Arabian Sea [ocean]

Nutrient-rich Water

Chlorophyll Concentration

Coasts

Primary Productivity

warming can reduce

is connected to

is related to

systems located over

Monsoon Winds

Algal Blooms
Dr. Michael Kaplan – Dating de-glaciation in Alpine Regions

- How can we find out when glaciers retreated when there are only boulders & till?

cosmogenic isotopes

http://earth2class.org/site/how-glaciers-have-behaved-in-patagonia-in-the-past-with-mike-kaplan/
Dr. Karen Smith – Climate Change and Stratospheric Ozone Depletion

Dr. Natalie Boelman – Impacts of Acute Warming on Arctic Flora and Fauna

Past and future E2C Workshops

- How Does the Land Affect Climate?
- Global Climate Models: Any Progress on Prediction?
  Tree, Climate, and Societal Relevance: A Case Study in Mongolia
- Could Global Warming Mean Less Sunshine and Less Precipitation?
- Climate Change Human Health Project

http://earth2class.org/site/category/climate-change/
E2C website

www.earth2class.org

- Enables teachers and students not able to attend ‘live’ workshops to access archival versions

- Also provides wide variety of educational resources for ES learners
  - Slideshows, activities, links to Standards, Regents Exams, websites

- Valued on national basis--average of >175k hits per month from thousands of site visitors.
What’s Next?

- Over the next few years, E2C program plans expansion to provide more resources for educators seeking to introduce NGSS-based programs in their districts
- Revise and update website resources
- E2C model can be applied in other settings, with appropriate modifications

Questions? michael@earth2class.org

www.earth2class.org