Climate Change Education in the Southeastern U.S. Through Public Dialogue: Not Just Preaching to the Choir

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ABSTRACT

Climate change education in the southeastern United States can be challenging. Due to economic factors, as well as the conservative political and faith perspectives typical of the region, high proportions (40%) of the population are not engaged, not convinced, or doubt Earth's climate is changing or that climate change has anthropogenic causes. Finding ways to bring such people into the climate change conversation is a crucial first step. This paper describes a public dialogue approach that brings together scientists with heterogeneous groups of faith, leisure/outdoor, educator, and agriculture communities to promote perspective sharing in an open and safe environment. It also describes the research we conducted on participants' experiences. Participants' postdialogue responses showed that they rated their learning about policies that might address climate change more strongly than their learning about climate science or the impacts of climate change. Exploratory factor analysis (EFA) of postdialogue evaluations found that three factors explained 63% of the variability in the data and represented substantively distinct components of participants' experiences: (1) feeling respected, (2) learning about climate science and policy content, and (3) learning about faith-based and other new and different perspectives about the issue. Qualitative findings supported quantitative results, suggesting that respondents felt comfortable speaking freely about their views on climate change, politics, and religion and that they valued engaging with diverse groups to have an open discussion about climate change. The dialogue approach has potential to depolarize climate change discourse through relationship building so that diverse communities can engage in productive and civil conversations expressing multiple perspectives. © *2014 National Association of Geoscience Teachers*. [DOI: 10.5408/13-061.1]

Key words: dialogues, Climate Literacy Partnership of the Southeast (CLiPSE), informal education, conservative communities

INTRODUCTION

The scientific consensus is clear—anthropogenic climate change is a reality and poses serious environmental, economic, health-related, and other threats to humanity and other species during the coming decades and beyond (Cook et al., 2013; IPCC, 2013; Melillo et al., 2014). Addressing the causes of climate change, and working to mitigate its potential impacts, should be a political and societal priority. Yet broad swathes of the American public (about 33%) are "dismissive, doubtful, or disengaged" about the reality of climate change (Pew Research Center, 2008; Leiserowitz and Smith, 2010; Leiserowitz et al., 2010, 2012). Those dismissive of climate change are certain that climate change is not occurring and often regard the issue as a hoax (Leiserowitz et al., 2012). Those doubtful of climate change are uncertain whether global warming is occurring but believe that if it is happening, it is attributable to natural causes, not human activities (Leiserowitz et al., 2012). Those disengaged about climate change have given the issue of climate change little to no thought and have no strongly held beliefs about it, know little about it, and do not view it as having any personal relevance (Leiserowitz et al., 2012).

In the Southeast U.S. (SEUS), the percentage of people who are dismissive, doubtful, or disengaged is closer to 40%, and in some states, such as Alabama, Texas, and Mississippi, it is between 45% and 50% (Monroe and Adams, 2012). The reasons for these regional variations are complex, but the conservatism of the SEUS could be a contributing factor (Halpin and Agne, 2009). The SEUS region has the most conservative political ideology in the country (Halpin and Agne, 2009), the highest poverty rates (Bishaw and Renwick, 2009), and the highest percentage of Protestant Christians (Kosmin and Keysar, 2009). Furthermore, the region's dependence on industries that contribute to climate change, such as coal and oil, has been shown to contribute to this increased skepticism (Leiserowitz, 2003a, 2003b, 2008; Pew Research Center, 2008; McCright and Dunlap, 2011).

The skepticism in the SEUS is ironic since reports suggest that the SEUS will be hit hard by climate change impacts and that these impacts present the region with considerable and costly adaptation challenges (Roach, 2005; Melillo et al., 2014). Sea level rise and increased frequency of high-magnitude storm events (Karl et al., 2009) will increase the danger of coastal flooding and shoreline retreat in heavily populated low-lying areas and will increase groundwater salinity. The myriad impacts on wetlands include saltwater intrusion, increased fragmentation, habitat degradation, and reduced sedimentation (Nicholls and Cazenave, 2010), which will affect their carbon sequestration capacity and primary productivity (Morris et al., 2002). Agriculture will be affected via increased droughts and heat-related stresses for plants and animals; increased crop diseases due

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to higher winter survival rates of disease pathogens and parasites (Hatfield et al., 2008); temperature and carbon dioxide conditions that favor the growth of weeds and invasive species, such as kudzu; and changes in species composition of SEUS forests (McNulty et al., 1996; Bachelet et al., 2001).

In addition to these cultural and economic factors, recent research on climate change risk perceptions has advanced an intriguing hypothesis that we need to consider when designing climate change education opportunities. The cultural cognition thesis (CCT) suggests not only that people depend on their cohorts in forming opinions about climate change science but also that the more educated people in a group, with appropriate cultural motivation, use their knowledge of science to influence the less scientifically literate in the group. This phenomenon is known as cultural polarization (Kahan et al., 2012), and it assumes that most people delegate the task of forming an opinion on important topics to others (Boholm, 1996). Without some other opportunity to engage the issues, people will likely believe the dominant view in their group.

A key challenge for climate change educators in the SEUS, and perhaps elsewhere, is how to successfully bring people into a conversation about climate change and its impacts, given the region's religious and political ideologies, its rates of doubt about or dismissal of the science, and its implications that are higher than in other parts of the U.S.

THE CLIPSE PROJECT

The Climate Literacy Partnership of the Southeast (CLiPSE) was funded by the National Science Foundation through its Climate Change Education Partnership program (Grant DUE 1043398) to find a way to bring the climate change conversation to communities that typically do not engage with one another. Since climate change is widely recognized as a polarized topic, CCT suggests, and CLiPSE assumed, that prior group influences on opinion are unavoidable (Dunlap and McCright, 2008; Nisbet, 2009; McCright and Dunlap, 2011; Kahan, 2012). The model from which CLiPSE worked is rooted in the premise that people who are already convinced about climate change cannot change public opinion alone but may be influential in their own cultural communities or may make important partners with key influential people. However, in order for public opinion and policy to change and create momentum to reduce greenhouse gas emissions and to mitigate the impacts of global climate change, these key influential people and scientists must first learn how to talk to people, especially those who may not share the same views with regards to climate change. Although many climate scientists and activists understandably want to act quickly in order to address the urgent problem of global warming, we felt it was important to acknowledge that we will not make real progress without broad input, especially since we believe that solutions generated from a range of perspectives will be more effective and sustainable. Climate scientists may know the science, but they may not understand the economic pressures or how to manage policy and decision-making channels and they may not have the same values as political and religiously oriented communities and constituencies. In contrast, political and religious leaders may understand the values and motivations of their communities and how to mobilize them to work toward alleviating climate change, but they may not be experts in the science.

The primary programmatic goals of CLiPSE were to (1) form a robust regional network reaching several key audiences in the SEUS, (2) create a strategic plan and pilot activities to engage these key audiences, and (3) inventory and provide resources to support climate education with these audiences. To address these goals, CLiPSE brought together 24 core partners and 50 partnering organizations from 11 states and regions (Alabama, Arkansas, Georgia, Florida, Kentucky, Louisiana, Mississippi, North and South Carolina, Tennessee, and Texas). CLiPSE developed a strategic plan and organizational framework for a shared vision of climate change education across the region, tested and iteratively designed pilot dialogue sessions (the focus of the presented research study), and inventoried over 2,000 existing resources, including Web sites, lesson plans, books, and sermons. CLiPSE deliberately chose several key audiences representative of the SEUS in its strategic plan. Though a portion of CLiPSE's work was in schools and colleges, it was clear that making a difference in climate change education in the SEUS required outreach to a range of people outside of schools, in particular through religious and community-based organizations, in a way that was uniquely tailored for the region (Weber, 2010). Since the SEUS has the highest percentage of evangelical Christians compared with elsewhere in the U.S. (Kosmin and Keysar, 2009), one key audience for these efforts was faith-based communities. Others included groups focusing on agriculture, leisure/outdoor audiences such as garden clubs and hunting/fishing organizations, and those working to reach people from a variety of racial and cultural backgrounds. CLiPSE focused on groups that had a strong prevalence in the SEUS—and thus could provide the possibility of reaching important communities—and held some value for environmental protection and stewardship (e.g., protecting the environment as a source of income and/or enjoyment or stewardship of God's creation). Though groups needed to be open to and interested in using sound science to educate their members, they varied in the extent to which scientific evidence was valued. Creating opportunities for climate change education with these audiences would not just be preaching to the choir—that is, the orienting world view of some of these groups might be different from those of the scientists and educators on the CLiPSE team, and we would need to work hard to find productive ways to speak across these differences if our efforts were to be successful. (We recognize the irony that in this case, those with a science-driven world view are "the choir," while those with a more faith-based perspective may not even be in "the pews" of climate change acceptance.)

Still, we were left with the question of how to engage communities on this urgent and polarizing issue. Like most things in the South (and elsewhere), relationships are key to setting the stage for starting and continuing communication. With our belief in the importance of relationship building and open communication at the forefront, the CLiPSE project began a series of meetings and dialogue sessions that brought together interested parties from multiple communities in the SEUS from whom we sought to learn while teaching them about climate change and its impacts.

RESEARCH GOALS AND OBJECTIVES

Building off of the programmatic goals of CLiPSE and the larger project activities, in this paper we specifically address the following research goals related to the dialogue activities:

- Evaluate the efficacy of the dialogue approach as it applied to climate change education in the SEUS
- Analyze the postdialogue evaluation responses provided by participants to identify the connections participants made between various issues and aspects of the dialogue approach

We wanted to know how effective the dialogue approach was in helping create opportunities for those from multiple perspectives to share their views on climate change and learn about the issue. How much did participants value these experiences and feel as though they could share their opinions and be heard? What were the most important aspects of the dialogue event that seemed to help participants reflect on climate change and gain new knowledge and perspectives? We share some of the issues we faced and how prior work helped us devise methods to address them. We describe our thinking, experiences, and activities, detailing the dialogue approach and why it was important to CLiPSE. We describe the dialogues and present data about their impact. Finally, we discuss what we learned from the dialogues as an approach to engage communities that would otherwise be left out of the climate change conversation and what we learned about creating ways of communicating that address the values and belief systems that are threaded through the fabric and culture of the SEUS.

LITERATURE REVIEW

Our work developing communities and discussion groups to talk and learn about climate change and how we might address its impacts builds both on the literature on climate change education and communication and on the literature on creating community dialogue about difficult issues. We briefly review this literature here.

Climate Change Education Barriers

The unique characteristics of the SEUS exacerbate well-known cognitive and perceptual challenges to climate literacy and to understanding complex Earth systems in general (Herbert, 2006; Grotzer and Lincoln, 2007; McNeal et al., 2008). Cognitive and affective barriers to increasing the public's knowledge, concern, and action about climate change include lack of information, skepticism or distrust of the science, feeling discouraged about whether any actions could make a difference, feeling that other priorities and values are more important, perceived inaction by others, contrary social norms (e.g., consumerism), and difficulty perceiving risks (e.g., risks of relatively rare events or from slow changes in steady-state characteristics; Ockwell et al., 2009). Educators may first consider lack of knowledge and/or misconceptions, since climate change is a complex and sometimes counterintuitive topic (McCaffrey and Buhr, 2008). Understanding climate change processes and impacts is even more difficult because climate change occurs as a result of interactions among the Earth system components—atmosphere, hydrosphere, biosphere, lithosphere, cryosphere, and anthrosphere. The Earth system exhibits complex characteristics such as emergence, nonlinear behavior, disequilibrium, and chaos over multiple spatial and temporal scales, and the interactions frequently occur at the interfacial regions between Earth system boundaries (Sell et al., 2006).

Students often poorly understand radiative processes, water vapor, feedbacks, and the timescales over which climate change can occur (Gautier and Rebich, 2005). Some students believe the greenhouse effect is due to the ozone hole or that greenhouse gases are bad rather than necessary for moderating Earth's climate (Boyes and Stanisstreet, 1994; Gautier and Rebich, 2005). Furthermore, Americans in general often have poor explanations of the greenhouse effect (Ranney et al., 2012). Individuals may use weather events, which are localized and short term, to draw conclusions about the potential for climate change, which would occur regionally over much longer periods (Choi et al., 2010). In order to assist learners in reasoning about climate change, new ideas must be integrated with preexisting conceptual models (Vosniadou and Brewer, 1992; Bransford et al., 1999; Chi, 2005), and appropriate learning progressions must be established (NRC, 2007).

Emotions can strongly influence learning about a topic. People often default to reliance on their fundamental values and worldviews when making decisions, especially about topics that are highly controversial and polarizing, which can be true if human-induced climate change is discussed (Rutherford and Weber, 2011; Lombardi and Sinatra, 2012). Incoming information that addresses climate change may be rejected upon quick judgment if it challenges the deeply held beliefs of an individual or those of the group with which that person most identifies (Kahan et al., 2007, 2012). Confirmation bias can lead people to selectively hear and collect evidence that supports their beliefs and values (Kahan and Braman, 2008; CRED, 2009), ignoring information that challenges preexisting beliefs.

Understanding people's prior beliefs and perspectives is, therefore, crucial to designing effective climate change education efforts. Often, however, well-intentioned educators do not take a constructivist approach and instead see the public as empty vessels waiting to be filled with information (Irwin and Wynne, 1996). Engaging people at an affective, emotional level through exploration of nonexpert climate perceptions may be a more effective approach to gaining interest and engagement of the public (Ockwell et al., 2009). Communication approaches must not only account for the cognitive issues but must also address affective (or emotional) barriers (Irwin and Wynne, 1996; Ockwell et al., 2009; Weber, 2011; Lombardi and Sinatra, 2012).

Dialogue

Though climate change can be a polarizing topic that has distinct cognitive and affective barriers, dialogue approaches may be a step toward building positive relationships and attitudes (Bruning et al., 2008) to best facilitate interactions among heterogeneous audiences, decision makers, scientists, and the public (Abelson et al., 2003). Dialogical communities have been described by a number of scholars in diverse fields, including philosophy, theology, social sciences, and nursing (Porter, 1995; Moore, 2004; Miller and Hafner, 2008).

TABLE I: Characteristics of a dialogical community.

Diversity of viewpoints is acknowledged and valued.
Vibrant and potentially transformative conversation occurs when groups are self-aware about the ways in which their members differ.
Mutual respect is the key to meaningful dialogue.
Dialogue occurs in a context in which speakers and listeners embrace responsibility for one another and the community at large.
Participation in dialogue balances rights with responsibilities.
Respectful speaking is coupled with empathetic listening (each participant tries to take the perspective of the other).
Meaningful communication is open ended and potentially transformative.
Participants recognize and articulate their standpoint, its foundations, and its boundaries (values, assumptions, etc.).
As the conversation unfolds, participants are willing to reconsider the boundaries that form their standpoint without being asked to relinquish foundational values.
Dialogue is not governed by a dialectical process.
Dialogue seeks to resolve oppositions through a synthesis of viewpoints, values, etc.

While definitions of the key elements vary, a dialogical community generally has the characteristics described in Table I. Briefly, because a dialogical community values diversity, differences are not a problem to be solved. Dialogue brings to the table voices that have routinely been excluded from participation. To "unleash the capacity of communities to create their desired future," it "invite[s] vibrant discourse among multiple stakeholders while supporting and enhancing a network of relationships, strengthening the fabric of the community and its ability to get things done" (Finegold et al., 2002, p. 236). Dialogue also provides opportunities for sharing perspectives and creates a more informed citizenry (Abelson et al., 2003, p. 241) that is engaged on the issues, making their voices and values heard (Moser and Dilling, 2004).

The dialogue we describe here is not deliberation, which is "the act of considering different points of view and coming to a reasoned decision" (Abelson et al., 2003). The dialogue approach CLiPSE employed set out not to resolve a problem with a decision at the end of the event but rather to discuss the various perspectives of our participants and to invite them into an honest conversation about climate change in order to engage individuals and motivate them to leadership and action in the SEUS. Our goals were to start the conversation in a way that promoted perspective sharing and to build new relationships that would lead to future engagement and leadership on this issue in the region. To facilitate these conversations effectively, CLiPSE used a model of dialogical community that valued diversity, encouraged respect among participants, recognized and articulated viewpoints, and prioritized understanding over resolution. CLiPSE dialogue sessions aimed to give stakeholders who would not normally be in the same room together an opportunity to hear and deepen their understanding of others' realities and then to continue to support these stakeholders to bring evidence-based critical thinking to their conversations. We designed and implemented three public dialogue events at two locations in the SEUS for CLiPSE partner and public participation, with the following programmatic goals:

- To create a positive environment for conducting climate conversations in the SEUS
- To include those who are not typically included in such conversations
- To provide direct and indirect access to experts from a variety of related disciplines
- To help CLiPSE learn to create safe places for people of heterogeneous perspectives to come together and discuss their views in a civil conversation

Although we applied the principles of dialogical community to particular audiences in the SEUS and to the particular topic of climate change, these principles are universal, transferring to other groups and topics. For instance, Interfaith Power and Light in Minnesota, a nonprofit organization committed to "creation care"—that is, environmental stewardship based on a biblical commitment to caring for God's creation—applied the dialogue and relationship-building approach to exclusively faith-based audiences, educated hundreds of thousands of congregants, and worked with every major religious denomination in the state (http://mnipl.org/). In addition, the Southern Rural Development Center (SRDC, http://srdc.msstate.edu/) works to foster civic action by communities through public deliberation approaches. The center has worked with people in coastal areas in the South to discuss how to resolve the impacts of Hurricane Katrina, address poverty and welfare issues, and discuss immigration issues, among many others. Finally, the Kettering Foundation (http://kettering.org/), a nonprofit organization that engages in joint research with others to employ a democratic approach to addressing society's problems, publishes results of their work through the National Issues Forum (Kettering Foundation, 2014). They operate through joint learning exchanges with citizens' organizations, communities, and institutions that are experimenting with ways to strengthen democracy where "the objective of an exchange isn't to praise or blame but rather to share what participants struggle with and hope to learn more about" (http://kettering.org/). An example of their work includes results of 115 public forums centered on higher education and its future (Johnson et al., 2014). Although the application of the dialogue approach in CLiPSE was not new, what makes our work different from previous efforts is that we aimed to research the efficacy of the public dialogue approach about the climate change issue among southern conservatives.

PILOT IMPLEMENTATION

The first event, in Savannah, Georgia, served as our initial dialogue implementation and targeted a heterogeneous audience of faith communities, agriculture communities, K–12 educators, and leisure/outdoor enthusiasts. Participants from the public were recruited through the SRDC's agriculture extension agents, who e-mailed advertisements about the event to their listservs. Participants were assumed to be representative of the general cultural, political, and religious characteristics of the targeted

constituencies. Some CLiPSE partners (experts in climate science and/or educators invested in climate education) attending a concurrent workshop also participated in the dialogue event and distributed themselves among the tables. Volunteer participants ($N = 77$) attended a 2-h session at a local dining facility, where dinner was provided. Participants of similar backgrounds or interests (e.g., educators, outdoor enthusiasts, evangelicals, and farmers) were asked to sit in tables of eight and were joined by a CLiPSE partner and a trained moderator. At this initial dialogue, we decided that discussions among relatively homogenous groups would help us understand what these groups thought were the biggest roadblocks to their community partaking in climate change education discussions and where conflicts in perspectives within the community and with other communities were likely to occur. Furthermore, it helped us learn to conduct a dialogue event for the more heterogeneous second and third dialogues that took place in Starkville, Mississippi.

Moderators were trained for 2–3 h prior to the dialogue by a representative from the SRDC, a regional leader in public discourse on controversial topics. Training provided basics on the role of the moderator, offered opportunities for role playing and observation to experience how a moderator should respond to various dialogue group scenarios, and gave sample phrases to help start and end conversations to engage and include all participants. Moderators worked to ensure that the golden rules of dialogue (Nash et al., 2008) were explained and followed. These rules included the following:

- Listen to others as we want to be listened to
- No matter how outrageous a point of view might first appear, we must always grant it the right to be heard and understood
- Be willing to find the truth in what we oppose and the error in what we espouse—at least initially

Moderator questions focused on participants' own interest in climate change, their perceptions about polarization or politicization of the issue and its possible causes, the primary concerns and perspectives of their communities, identifying others who might disagree with these perspectives and their possible reasons, and identifying possible shared interests and ways to "make positive strides together" (Table II). Participants were asked to discuss these questions in their groups while they had dinner. At the end of the discussion, they were provided opportunities to ask their table scientist pressing questions about climate change, provided the CLiPSE Web site URL, and introduced to the suite of CLiPSE partners to obtain further information about the topic of climate change. Evaluations were collected at the end of the evening to assess its impact and to inform modifications of future events.

The second and third public dialogue events targeted college students and community members at and around Mississippi State University in Starkville. Participants were assumed to be representative of the general cultural, political, and religious characteristics of the targeted constituencies. Participants attended one of two 2.5-h sessions where a light lunch or dinner was provided. The second session ($N = 58$) was mostly students and was advertised through local media, university press releases, student organizations, and relevant university courses. The third session later that day ($N = 33$) targeted the local public and was advertised via press releases, local newspapers, Web site announcements, and flyers at local business establishments and churches. CLiPSE intentionally advertised to and recruited from its target audiences, including those from local churches with e-mails to their leaders, agriculture communities through the university extension service listservs, and invitations to local leisure/outdoor groups such as the Deep South Region of the National Garden Clubs.

Since our programmatic approach employed an iterative design, both these sessions differed from the first event in several ways. Responding to the Savannah group's desire to increase diversity of views in the conversation, Starkville participants were placed in heterogeneous groups of 5 to 8 and asked not to sit with those they knew previously. A panel of three experts representing faith, science, and policy kicked off the event, each providing a 10-min overview of their perspective on climate change. The first speaker, a faith-based expert, was from a bordering state and worked at the interface between resource use and conservation. He was a key adviser to numerous evangelical organizations and leaders on issues pertaining to climate change and creation care. The second speaker was a local professor and scientist who studied the impacts of a changing climate on SEUS agricultural systems. The third speaker was a former southern Republican congressman who was outspoken about the issue of climate change and led a nonprofit organization that aimed to reach conservatives and inform them about free-market mitigation policies related to taxing carbon emitters.

Once the speakers completed their overviews, trained moderators (consisting of graduate students and faculty from the CLiPSE effort) joined the tables to facilitate a conversation. They presented and reviewed the golden rules, posed questions about participants' concerns about climate change, sought their responses to the views presented by the expert panel, and identified ideas that might garner broad agreement or significant disagreement (Table II). The second part of the conversation focused on a proposal by the policy expert intended to reduce climate change by taxing greenhouse gas polluters (Table II). Groups were asked to discuss this proposal and their views about a variety of potential uses of the resulting revenues, including tax reductions for all Americans, funding of government programs, reducing the federal deficit, and funding mitigation of climate impacts and resilience building (Table II). Each table was provided with easel paper and markers to summarize areas of agreement and disagreement and to note questions they had for the panelists. After the discussion, the members of each table shared their perspectives and questions with the wider group, and each panelist addressed the questions posed and made final remarks. At the end of each session, participants completed evaluation forms, were provided the CLiPSE Web site, and if interested, signed up to be on the listserv to receive further information.

RESEARCH METHODS

At the conclusion of each dialogue session, we administered a short survey to gather information about participants' experiences. All surveys included open-ended questions about what was most valuable about the

TABLE II: Facilitator questions for dialogues.

Savannah Dialogue
Part 1
What is the worst weather-related incident you have experienced personally? Where were you? How were you impacted?
Often when we are among people we don't know well, the conversation turns to the weather. ("Nice weather we are having, isn't it?" or "Sure is cold/hot today.") Why do you think weather is such a default topic?
Why does this topic of climate trends interest you personally?
Part 2
Some people have described the topic of climate change as "polarized" or "politicized." Do you think these are accurate descriptions? Why or why not?
What seem to be the underlying questions or aspects that cause the most disagreement?
What makes these questions or aspects so challenging?
Part 3
When you think specifically about these questions from the viewpoint of (ag/faith/K–12/higher ed/outdoor enthusiast), what do you see as the biggest concerns this group may bring to the discussion? What insights might they add?
What groups/people do you think may disagree with these concerns or viewpoints?
Why do you think there is disagreement?
What do you see as some shared interests among the various stakeholder groups?
How could this initiative build on these shared interests to make positive strides together?
What would need to happen for these steps to be successful?
Starkville Dialogues
Part 1
To what extent are you concerned about climate change?
Did any of the panelists make statements that surprised you? If so, what?
On what points made by the panelists do you think there would be broad agreement?
On what points might there be disagreement?
What underlying questions or aspects of this discussion seem to cause the most disagreement?
Part 2
There are lots of options to address climate change. But let's think about the policy that the Representative described, whereby the government would tax global warming pollution and return all revenue raised to the taxpayers. Would you be more or less supportive of taxing global warming pollution if revenues raised by the government were used for:
Income tax reductions for all Americans?
Funding government programs?
Reducing the federal deficit?
Funding climate-impacts resilience building (such as storm/drought protection projects, disaster planning, etc.)?
Part 3
On what points did your table generally agree?
On what points did your table disagree?
On what points did your table want more information?

experience and about the questions or issues "we should have discussed but didn't get to," as well as a space for open comments. In all three dialogues, surveys also included participant ratings of agreement with eight statements about whether people and different viewpoints were respected, their learning about different perspectives, whether they saw areas for possible agreement among different views, and the value of the dialogues. During the first dialogue session, participants also rated two statements concerning possible anxieties in being part of a dialogue about differences. In the second and third dialogues, participants rated four statements about content learning. All ratings used 7-point scales from "strongly disagree" (−3), through "neither agree nor disagree" (0), to "strongly agree" (+3).

Because one of the CLiPSE principal investigators and event organizers required her students to attend the second and third dialogue sessions, we were also able to gather and analyze student reflection papers that were required as part of the course. These papers provided additional insight since they were more free-form than the survey responses.

Quantitative data were analyzed using descriptive statistics to understand average impact, with planned *t*-tests, or omnibus analysis of variance (ANOVA) followed by post hoc comparisons to detect differences among respons-

TABLE III: Participant responses to postdialogue evaluation statements for all three events.[1–3]

Statement	*N*	Mean	SD
Eight common statements presented at all 3 dialogues:			
5. I felt respected as a person.	94	2.41	0.88
1. I felt my views were heard and respected.	92	2.35	0.80
7. I found the conversation valuable.	96	2.08	1.10
6. I see possible areas of agreement with people whose views are different from my own.	95	1.92	0.90
8. I'd like to be part of another dialogue session like this.	97	1.77	1.55
2. I left the dialogue with a better understanding of a view that's different from my own.	97	1.40	1.35
4. I learned about another way of thinking about the issues.	95	1.34	1.32
3. I learned something about what I believe.	96	1.18	1.43
Dialogue 1 only:			
9. *Before the dialogue session*, I felt worried that I would be attacked for saying something someone else disagreed with.	43	−1.49	1.53
10. *At the dialogue session*, I felt worried about being attacked for expressing my views.	43	−2.14	1.19
Dialogues 2 & 3 only:			
13. I learned something new about policies to address climate change.	50	1.82	0.90
14. I learned something new about faith-based perspectives on climate change/stewardship.	52	1.48	1.44
11. I learned something new about climate science.	52	1.04	1.64
12. I learned something new about possible impacts of climate change.	52	0.97	1.55

[1]*N* = number, mean = average scores, SD = standard deviation.
[2]All ratings are on a scale from "strongly disagree" (−3) to "neither agree nor disagree" (0) to "strongly agree" (+3).
[3]Statements and descriptive statistics are ordered from highest to lowest agreement within clusters of when statements were presented.

es. We also conducted EFA to understand whether and how quantitative responses grouped into a smaller set of more meaningful dimensions. Open-ended survey responses and student reflection papers were coded and analyzed using inductive qualitative techniques (Patton, 1990; Coffey and Atkinson, 1996; Rossman and Rallis, 1998), focusing on identifying meaningful themes and patterns that emerge from the responses rather than generating a classification scheme from theory prior to coding. Such an approach is useful in understanding novel phenomena, such as these SEUS climate change dialogues, as it doesn't impose preconceptions about what "should" be observed but tries to let the data speak for themselves.

Dialogue participants were recruited as members of targeted communities, not randomly selected to reflect the larger population, so results are not generalizable to all possible participants, but they do reflect CLiPSE's purpose in addressing groups that might not otherwise participate in discussions about climate change. Human subject research approval was obtained prior to data collection activities for the project, and appropriate consent procedures were followed.

FINDINGS

Quantitative Results

Participants agreed "somewhat" to "strongly" with all eight common statements, with averages ranging from 1.18 to 2.41 (on a scale with a maximum of 3), and 70% or more of respondents agreed at least to some extent with each statement (Table III). This suggests that all three dialogues created an atmosphere of respect, provided opportunities to learn about other viewpoints, and were seen as valuable.

In the first dialogue session in Savannah, comparing responses to Statements 9 and 10, we found that participants reported becoming somewhat more comfortable expressing potentially controversial views after attending the dialogue. Participants disagreed somewhat with the statement that they worried before attending that they would be attacked for saying something someone else disagreed with (mean = −1.5). When rating their degree of worry at the session, they disagreed more strongly (mean = −2.1), and this difference is statistically significant ($t_{\text{paired}} = 3.1$, df = 42, $p = 0.003$). Feeling comfortable expressing views is a prerequisite to authentic dialogue, and it seems the sessions CLiPSE created enabled participants to do so.

In the second and third dialogue sessions, responses to Statements 11–14, whose means ranged from 1.0 to 1.8, suggest that participants felt they learned something about the several kinds of content presented: climate science, the impacts of climate change, policies that might address climate change, and faith-based perspectives on climate change. We wondered whether participants felt they learned more about some topics than others, so we conducted an omnibus test of these differences, using a within-subject repeated measures statistic to match the structure of our data and to account for subject-specific differences in perception of learning. We tested for sphericity—that is, equality in the variance of the differences of the several measures, a key assumption of repeated measures ANOVA—and found our data violated this assumption [$W_{\text{Mauchly}} = 0.42$, χ^2 (df = 5) = 40.39, $p < 0.001$]. Because the associated epsilon statistic (ε) of 0.66 is less than the 0.75 cutoff suggested by Girden (1992), we applied the Greenhouse-Geisser correction to the degrees of freedom to avoid Type I error. Using this within-subject repeated measures ANOVA with Greenhouse-

TABLE IV: Loading scores for EFA. Analyses used maximum likelihood estimation with varimax rotation.[1]

Statement	Analysis A[2]		Analysis B[3]		
	A1	A2	B1	B2	B3
1. I felt my views were heard and respected.	0.499	**−0.031**	0.723	**0.049**	**0.065**
2. I left the dialogue with a better understanding of a view that's different from my own.	**0.087**	0.592	**0.111**	**0.129**	0.478
3. I learned something about what I believe.	**0.195**	0.692	**0.296**	0.572	**0.338**
4. I learned about another way of thinking about the issues.	**0.012**	0.929	**0.051**	*0.412*	0.539
5. I felt respected as a person.	0.785	**0.137**	0.838	**0.005**	*0.428*
6. I see possible areas of agreement with people whose views are different from my own.	**0.225**	0.493	**0.297**	**0.063**	0.827
7. I found the conversation valuable.	0.799	*0.474*	0.738	**0.200**	*0.538*
8. I'd like to be part of another dialogue session like this.	0.726	**0.275**	0.757	**0.124**	**0.034**
11. I learned something new about climate science.	—	—	**−0.023**	0.985	**0.114**
12. I learned something new about possible impacts of climate change.	—	—	**0.041**	0.853	**0.091**
13. I learned something new about policies to address climate change.	—	—	**0.163**	0.493	**0.293**
14. I learned something new about faith-based perspectives on climate change/stewardship.	—	—	**0.089**	**0.190**	0.701

[1]Primary factor loadings are in plain text, secondary loadings if $|x| > 0.4$ are in *italics,* and others are in **bold.**
[2]Analysis A includes Statements 1–8 presented at all 3 dialogues ($N = 87$)
[3]Analysis B includes Statements 1–8 and 11–14 presented at dialogues 2 and 3 ($N = 46$).

Geisser correction for lack of sphericity showed significantly different values among several of the learning measures [$F(1.96, 94.19) = 5.97$, $p = 0.004$]. Post hoc pairwise comparisons with Bonferroni adjustment—a conservative approach that distributes the sought after α level of 0.05 equally among the six pairwise tests to avoid Type I error, yielding an adjusted α of 0.008—finds participants rated their learning about policies that might address climate change more strongly than their learning about climate science ($p = 0.002$) or the impacts of climate change ($p = 0.001$). No other pairwise comparisons showed statistically significant differences.

Though we had presented 10 or 12 statements at each dialogue session, we believed that people's responses to these items were not independent and that an understanding of how they correlated with one another could help us better understand participants' experiences. We used EFA to try to reduce the complexity of the data, looking for a few underlying dimensions that explained the majority of the shared variance in the data. We chose a varimax rotation so that these dimensions would be orthogonal or independent of one another and rotated to better align with the underlying axes and increase interpretability. An eigenvalue cutoff of 1—meaning the derived factor explained at least as much variance as one of the original statements would have—and an examination of the scree plot were used to determine the number of major factors in each model.

EFA using maximum likelihood estimation with varimax rotation on the eight statements shared across all three dialogue sessions ($N = 87$) suggests there are two primary factors explaining 55% of the common variance in responses (Table IV). One factor (A1: feeling respected) loads on Statements 1, 5, 7, and 8 and describes participants' experience of being respected as a person and having their views respected, finding the conversation valuable, and wanting to participate again. The second factor (A2: learning about other views and my own) loads on Statements 2, 3, 4, and 6 and somewhat on Statement 7 and describes an experience of learning about one's own and others' views and seeing possibilities for agreement—and seeing that these contribute somewhat to a sense of value for the dialogue.

A slightly different pattern emerges when we conduct the same analysis on the 12 statements presented at the second and third dialogue sessions ($N = 46$). Now we obtain three factors that explain 63% of the common variance in responses. Factor B1 (feeling respected), loads on the same statements as Factor A1, grouping ratings about respect and the value of the conversation. However, the added learning statements don't all cluster together. The statements about climate science, climate change impacts, and climate change policy group together, along with statements about learning more about participants' own beliefs and to some extent about another way of thinking about the issues (B2: learning about climate science and my own views). The statement about learning about faith-based perspectives loads with statements about seeing possible areas of agreement, learning about views that are different from participants' own, learning about new ways of thinking about the issues, and to some extent, feeling respected and finding the conversation valuable (B3: learning about faith-based perspectives and other views). (Although the values of the loadings and percentages of variance explained differ somewhat, we obtain the same pattern of results using other methods such as principal axis factoring, which also looks for patterns in the shared variance, and even principal components analysis, which looks for patterns in all observed data.)

Trying to understand this clustering of variables, and being careful not to overinterpret from this observed pattern with a relatively small sample, it seems participants' in these university-based sessions may have separated out the more cognitive components of the conversation (climate change science, impacts, and policy perspectives) from components that were more ethical and community-discourse focused. That is, we see that the faith-based components, rather than the science and policy components, are associated with understanding different views and seeing possibilities for

agreement across differences. This suggests the importance of helping people bring different sides of their experience and understanding to these conversations: While deeper understanding of the science and possible solutions matters, tapping people's sense of values and community may be key to finding ways to move forward with this controversial issue.

Qualitative Results

Ratings suggesting participants generally had a positive view of the dialogue experience are confirmed by open-ended survey responses. In the second and third dialogues, participants generally felt comfortable speaking freely about their views on climate change, politics, and religion. Moreover, many respondents felt the experience of meeting with diverse groups to have an open discussion and be heard about potentially controversial subjects was valuable over and above learning anything new about climate science or policy proposals, although several did want to learn more from the expert panelists. One woman spoke to the value of the open dialogue and listening, declaring she "loved that someone valued my opinion." Others noted that the crowd seemed friendly and they had "no fears about extreme or unproductive disagreement" during the dialogue. Another participant noted, "We are surprised when people aren't constrained by their labels, and discuss freely." It seems, then, that the dialogue approach of open communication was something that people valued even if they did not come to any conclusions about climate science or policies to address climate change.

Not all participants had an entirely positive experience with the dialogues. Some respondents shared concerns about the lack of progress toward any concrete actions. A few people felt their views were dismissed, either because of youth or because they held a more liberal or Democratic perspective in a policy discussion focusing on a conservative proposal. One person explained that he or she just wasn't patient enough for these types of things, and another felt that much of the policy talk went over his or her head. While it is important to consider a range of concerns in planning for future dialogues, it is also important to remember that most respondents found the experience to be positive and the dialogue meaningful.

Participants seemed to appreciate the inclusion of religious perspectives in these dialogues, especially because many have come to expect that the debate around climate change will exclude religious views. One student participant highlighted both the wary expectation and the appreciation of including Christian voices:

> *"I was extremely surprised when the first speaker came out while discussing Science and Christianity and how he intertwined the two together. I found this to be so interesting primarily because the first thing that I told my guests was not to be surprised if the speakers did not even mention Christianity in their speeches, but the first speaker did. I enjoyed it how such an intelligent person can support both science and religion when discussing global climate change, and how he was open and nonchalant about it."*

The same student went on to mention a conversation with a friend, who said, "It made me realize that Christianity does still strongly exist in some areas out there in the scientific world." In one session, participants agreed that "Religion and climate change awareness are not mutually exclusive."

The importance to many participants of including faith perspectives in dialogue around climate change supports CLiPSE's theory of action. Although the debate around climate change often focuses on science to the exclusion of religious perspectives, it seems that welcoming a range of views into the discussion also welcomes a wider range of people and helps them integrate themselves into the conversation and move beyond the apparent tensions to embrace how both religion and climate science perspectives can be brought to bear on climate change debates. This was also supported by our factor analytic results.

The dialogues, especially the second and third events in Starkville, also created opportunities to discuss political and policy aspects of climate change. This allowed us to make explicit what can be some of the most polarizing aspects of the climate change debate, with an eye to providing a more open context in which to discuss the issues. This was difficult for some participants. Some felt politics and climate science needed to be disentangled, with one saying, "We want more information on climate change not biased by religion or government." Another echoed this concern: "Wasn't sure how to bring this up: Role of science in politics and role of politics in science." Many people expressed a mistrust of government and corporations to implement policies mitigating climate change on a scale that would make a difference. This was surprisingly prevalent in many of the survey responses and student reflection papers. One student reflected:

> *"Can we really trust the government to do what they say they will with the tax money or are taxes just going to increase and we will never really see that money going to anything, but attempts at salvaging our government's fiscal deficit? I just do not know if people will buy it. Especially those that have been burned and burned again trying to trust the government with their money."*

Another respondent shared that "Corporate influence on government is a problem," while another flatly said that "Government projects [are] not a good idea." While many at the dialogues agreed that climate change is a problem that needs to be addressed, there was a clear and common concern that the most powerful institutions could not be trusted to handle the problem.

Although many participants voiced concerns about government or business being able to take action on climate change, the desire to overcome the political divide to learn more about policy initiatives and to find common ground to address the problem of climate change was also apparent. When asked what was most valuable about the dialogues, several respondents expressed delight at hearing a broad range of views on how to address climate change: "Having [the former congressman] here to discuss policies was great!" and "The Representative's policies towards combating emissions offered me new ideas about climate change policy issues." One respondent stated the most valuable thing was "Sharing a common cause and going in depth to find solutions to problems created by certain sources." Another felt more urgent about the situation: "A change needs to come and it needs to come fast! Let's stop being

against one another and come together to make this a better world for the future!" There were few respondents who felt this was not an urgent or salient issue for them.

After the dialogue, one participant asked, "So where do we go from here?" reflecting a lack of outcome focus in the dialogues. Although there was a desire to move forward, no clear direction emerged and some feared what institutional action might mean for themselves or the economy. Some preferred a more individualistic approach to addressing climate change, for example, "I believe that we have to worry about what each individual can do to help make this world cleaner. Tackling global warming by itself will not work unless every individual contributes to help." Others preferred to focus on education or projects like recycling and community bicycling programs. Furthermore, some participants were concerned about the negative effects of climate change mitigation and wondered about "Short-term costs (sacrifices) vs. long-term benefits?" Another participant asked, "How does this benefit me rather than others less fortunate and cost me in taxes?" Beyond a concern about taxes, others just worried about an increase in consumer prices or a decrease in local jobs that may result. These issues may be suitable to address in the future as people become more comfortable with the process of community dialogues. Several participants mentioned that they wanted more time to continue the dialogue so that they could "be relationship building events, not single episodes." Community dialogues, because they bring together such diverse voices, could be an effective format for identifying concerns and finding innovative and workable approaches to address climate change. As one participant stated, "We don't want debate, we want deliberation."

Overall, participants were comfortable with the dialogues, seeing them as inclusive spaces where they could speak freely without being attacked for their views. This is especially remarkable given the contentiousness of the topic being discussed. When participants were asked what they found most valuable from the experience, many shared that they appreciated the openness of the dialogues and even found them constructive, because they were able to hear from diverse groups and discuss potential ways to address the issue of climate change in a safe setting.

LESSONS LEARNED AND FUTURE DIRECTIONS

What can we learn from these results and from CLiPSE's experience with dialogues more generally?

A Holistic Approach Opens Up New Possibilities

By presenting scientific information about climate change in a context that was open to nonscientific views, CLiPSE created an environment that helped people feel welcome and that allowed them to bring their whole selves to the discourse. People did not have to "turn off" their religious or political selves and were encouraged to bring their full experiences to the conversation. Both quantitative and qualitative evidence suggests that this was a powerful experience for people, one that made it possible for people to engage with the topic in a different and more meaningful way and to see possibilities for agreement where discussions are often polarized. Because the effectiveness of solutions to reduce greenhouse gas emissions and mitigate the impacts of climate change will require broad-based support, finding ways to overcome this polarization and bring more perspectives into conversations may be a key element to making progress on this urgent issue.

We All Have Pieces of the Truth

We must accept that everyone has a piece of the truth and is an expert at something, even if it is not about climate change. Talking with others who disagree about a topic can be uncomfortable, but we need to include multiple voices if we're going to address the polarization around this issue. To do so successfully, we have to identify and address our assumptions and biases about groups and individuals who disagree with us and then make a space where others can start to do so as well. We have to agree that there really is common ground, even if we disagree about other things. However, we cannot discover this if we do not listen carefully to one another. There is a sweet spot in dialogue that helps us find what everyone has to offer and then uncover the areas of common ground. As such, we recommend not only that dialogues commence with the golden rules of moral conversation but also that time be spent training facilitators and panelists in how to support the conversation to allow all participants' voices to be heard and that trained facilitators get a chance to repeat dialogue sessions with the same or other participants to provide opportunities to refine this skill.

Social Power

We also learned that it is important to remember that people come to these conversations with different amounts of social power. This was highlighted when one of the younger participants felt "dismissed" and when a more liberal attendee felt uncomfortable with the way liberals were addressed by some during policy discourse. Acknowledging that people are coming to dialogues not only with different values and worldviews but also as people within a social hierarchy (really several interrelated social hierarchies whose salience may shift in different contexts) may be one way to deal with this. People do not automatically escape the outside world's social relations when they enter a dialogue. Training facilitators and speakers to be sensitive to this would be important for future dialogues. The SRDC was an important resource to CLiPSE, and its representatives have years of dialogue experience. Although this resource may not be available to everyone, we recommend that at least one person from a group receive basic training in dialogue and then train others on site, ahead of time, to be facilitators.

Planning a Public Dialogue

Public dialogue is not a common form of interaction for many of us. In addition to training facilitators to help participants stay focused on respectful listening and sharing in the moment, upfront planning and coordination of outreach and agendas can support successful implementation, creating a local context in which climate change discussions and education efforts can continue. We offer some suggestions:

- Set modest goals for the intended outcome or outcomes of the event, and then plan for it to be a truly open conversation by shaping guiding questions that make space for expression of multiple perspec-

tives, rather than forcing the conversation to a predetermined end.
- Engage in open conversation with event planners and panelists in setting the agenda, being sure that everyone is clear on the goals and focus of the session.
- Engage in "peer review" of the dialogue's guiding questions prior to implementation to be sure the questions support your goals; how a question is phrased can make a big difference in how it may be received by participants, and different people on your leadership team may have differing perspectives on phrasing.

To avoid logistical glitches that may undermine the dialogue process, planners should think carefully about organizing things so that the session will run smoothly. Will the various recruiting mechanisms get the right constituencies and numbers to the event? What space is available that will be a good match for these numbers—big enough, but still supporting intimate discussion and with sufficient parking or other transportation access? What materials need to be available—pens, paper, easels, tables, chairs, name badges, projector, food, drinks, etc.—so people will be comfortable and can work well together? What is your budget to provide these items? What written materials do you need to prepare ahead of time to distribute to participants? If you are having panelists, how will they get there and what accommodations (if any) will they need? How will facilitators be trained and prepared?

If you choose to have panelists, be sure that they are qualified, respectful, and trusted sources of accurate information. It may be helpful if they can speak to a constituency that you plan to invite to the event, acknowledging that not every view or perspective will be represented by a panelist. Be careful not to fill the dialogue event with panelists' talks—it is essential that the participants have time to discuss their own ideas and concerns and to respond to the ideas shared by the panelists. A balance must be made between catalyzing the conversation through your panelists and providing substantial time for dialogue among participants. Set a time limit for panelists and stick to it; we suggest no more than a third of the total dialogue time. To model the value of diverse perspectives in dialogue, be sure to choose speakers who can address a broad range of viewpoints represented in your local area, not just the many complexities of the relevant scientific disciplines. Our results suggest that including affective and values perspectives may open the conversation to new possibilities. Even communities that mostly agree with the science may want or need to hear different points of view to be effective in convincing others.

Follow-Up From a Public Dialogue Event

Our intention with dialogue sessions was to start the process of conversation and perspective sharing. But while a single dialogue event may be such a catalyst, follow-up is needed to make progress toward solutions. For instance, further dialogue sessions could focus in greater depth on climate change and its several impacts or on religious, economic, policy, or other perspectives. Community film viewing on climate change phenomena and invitations of guest speakers to community organizations are other potential avenues to continue the conversation. Existing community groups or educational institutions could host or facilitate these ongoing sessions. Eventually, smaller subgroups might wish to go deeper still by engaging in a book study or perhaps a local climate-related service project or mitigation effort. Some organizations may wish to partner together and create climate leadership training opportunities in climate science fundamentals, dialogue facilitator training, and/or leadership skills for groups including youth, college students, concerned citizens, or key influential community members.

General Applications Beyond Public Dialogue

Recognizing that not all climate scientists or educators will have the opportunity to participate in or organize public dialogues to the extent presented in this research study, we have included some practical advice that we have learned from the CLiPSE efforts and the literature. The most important take-home message from our work is to tie the climate change problem to values of the audience and to provide a climate of respect for varied views. For faith audiences, this means one should include the moral dimensions of the issue. According to Wardekker et al. (2009), three ethical themes should be considered when engaging faith-based audiences: the effects of human-induced climate change on nature, the implications for future generations, and the implications for the poor. For politically conservative audiences this means one should emphasize policy strategies and solutions that include limited government, economic growth, and free markets. Keeping in mind the above messaging strategies for each audience supports our findings that CLiPSE participants had the most positive experiences when they felt respected and felt their views were heard. Establishing this in your conversation is critical if you want people to engage with a new way of thinking about the climate change issue and to be open to learning new information about it.

Future Research

This research, though novel, only begins to address questions about the efficacy of public dialogue on the topic of climate change with southern conservatives or other groups. Is a public dialogue approach more effective with certain groups or with particular combinations of groups talking to one another? How can a sense of trust and mutual respect be maintained as conversations move to a deeper level of detail? Understanding the extent of changes in participant knowledge and perception about climate change as a result of dialogue could be another area of research. What are the features of single sessions or a series of sessions that optimize these changes? Number of sessions? Topics addressed? Characteristics of participants? Specific processes or guidelines used? These sorts of investigations would be fascinating but would also have to develop methods that balanced programmatic and research goals—e.g., avoiding test fatigue or bias as a consequence of completing multiple assessments or surveys. Finally, research could address the relationship between participation in dialogue and personal efficacy about climate change. To what extent do changes in knowledge and attitudes lead to changes in behavior and action, either personally or politically?

CONCLUSION

The dialogue sessions organized by CLiPSE shifted climate literacy education from one-way transmission to two-way interactive engagement, where we, as scientists, leave the choir, where there is broad agreement about anthropogenic climate change and the urgency of addressing it, in order to work with the people in the pews and beyond. To do so, we needn't give up what we know from science, but we may need to acknowledge that it is not the only way of knowing what's true and what's important in the world. Too often, scientists speak only to those who are already scientifically inclined. Many scientists want to take what seems like the fast track, assuming that clearly presenting scientific information will convince others to act and becoming confused or frustrated when that is ineffective. We know that dealing with and addressing Earth's changing climate is terribly urgent and that relationship building seems to some to be too time consuming. But our communities include more than just those who share our motivations and perspectives—we are connected to a wider group with a range of faiths, viewpoints, and interests—and the research reported here suggests that we need to find ways to talk across and with (not over) those beliefs. If we don't build these broader relationships and humbly learn from what they have to offer, we won't gain others' respect and we won't make any progress.

Clearly, dialogue should not be the only approach used in climate change education. However, this research shows why the dialogue approach is particularly effective for creating opportunities for safe places for discussion, for sharing perspectives, and for building respectful relationships that can help depolarize the issue and bring into conversation people from a variety of backgrounds, including some who are often excluded. The difference between "trying to change minds" through traditional didactic approaches and "creating relationships" and "safe places" through dialogue is that people not only receive accurate climate science information but also are included in a community conversation with others who hold both similar and different values and perspectives. Our findings show that in spaces where they feel welcomed and respected, people are more willing to learn new things and stretch beyond what they otherwise would have. They may also be willing to engage with the issues and to address their questions and doubts. Though relationship building takes time and effort, we argue that by not creating this "from the ground up" culture, scientists and educators are missing large segments of the population (some of whom are influential).

So we have to start with relationship building, at least in the SEUS and with other doubtful and disengaged communities. To do so, we need a little bit of humility about what we know, a little bit of optimism about people and how they can participate in a climate change dialogue, and a little bit of patience to work with a process that will take some time but is faster in the long run than activities that create further polarization and ultimately lead to stagnation. Finally, we need to open ourselves to engage in conversations beyond our own areas of expertise and comfort and to find common ground as we seek the broad-based solutions so urgently need.

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REFERENCES

Abelson, J., Forest, P.-G., Eyles, J., Smith, P., Martin, E., and Gauvin, F.-P. 2003. Deliberations about deliberative methods: Issues in the design and evaluation of public participation processes. *Social Science and Medicine,* 57:239–251.

Bachelet, D., Neilson, R.P., Lenihan, J.M., and Drapek, R.J. 2001. Climate change effects on vegetation distribution and carbon budget in the United States. *Ecosystems,* 4:164–185.

Bishaw, A., and Renwick, T. J. 2009. *Poverty: 2007 and 2008 American community surveys.* Washington DC: U.S. Department of Commerce Economics and Statistics Administration, U.S. Census. Available at http://www.census.gov/prod/2009pubs/acsbr08-1.pdf (accessed 31 May 2012).

Boholm, Å. 1996. Risk perception and social anthropology: Critique of cultural theory. *Ethnos,* 61:64–84.

Boyes, E., and Stanisstreet, M. 1994. The ideas of secondary school children concerning ozone layer damage. *Global Environmental Change,* 4:311–324.

Bransford, J.D., Brown, A., and Cocking, R.R., eds. 1999. How people learn: Brain, mind, experience, and school. Washington, DC: National Academy Press.

Bruning, S.D., Dials, M., and Shirka, A. 2008. Using dialogue to build organization: Public relationships, engage publics, and positively affect organizational outcomes. *Science Direct, Public Relations Review,* 34:25–31.

Center for Research on Environmental Decisions (CRED). 2009. The psychology of climate change communication: A guide for scientists, journalists, educators, political aides, and the interested public. New York: Columbia University, CRED.

Chi, M.T.H. 2005. Commonsense conceptions of emergent processes: Why some misconceptions are robust. *Journal of the Learning Sciences,* 14:161–199.

Choi, S., Niyogi, D., Shepardson, D.P., and Charusombat, U. 2010. Do Earth and environmental science textbooks promote middle and high school students' conceptual development about climate change? Textbooks' consideration of students' misconceptions. *Bulletin of the American Meteorological Society,* 91:889–898.

Coffey, A., and Atkinson, P. 1996. Making sense of qualitative data. Thousand Oaks, CA: Sage.

Cook, J., Nuccitelli, D., Green, S.A., Richardson, M., Winkler, B., Painting, R., Way, R., Jacobs, P., and Skuce, A. 2013. Quantifying the consensus on anthropogenic global warming in the scientific literature. *Environmental Research Letters,* 8:1–7.

Dunlap, R.E., and McCright, A.M. 2008. A widening gap: Republican and Democratic views on climate change. *Environment: Science and Policy for Sustainable Development,* 50:26–35.

Finegold, M.A., Holland, B.M., and Lingham, T. 2002. Appreciative inquiry and public dialogue: An approach to community change. *Public Organization Review: A Global Journal,* 2:235–252.

Gautier, C., and Rebich, S. 2005. The use of a mock environmental summit to support learning about global climate change. *Journal of Geoscience Education,* 53:5–16.

Girden, E. 1992. ANOVA: Repeated measures. Newbury Park, CA: Sage.

Grotzer, T., and Lincoln, R. 2007. Educating for "intelligent environmental action" in an age of global warming. *In* Dilling, S.M.A.L., ed., Creating a climate for change. New York: Cambridge University Press, p. 266–280.

Halpin, J., and Agne, K. 2009. State of American political ideology. Washington, DC: Center for American Progress. Available at http://www.americanprogress.org/issues/2009/03/pdf/political_ideology.pdf (accessed 11 September 2014).

Hatfield, J., Boote, K., Fay, P., Hahn, L., Izaurralde, C., Kimball, B.A., Mader, T., Morgan, J., Ort, D., Polley, W., Thomson, A., and Wolfe, D. 2008. Agriculture. *In* Backlund, P., Janetos, A., Schimel, D., Hatfield, J., Boote, K., Fay, P., Hahn, L., Izaurralde, C., Kimball, B.A., Mader, T., Morgan, J., Ort, D., Polley, W., Thomson, A., Wolfe, D., Ryan, M.G., Archer, S.R., Birdsey, R., Dahm, C., Heath, L., Hicke, J., Hollinger, D., Huxman, T., Okin, G., Oren, R., Randerson, J., Schlesinger, W., Lettenmaier, D., Major, D., Poff, L., Running, S., Hansen, L., Inouye, D., Kelly, B.P., Meyerson, L., Peterson, B., and Shaw, R., eds., The effects of climate change on agriculture, land resources, water resources, and biodiversity in the United States. Synthesis and assessment product 4.3. Washington, DC: U.S. Department of Agriculture, p. 21–74.

Herbert, B.E. 2006. Student understanding of complex Earth systems. *In* Mogk, D.W., ed., Special Paper 395: Geologists think and learn about the Earth. Boulder, CO: Geological Society of America, p. 95–104.

Intergovernmental Panel on Climate Change (IPCC), ed. 2007. Climate change 2007: The physical science basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press, p. 996.

Intergovernmental Panel on Climate Change (IPCC), ed. 2013. Climate change 2013: The physical science basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK: Cambridge University Press, p. 1552.

Irwin, A., and Wynne, B., eds. 1996. Misunderstanding science? The public reconstruction of science and technology. Cambridge, UK: Cambridge University Press.

Johnson, J., DiStasi, D., Tebbetts, I., ed., and Boone-Berry, L., ed. 2014. Divided we fail: Why it's time for a broader, more inclusive conversation in the future of higher education. A Final Report on the 2013 National Issues Forum. Washington, DC: Kettering Foundation.

Kahan, D.M., and Braman, D. 2008. The self-defensive cognition of self-defense. *American Criminal Law Review,* 45:1–65.

Kahan, D.M., Braman, D., Gastil, J., and Slovic, P. 2007. Culture and identity-protective cognition: Explaining the white-male effect in risk perception. *Journal of Empirical Legal Studies,* 4:465–505.

Kahan, D.M., Peters, E., Wittlin, M., Slovic, P., Ouellette, L.L., Braman, D., and Mandel, G. 2012. The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature Climate Change,* 2:732–735.

Karl, T.R., Melillo, J.M., and Peterson, T.C., eds. 2009. Global change impacts in the United States. New York: Cambridge University Press.

Kettering Foundation, 2014. Joint Learning Exchanges. Available at http://kettering.org/how-we-work/joint-learning-exchanges/ (accessed 11 September 2014).

Kosmin, B.A., and Keysar, A. 2009. American religious identification survey 2008. Hartford, CT: Trinity College. Available at http://commons.trincoll.edu/aris/files/2011/08/ARIS_Report_2008.pdf (accessed 11 September 2014).

Leiserowitz, A. 2003a. Global warming in the American mind: The roles of affect, imagery, and worldviews in risk perception, policy preferences and behavior [unpublished dissertation]. Eugene: University of Oregon. Available at http://environment.yale.edu/leiserowitz/climatechange/US_assets/SignedDissertation.pdf (accessed 1 March 2012).

Leiserowitz, A. 2003b. Policy report: American opinions on global warming. Eugene, OR: Decision Research. Available at http://environment.yale.edu/leiserowitz/climatechange/US_assets/DRPolicyReport.pdf (accessed 1 March 2012).

Leiserowitz, A. 2008. Climate change in the American mind. New Haven, CT: Yale Project on Climate Change. Available at http://www.joss.ucar.edu/cwg/jun08/presentations/leiserowitz.pdf (accessed 1 March 2012).

Leiserowitz, A., Maibach, E., Roser-Renouf, C., and Hmielowski, J. 2012. Global warming's six Americas, March 2012 and Nov. 2011. New Haven, CT: Yale University and George Mason University, Yale Project on Climate Change Communication.

Leiserowitz, A., Maibach, E., Roser-Renouf, C., and Smith, N. 2010. Climate change in the American mind. Available at http://environment.yale.edu/climate/files/PolicySupportJune2010.pdf (accessed 11 September 2014).

Leiserowitz, A., and Smith, N. 2010. Knowledge of climate change across global warming's six Americas. New Haven, CT: Yale University Project on Climate Change Communication.

Lombardi, D., and Sinatra, G.M. 2013. Emotions about teaching about human-induced climate change. *International Journal of Science Education,* 35:167–191.

McCaffrey, M.S., and Buhr, S.M. 2008. Clarifying climate confusion: Addressing systematic holes, cognitive gaps, and misconceptions through climate literacy. *Physical Geography,* 29:512–518.

McCright, A., and Dunlap, R. 2011. The politicization of climate change and polarization in the American public's views of global warming: 2001–2010. *Sociological Quarterly,* 52:155–194.

McNeal, K.S., Miller, H.R., and Herbert, B.E. 2008. The effect of using inquiry and multiple representations on introductory geology students' conceptual model development of coastal eutrophication. *Journal of Geoscience Education,* 56:201–211.

McNulty, S.G., Vose, J.M., and Swank, W.T. 1996. Potential climate change effects on loblolly pine forest productivity and drainage across the southern United States. *Ambio,* 25:449–453.

Melillo, J.M., Richmond, T., and Yohe, G.W., eds. 2014. Climate change impacts in the United States: The third national climate assessment. Washington, DC: U.S. Global Change Research Program, p. 841.

Miller, P.M., and Hafner, M.M. 2008. Moving toward dialogical collaboration: A critical examination of a university–school–community partnership. *Educational Administration Quarterly,* 44:66–110.

Monroe, M., and Adams, D. 2012. The six Americas of climate change: Perceptions of southeast extension professionals. Available at http://www.pinemap.org/videos/webinar-recordings (accessed 28 March 2013).

Moore, J.F. 2004. Toward a dialogical community: A post-Shoah Christian theology. Lanham, MD: University Press of America.

Morris, J.T., Sundareshwar, P.V., Nietch, C.T., Kjerfve, B., and Cahoon, D.R. 2002. Responses of coastal wetlands to rising sea level. *Ecology,* 83:2869–2877.

Moser, S.C., and Dilling, L. 2004. Making climate hot. *Environment: Science and Policy for Sustainable Development,* 46:32–46.

Nash, R.J., Bradley, D.L., and Chickering, A.W. 2008. How to talk about hot topics on campus. San Francisco: CA: Jossey-Bass.

National Research Council (NRC). 2007. Taking science to school: Learning and teaching science in grade K–8. *In* Duschl, R.A., Schweingruber, H.A., and Shouse, A.W., eds., Committee on science learning, kindergarten through eighth grade. Washington, DC: National Academy Press.

Nicholls, R.J., and Cazenave, A. 2010. Sea-level rise and its impact on coastal zones. *Science,* 328(5985):1517–1520.

Nisbet, M.C. 2009. Communicating climate change: Why frames matter for public engagement. *Environment: Science and Policy for Sustainable Development,* 51:12–23.

Ockwell, D., Whitmarsh, L., and O'Neill, S. 2009. Reorienting climate change communication for effective mitigation: Forcing people to be green or fostering grass-roots engagement? *Science Communication,* 30:305.

Patton, M.Q. 1990. Qualitative evaluation and research methods, 2nd ed. Newbury Park, CA: Sage.

Pew Research Center. 2008. A deeper partisan divide over global warming. Pew Research Center for the People and the Press. Available at http://www.people-press.org/files/legacy-pdf/417.pdf (accessed 28 February 2012).

Porter, E.J. 1995. Fostering dialogical community through a learning experience. *Journal of Nursing Education,* 34:228–234.

Ranney, M.A., Clark, D., Reinholz, D.L., and Cohen, S. 2012. Changing global warming beliefs with scientific information: Knowledge, attitudes, and RTMD (reinforced theistic manifest destiny) theory. *In* Miyake, N., Peebles, D., and Cooper, R.P., eds., Proceedings of 34th Annual Meeting of the Cognitive Science Society. Austin, TX: Cognitive Science Society, p. 2228–2233.

Roach, J. 2005. In U.S., climate change may hit Southeast hardest. Available at http://news.nationalgeographic.com/news/2005/08/0811_050811_climatechange.html (accessed 28 March 2013).

Rossman, G.B., and Rallis, S.F. 1998. Learning in the field. Thousand Oaks, CA: Sage.

Rutherford, D.J., and Weber, E.T. 2011. Ethics and environmental policy. *In* Chen, W.-Y., Seiner, J. Suzuki, T., and Lackner, M., eds. Handbook of climate change mitigation. New York: Springer Science+Business Media.

Sell, K., Herbert, B., Stuessy, C., and Schielack, J. 2006. Supporting student conceptual model development of complex Earth systems through the use of multiple representations and inquiry. *Journal of Geoscience Education,* 54:396–407.

Vosniadou, S., and Brewer, W.F. 1992. Mental models of the Earth: A study of conceptual change in childhood. *Cognitive Psychology,* 24:535–585.

Wardekker, J.A., Petersen, A.C., and van der Sluijs, J.P. (2009). Ethics and public perceptions of climate change: Exploring the Christian voices in the US public debate. *Global Environmental Change,* 19:512–521.

Weber, E.U. 2010. What shapes perceptions of climate change? *Wiley Interdisciplinary Reviews: Climate Change*, 1(3):332–342.

Weber, E.U. 2011. Psychology: Climate change hits home. *Nature Climate Change,* 1:25–26.