Cultivating Climate Change Education

Laney Siegner
PhD student, UC Berkeley Energy and Resources Group
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My climate (education) story

- AmeriCorps Citizen Schools Teaching Fellow
- Energy and Resources Group (ERG)
- Master’s Project: Farm to school program evaluation in San Juan Islands
- Climate change and school garden curriculum development
- Piloting in Oakland, CA and Lopez Island, WA
- My approach: unite research and practice

Mother-daughter climate education team; Lowell School Fall 2016
Climate Education Contexts

Oakland, CA

Lopez Island, WA
1. Food and Climate Change

- Agriculture accounts for up to $\frac{1}{3}$ of greenhouse emissions (Gilbert 2012)
- Large source of emissions, but also large sink capacity via soil carbon sequestration and improved N-fertilizer management (Lal 2011, 2012)
- Land management and agroecology strategies for climate change mitigation are high potential, low cost solutions with multiple benefits
How food/ag impacts climate change:
- Source of carbon emissions (could be sink)
- Personal food choices
- Transportation

How climate change impacts food/ag:
- Decreased ag yields
- Unstable climate-altered precipitation and heat trends

FOOD SYSTEM

CLIMATE SYSTEM
Climate change, quite simply, can’t be halted without fixing agriculture.

~ Michael Pollan
Climate Education Opportunity

- Food “frame” for climate change instruction
- Teach climate while engaging students in solutions in school garden
- Garden system is a good metaphor for the complexity of the climate system (OUSD garden instructor)
- Build on the success/efficacy of outdoor garden-based education (Blair 2009)
Curriculum Development Process

- Farm to school evaluation
- Climate Generation Summer Institute
- Curric. Dev. and Piloting in Oakland and Lopez Island
2. Curriculum pedagogy

- Hypothesis: experiential learning and hands-on activities are better strategies for teaching climate change to youth than didactic, lecture-based instruction (want to explore this further in my PhD research)
- Inspired by Paolo Freire’s critical pedagogy, David Kolb’s experiential learning cycle
<table>
<thead>
<tr>
<th>Learning Objective</th>
<th>Topic</th>
<th>Experiential Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is climate change? How do food systems interact with climate systems?</td>
<td>Weather vs. climate</td>
<td>Climate storytelling exercise, weather data-logging in garden</td>
</tr>
<tr>
<td>2. What factors, including agriculture, have caused the rise in global temperatures?</td>
<td>Causes of climate change; Carbon cycle</td>
<td>CO₂ Freeze Tag</td>
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<tr>
<td>3. What are the effects of climate change and what will that look like here?</td>
<td>Effects of climate change</td>
<td>Garden resilience plan</td>
</tr>
<tr>
<td>4. How can we monitor effects locally?</td>
<td>Farmer monitoring efforts</td>
<td>Guest speaker or tour of local farm</td>
</tr>
<tr>
<td>5. What are local solutions to climate change?</td>
<td>Climate action and solutions</td>
<td>Composting</td>
</tr>
<tr>
<td>6. Launch class food-climate action project(s)</td>
<td>Student determined, i.e. biochar</td>
<td>School garden improvement project</td>
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</tbody>
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Example of solutions-oriented lesson: Composting

Students are composting in the Lopez school garden, adding material to the appropriate bin after learning about the potential for compost application to increase soil carbon sequestration capacity.
Who is the curriculum for?

- Farm to school programs
- School garden teachers
- Science teachers (ideally with a school garden)
- Informal educators
- Education NGOs w/ focus on curriculum development or dissemination
42,587

Schools participating in Farm to School

High potential to incorporate food and climate education
3. Results

- Based on 4 school pilots, 65 students
- Ongoing- implementation in 5-6 additional schools this spring (in California and Oregon)
## Student Environmental Literacy - San Juan Islands (% Correct)

<table>
<thead>
<tr>
<th></th>
<th>Main GHG</th>
<th>GHG Concentration</th>
<th>Global Temp. Rise</th>
<th>Water Cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lopez</td>
<td>42</td>
<td>42</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>Orcas</td>
<td>52</td>
<td>3</td>
<td>32</td>
<td>71</td>
</tr>
<tr>
<td>San Juan</td>
<td>22</td>
<td>0</td>
<td>11</td>
<td>22</td>
</tr>
</tbody>
</table>
Curriculum Piloting - Pre/Post Surveys, Oakland

Box Plot of Pre/Post Survey Results (All Schools)

Questions Correct

1 Pre
N = 40 students
2 Post

Mean: 53% (pre) vs 68% (post)
t-score = 3.18, P-value = .001
Results by Question - Oakland

- Greenhouse effect: Pre 75, Post 79
- Current CO2 (400 ppm): Pre 54, Post 59
- Target CO2 (350 ppm): Pre 33, Post 52
- Carbon Sequestration: Pre 48, Post 73
- Temp. Rise Limit (2°C): Pre 35, Post 36
Curriculum Piloting - Student Engagement, Oakland

**Addressing and acting on climate change is a priority for me in life**

**What I do personally matters when it comes to mitigating climate change**

**Number of Environmental Activities I Participate In (out of 10)**

- Pre (TOTAL): 3.7
- Post (TOTAL): 5.1
Research Highlights

- Student: knowledge improvements (15%), positive feedback
- Co-teacher interviews
  - “A lot of climate change is out of control and scary for kids, but to teach while doing something positive balances that out.”
  - “One of the things I like about having co-teachers is that it just means more to [students], they listen better... and I learned from the experience and I can begin to weave it into what I do and teach.”
- Challenges:
  - For some students, climate change still feels like a future issue, more pressing concerns day to day
  - Keeping it interactive and engaging, minimizing “teacher talk”
Key takeaway:
Gains are positive, but want to do better!
Path Forward

- Partnerships with farms and climate education NGOs
- Longer, sustained engagement
- Farm school for climate change education
Thanks!

Any questions?

Contact info:

asiegner@berkeley.edu