MADE-CLEAR CCEP Grant

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The Context for Climate Change Education
Sensitive Topic Definition

- “Issues that deeply divide a society, that generate conflicting explanations and solutions based on alternative value systems, are considered controversial [sensitive]” (Harwood & Hahn, 1990).
Identified Earth System Sensitive Topics in Science Education (USA)

NESTA Survey of Earth and Space Science Teachers about Needs/Concerns

<table>
<thead>
<tr>
<th>Sensitive Topic</th>
<th>% Feeling Difficulty or Pressure from Parents, Students, Administrators, or Other Community Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evolution</td>
<td>68%</td>
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<tr>
<td>Age of the Earth</td>
<td>47%</td>
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<tr>
<td>Climate Change</td>
<td>43%</td>
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<tr>
<td>Solar System Formation</td>
<td>22%</td>
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<tr>
<td>Planetary Formation</td>
<td>13%</td>
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</table>

There were 275 respondents to this survey (Johnson, 2011).
## Public’s Agenda for President and Congress 2001–2012

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<tbody>
<tr>
<td>Strengthening nation’s economy</td>
<td>38%</td>
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<tr>
<td>Improving job situation</td>
<td>68%</td>
<td>75%</td>
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<tr>
<td>Protecting environment</td>
<td>57%</td>
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<td>41%</td>
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<tr>
<td>Reducing influence of lobbyists</td>
<td>35%</td>
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<tr>
<td>Dealing with illegal immigration</td>
<td>55%</td>
<td>51%</td>
<td>41%</td>
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<td>Strengthening the military</td>
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<td>Dealing with global trade</td>
<td>37%</td>
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<td>Improving roads, bridges, and public transportation</td>
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<td>Reducing military spending</td>
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<td>Reforming campaign finance</td>
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<tr>
<td>Dealing with global warming</td>
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Changes from 2001 to 2012:
- Strengthening nation’s economy: +18
- Improving job situation: +25
- Protecting environment: -14
- Reforming campaign finance: -13
Teaching Strategies for Sensitive Topics

• “The formulation of evidence in support of knowledge claims is central to scientific practice and has been identified as a pedagogically inventive way to engage students in meaningful discussions related to controversial scientific issues such as global climate change” (Schwizer & Kelly, 2005, p. 75).

• Begin by teaching relevant science content, then discuss related policy or economic issues, and end by having students explore their own personal stances (Kirk, 2011).

• Invite guest speakers to come and speak (McGinnis & Simmons, 1999).
MADE-CLEAR Project Research Prospectus

• A focus on teachers learning how to teach climate change to their students guided by the Common Core (defined by the Next Generation Science Standards, once approved).

• Research guided by theory (learning progressions with a socioscientific issues perspective\(^1\)).

\(^1\) A socioscientific issues perspective adds a personally and socially relevant approach to learning progressions.
MADE-CLEAR Project
Research Prospectus

Goal: Embed climate change science into formal and informal education in the region.

Objective: Advance learning sciences research in the areas of conceptual change and learning progressions to create new understandings of how students from diverse backgrounds engage in learning about climate change.

- Assessments will draw on students experience and make student thinking visible, which will improve instructional interventions (see Smith et al., 2004).
**Goal:** Embed climate change science into formal and informal education in the region.

**Objective:** Assess new approaches to professional development (PD) that foster changes in teacher knowledge, skills, and dispositions through inquiry and the exploration of the relationships of science and technology to society.

- Assess outcomes of PD activities that incorporate learning sciences principles and climate change science through quasi-experimental design, case studies, and survey research.
LEARNING PROGRESSIONS
Learning Progressions

- More advanced understanding over time
Definition of Learning Progressions

• “Learning progressions are descriptions of the successively more sophisticated ways of thinking about a topic that can follow one another as children learn about and investigate a topic over a broad span of time (e.g. 6 to 8 years). They are crucially dependent on instructional practices if they are to occur” (National Research Council, 2007, p. 214).
Example: Sea-Level Rise

<table>
<thead>
<tr>
<th>Potential SLR LP indicator based on Gunckel, Covitt, Salinas &amp; Anderson (2012, p. 854)</th>
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</thead>
<tbody>
<tr>
<td>“SM” stands for scale and mechanisms</td>
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<tr>
<td><strong>Level 1 (Lower Anchor)</strong> “Informal Accounts”</td>
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<tr>
<td>SM1: Students explain sea-level rise on a macroscopic scale only, focusing on immediately visible structures or phenomena without including mechanisms for phenomena.</td>
</tr>
</tbody>
</table>
Three Climate Change Learning Progressions

1. Urban Heat Island Effect

2. Sea-Level Rise

3. Extreme Weather
Research Goals with Learning Progressions

To investigate:

1. how teaching a particular climate change impact helps students in a particular geographic region to learn about climate change science.

2. how teachers can use these learning progressions to teach about climate change science.

3. growth over time of students’ knowledge of climate change.
References


References


NSF Disclaimer

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