

Civic Education About Climate Change:
Opinion-Leaders, Communication Infrastructure, and Participatory Culture

Matthew C. Nisbet, Ph.D.

American University
Washington, DC

December 6, 2010

White Paper

*Climate Change Education Roundtable
National Academies
Washington, DC*

[MATTHEW C. NISBET, Ph.D.](#) is Associate Professor in the School of Communication and Affiliate Associate Professor of Environmental Science at American University, Washington, D.C. His research on climate change communication focuses on the mental models that individuals apply to learning and decision-making; how opinion-leaders shape knowledge and understanding; and the role that the news and digital media serve in shaping knowledge, facilitating public participation, and influencing policy outcomes. Nisbet is the author of more than 35 peer-reviewed journal articles and scholarly book chapters. He holds a Ph.D. and M.S. in Communication from Cornell University and an A.B in Government from Dartmouth College.

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Informal climate change education is too often discussed rather narrowly in terms of promoting a technically informed yet essentially spectator public. In this view, the goal is to achieve a level of public understanding where Americans can accurately assess specific scientific details or concepts relevant to climate change. This knowledge is assumed to then correlate with increased concern for the problem, leading to greater public acceptance of scientific expertise, and a decrease in societal conflict over policy. However, the role of knowledge and discussion typically ends there. The implied vision is of Americans as spectators in a political system where decision-making on climate change is handled by experts, policymakers, environmentalists, and industry.

This paper argues that the goals of climate change education need to be much broader, promoting a range of relevant areas of knowledge beyond just technical understanding of climate science. Importantly, the emphasis should be on *civic education and engagement* which means empowering, enabling, motivating, informing, and educating the public around not just the technical but also the political and social dimensions of climate change.

Besides cultivating a broader range of knowledge, civic education requires promoting affective outcomes such as increased feelings of trust and efficacy; investing in a new communication infrastructure and participatory culture; and recruiting citizens who can help their peers learn, connect, and plan.

In addition, unlike the emphasis on science literacy which has a uni-directional connotation that problematizes and blames a "knowledge deficient" public, civic education and engagement is as much about informing the public as it is about also informing experts and decision-makers. Education should be viewed as a two-way process where experts and decision-makers seek input and learn from the public about preferences, needs, insights, and ideas relative to climate change solutions and policy options.

In this paper I review current barriers to public learning and participation on climate change and the forms of knowledge and skills that should be invested in as part of civic education. I also discuss the need to recruit and train opinion-leaders, highlight new participatory models for gathering and disseminating climate change news, and emphasize the sponsorship of deliberative contexts where citizens can learn, debate, and connect.

With limited budgetary resources in mind, these initiatives are best focused on states, regions, or segments of the public that have the greatest need for information about climate change, either because of their political context and/or because of their vulnerability to specific climate change impacts. The plan, informed by research and incorporating best practices from

public engagement initiatives on science, is achievable at funding levels similar to previously supported informal learning initiatives.

BARRIERS TO LEARNING AND PARTICIPATION

There are many barriers to increasing the civic understanding and participation of Americans relative to climate change. These include the interaction between structural features of the media system and public preferences; the relatively slow rate of adoption among the scientific community of innovative digital technology and strategies; and the relative absence of organized, local contexts where citizens can participate in civil face-to-face deliberation, planning, and learning about climate change.

Interactions between the media system and public preferences

Across segments of the population, only a small proportion of Americans are likely to have the motivation to seek out and take advantage of learning and participatory opportunities relative to climate change. This “preference gap” divides not only public affairs and entertainment media users, but also occurs among the public affairs news segment. This reflects the problem of choice in the contemporary digital media landscape. There exist today more quality sources of information about climate change than could have even been conceived of 15 years ago. Yet the availability of information does not mean that the public will use it. With many media choices, citizens can pay almost exclusive attention to entertainment media, or within the news media follow closely only those issues they care deepest about (Prior, 2005; Nisbet & Scheufele).

Apart from preference gaps, media use also creates knowledge gaps among the public. Based on education, race, and socio-economic status, as more information about climate change diffuses across the media system, research predicts that the highly educated and resource rich will acquire this information at a much higher rate than individuals from a lower socio-economic background. The result will be widening, rather than lessening, gaps in knowledge and participation relative to climate change (Eveland & Scheufele, 2000).

Not only do there exist preference barriers but there are also ideological barriers. For example, research indicates that perceptions of climate science are policy dependent. When individuals perceive policy proposals as threatening to their ideology or worldview, as a way to argue against the policy, they tend to re-interpret scientific advice as uncertain (Kahan et al., 2010).

This propensity to resort to a belief in scientific uncertainty when an individual’s worldview is threatened is bolstered by another key feature of a high choice media environment. In a world of 300 cable TV channels in which advertising revenue is paired with subscription fees, cable news outlets can be profitable by appealing to ideologically-like minded niches of 3-4 million viewers. Combined with a need to produce content on a 24 hour cycle, there are deep incentives for the format of cable news to favor extreme commentary and debate over context-

based reporting. In the blogosphere and online, ideological choice and self-selection is magnified with little accountability or established norms for enforcing accuracy. This combined feature of cable television and the Web along with the traditional ideological orientation of talk radio is taken advantage of by interest groups who have an incentive to either deny or exaggerate the risks of climate change. As political scientists have noted about this trend generally, the result is the amplification at cable news and online of false and misleading information (Hamilton, 2005; Mutz, 2006). As these media spread and reinforce misperceptions across ideological segments, research finds that it is very difficult to counter these beliefs, especially when they serve to protect an individual's worldview and ideology. In fact, research finds that direct attempts to refute false beliefs can backfire, and reinforce the original belief (Nyhan & Reifler, 2010).

A third structural feature of the media system also limits public learning and participation. As regional and local newspapers struggle with financial distress, they have cut back their coverage of science, the environment, and sustainability. This makes it increasingly difficult for Americans across communities to find coverage of climate change that is linked to local impacts, risks, or policy actions. There is also an absence of participatory information about events, decision-makers, or groups with whom individuals can join or contact to express their civic voice or to assist in mitigation and adaptation related initiatives (Nisbet & Scheufele, 2009).

The distress and reduced capacity of local media to provide their traditional coordinating and informational role across communities likely indirectly enhances the influence of ideologically-focused national media such as cable news, blogs, and talk radio. In many regions of the country, these ideological sources, rather than localized science and public affairs coverage, is the most readily available source of information about climate change.

Limited Investment in New Models for Digital Media and Engagement

Despite the above factors, with focused investment, the contemporary news and digital media landscape has the potential to be both highly participatory and social. More than a 1/3 of U.S. Internet users have contributed to the creation of news, commented about it, or disseminated it via postings on social media sites like Facebook or Twitter. Overwhelmingly, Americans view news use as a social activity, with 70% saying they follow the news because they enjoy talking with others about what is happening in the world and that keeping up with the news is a social or civic obligation. Moreover, among those who get news online, 75% get news forwarded through email or posts on social networking sites and 52% share links to news with others via those means (Pew, 2010.)

Yet besides preference and knowledge gaps in how these new participatory and social media functions will be used, there also exist what recent research identifies as "competence" gaps in the use of mobile and handheld devices to participate. More than a third of cell phone users say they access news on their hand held devices (Pew, 2010), and use of mobile technology to obtain news is correlated with enhanced levels of civic participation. However,

the ability to turn mobile information into a resource for participation depends strongly on an individual's level of comfort and perceived competence in using such devices, a feeling of technological efficacy that is strongest among the youngest co-hort of news consumers and among users with higher levels of socio-economic standing (Campbell & Kwak, 2010).

These gaps aside, as will be discussed later, the social nature of contemporary online media appears to offer great promise. Yet to date, with only a few exceptions, a limited number of government- or foundation-sponsored climate change media and communication initiatives have taken advantage of the social and participatory nature of digital news today.

The trend in public affairs journalism has been towards employing new digital best practices that enable the individuals formerly known as audiences to be active co-producers of news content, engaging in pro-am reporting on local issues and events and adding their lay expertise and knowledge. In this process, both news organizations and journalists have adopted innovative roles as conveners, connectors, and hubs for the aggregation and sharing of information (Aufderheide et al., 2009; Knight, 2009; Lewis, 2010). Unfortunately, science journalism as a sub-set of the broader professional field has been slow to adopt these new strategies and roles.

Just as importantly, as foundations and universities have stepped forward to fund new models of not-for-profit news gathering and dissemination in areas such as investigative journalism or community media, few of these new not-for-profit models have been pursued around climate change and sustainability, particularly at the regional or local level where news coverage is most needed by Americans. This also raises the important question if specific to climate change and sustainability there is a role for government agencies to subsidize and fund these new models of news gathering and provision.

CIVIC EDUCATION ON CLIMATE CHANGE: WHAT ARE THE GOALS?

In the next section I will discuss opinion-leader strategies for overcoming some of these barriers to learning and participation as well as a proposed model for how government agencies, universities, and foundations can create new platforms for news gathering and dissemination as well as public forums where citizens can engage in face-to-face discussion, debate, and planning.

But first, I want to briefly review the categories of learning and outcomes that can be sponsored relative to civic education about climate change.

The Cognitive: Forms of Knowledge

The first set of outcomes involve dimensions of knowledge that include but also expand upon the focus of public education initiatives to date.

The first area of knowledge—and the most commonly emphasized—is climate science literacy. This focus derives in part from the work of Jon Miller (1998), who has defined science literacy generally as awareness and knowledge of technical terms and constructs sufficient to make sense of competing arguments encountered in news coverage, policy debates, and public discussions. Applied to climate change, survey assessments of climate literacy have included understanding the natural and man-made causes of climate change as well as current and future climate change-related impacts and risks (Nisbet & Myers, 2007).

The recent Yale University report “Americans Knowledge of Climate Change” is the most comprehensive conceptualization and measurement of climate science literacy to date. This report evaluates climate science literacy relative to (a) basic awareness of terms such as greenhouse effect and belief that climate change is happening; (b) understanding of natural and man-made causes of climate change; types of greenhouse gases and types of fossil fuels; (c) understanding of the differences between weather and climate; changes in temperature over time; and the rise in CO₂ levels; (d) understanding of regional variation in temperature, precipitation, and agricultural impacts; causes of sea level rise; and of other impacts such as ocean acidification and coral bleaching (Leiserowitz, 2010).

A second important dimension of knowledge focuses on understanding how climate science works as an institution and as a changing body of knowledge. Understanding in this area includes how scientists conduct their work and resolve disagreements; the role of scientists and their organizations in societal decision-making including how scientific advice is used in Congress or the co-production of IPCC reports between scientists and policymakers; the political and social biases of scientists; in the current political climate, the connections between scientists, environmental groups, the Democratic party and other frequent allies in communicating about climate change; and finally, public perceptions of scientific agreement. To date, survey assessments have focused on public perceptions of agreement among experts, but few if any of the other features of knowledge in this domain have been investigated.

A third area of knowledge involves understanding the political and policy dimensions of climate change. This includes understanding of recent legislation or international agreements; the position of political parties, interest groups, and leaders on these proposals; the range of policy solutions proposed or available at the international, national, or local level, and their relative trade-offs. As the recent Yale report does, this can also include understanding of the sources of greenhouse gas pollution such as coal powered plants or cars that can be addressed in mitigation-related policies. It would also include understanding the difference between mitigation and adaptation actions.

A fourth area of knowledge involves participatory knowledge, which includes information and details on how a citizen can get involved and have a say in decisions that are made about climate change at the community or national level. Knowledge in this area makes it easier for community members to voice their preferences, draw attention to perceived problems, and to express their ideas on possible solutions. Emphasizing this dimension of knowledge also helps promote a two-way exchange of information between experts and the public.

Consider that a past George Mason / Yale University survey on climate change found that more than 90% of Americans had never written, emailed, or phoned a government official about climate change. When respondents were asked about the reasons that prevented them from participating more frequently, 17% simply said they “didn’t know how” while another 16% said it “took too much effort.” (Leiserowitz et al., 2009a).

A fifth area involves conceptual and integrated understanding that might connect these knowledge areas. As an example, the recent Yale report asks respondents to identify figures that represent their conceptualization of how the climate system works, ranging from a threshold conceptualization to a fragile, random, or gradual view (Leiserowitz, 2010).

Another example is the mental model that Americans have about the best way to solve climate change-related energy problems. Mental models involve using heuristics and frameworks, usually based on everyday experience, conventional wisdom, or popular culture to make sense of a complex scientific topic or policy problem. Public understanding often depends on shifting the mental models that individuals use to make sense of an issue.

For example, on energy, one mental model focuses attention on a “supply problem” with the solution either the discovery of new sources of petroleum through off-shore drilling, and/or greater reliance on renewable resources such as wind, hydro-electric, solar, and nuclear. However, this “supply problem” mental model distracts public attention and action away from what experts, including the National Academies, describe as potentially more effective and feasible actions that reduce consumer and industrial demand for energy and in the process reduce greenhouse gas emissions. Examples include fuel standards for cars; and improvements in refrigeration, lighting, household, and industrial efficiency. One possible education goal, therefore, should be to shift the dominant mental model and focus in a community from “supply” to “demand” solutions. Polls show that the applicable mental model that the public applies to the energy challenge can tip based on swings in gas prices and media attention.

A sixth area involves practical or consumer literacy that can be applied to solving common everyday personal problems such as decisions about energy use or interpreting the packaging on energy appliances. For example, in a national survey, when asked about the important energy reduction actions of insulating their attic or weather proofing their home, more than 20% of Americans said that a barrier was that they “didn’t know how” and nearly a quarter indicated they didn’t have the time to research the options. In addition, many Americans may erroneously assume they have already adopted the best and most effective energy efficiency practices in terms of heating and insulation and may not be aware of newly available options (Leiserowitz et al, 2009b).

Consider also that many Americans express that they would like information on what personal actions they can take that would have the “most bang for the buck,” in other words the actions that are likely to make the most difference in terms of conservation or cost-savings.

As expert agreement emerges on these questions, there should be increased communication around these practical, consumer dimensions.

A seventh dimension of knowledge involves ethical, moral, and religious understanding What are the moral frameworks available and applicable to weighing and assessing the risks, trade-offs and complex questions surrounding climate change? How does climate change fit as an issue within the context of specific religious teachings or secular traditions such as environmentalism or humanism?

A final “meta-dimension” involves localized knowledge and understanding How do each of the above categories apply to the scientific, social, and political dynamics of climate change that are specific to an individual’s local area or community? For example in terms of the application of mental or conceptual models, a resident living in a Midwest city may draw upon their own personal experience observing agriculture-related energy use or on the potential of biofuels. In contrast, a resident of a Northeast city may reference their experience with commuting, urban sprawl, air pollution, and/or public transportation. Information provided in a region or city should therefore be tailored to these unique connections and needs.

The Affective: Trust and Efficacy

Research on civic engagement and political participation generally, finds that the influence of knowledge is mediated by feelings of trust and efficacy. Individuals who are more knowledgeable about public affairs tend to also be more trusting of government; more trusting of their neighbors and community members; and more efficacious, believing that their participation or collaboration with others can make a difference and those government officials will respond to their activity and preferences.

Apart from socio-demographic variables such as education and income, it is these feelings of trust and efficacy that have the strongest impact on the likelihood of an individual to become involved in their communities or to participate politically. Knowledge is one factor shaping trust and efficacy, but there are other important contributors to these feelings (McLeod, Scheufele, & Moy, 1999; Scheufele, Nisbet, Brossard & Nisbet; 2004).

Survey research specific to climate change has tracked public trust in different societal actors—including scientists—as sources of information about climate change. But little work has been done on the factors that shape trust in scientists and other actors, the role that trust plays in direct public involvement. Similarly, feelings of efficacy and their relationship to civic involvement on climate change also remain unexplored.

Climate change education initiatives can and should contribute meaningfully to feelings of trust and efficacy. As discussed later, this can take place through the organization of localized deliberative forums, but also through media presentations that portray individuals with whom a targeted audience identifies as effectively participating in their communities and

nationally on the issue, in collaboration with a diversity of others, and in successful collaboration with government officials and institutions.

Civic Skills and Media Literacy

If Americans are going to act on their knowledge of climate change, what skills do they need to effectively participate and collaborate with others? Civic education on climate needs to not only promote different forms of learning and affective outcomes, but also impart information and resources on how to host a meeting; recruit volunteers; speak at public forums; or find sources of financial support for local and regional efforts at mitigation and adaptation.

While these civic skills might be of use to a smaller sub-set of Americans, media literacy skills are important for almost any individual. To motivate and prepare Americans to use digital media to learn about climate change, share information, express their views, and coordinate activities, science organizations should partner with universities, social scientists, and journalists to develop “civic science media literacy” curricula. These modules can be formally incorporated into university, junior college, and high school science courses across the country or offered as part of continuing education at public libraries.

The modules would introduce students to quality online news sources about climate change; teach students about how to constructively use participatory tools such as blogs and other social media applications; educate students on how to critically evaluate evidence and claims as presented in the media; introduce students to the relationships between science and institutions as they are often covered in the news; and socialize students into enjoying and following the issue of climate change by way of digital media after they complete course or training. In short, this type of media literacy curriculum would not only potentially grow the audience for information about climate change but also impart the skills, motivation, and know-how that students need to be participatory citizens in the online and real world (Nisbet & Scheufele, 2009).

OPINION-LEADERS: FACILITATING A TWO-STEP FLOW OF KNOWLEDGE

Discussion of climate change education is not only typically focused relatively narrowly on promoting scientific terms and concepts, discussion also tends to erroneously conceive of how knowledge transfers from experts to the public. Learning is typically conceived of as either direct from expert institutions to the public or as mediated, flowing from expert institutions to the media (or museums etc) and then to the public.

In reality, however, the learning process is best conceptualized—and promoted—by way of identifying and recruiting opinion-leaders, everyday individuals who have a stronger motivation for public affairs content or information specific to climate change, and who have a special ability as a trusted source to share that information with others.

In this sense, the learning process across communities and the country is likely to proceed via a two-step flow from expert institutions to the media to opinion-leaders and then on to the public.

Who Is an Opinion-Leader?

Individuals who function as opinion-leaders are unique across several key dimensions including:

Who one is – this includes certain personality characteristics or values held by the individual.

What one knows – the degree of knowledge and expertise that one has about a particular issue or product.

Whom one knows – the number of contacts one has as part of their circle of friends and acquaintances.

As a combination of these traits and behaviors, opinion-leaders not only help draw the attention of others to a particular issue, product, or behavior, but perhaps most importantly, signal how others should in turn respond or act. This influence may occur by giving advice and recommendations, by serving as a role model that others can imitate, by persuading or convincing others, or by way of contagion, a process where ideas or behaviors are spread with the initiator and the recipient unaware of any intentional attempt at influence (Nisbet & Kotcher, 2009).

Transcending Barriers to Learning and Participation

Opinion-leaders are perhaps uniquely suited to breaking down some of the barriers to learning and participation reviewed earlier, to promote specific dimensions of knowledge, to promote trust and efficacy, and to pass on skills to others.

Opinion-leaders can bridge preference gaps by actively taking advantage of the participatory news environment, “facilitating incidental exposure” by passing on and sharing news and information about climate change that their peers would otherwise never be exposed to. This is especially important in coordination with major climate change-related focusing events such as the release of a new government or IPCC report; a pending legislative, policy action, or international summit; within the context of a mid-term or Presidential election; or relative to a perceived scandal such as Climategate.

They can also break down competency gaps in the use of digital technology by modeling the use of mobile and hand-held devices or by teaching others how and where to access information and digital tools.

They can begin to break down ideological gaps by serving as trusted third-party endorsers of the climate science, government agencies, and related institutions. They are perhaps the major source of requests to get involved and participate among their peers and co-workers, which these requests among the strongest influences on issue-specific participation and civic involvement (Goidel & Nisbet, 2006).

By modeling civic and political participation on climate change, opinion-leaders increase efficacy among their peers that they too can get successfully get involved. They also signal that civic commitment to climate change is socially normative and desirable. Similar modeling takes place surrounding consumer choices and the adoption of new energy-related behaviors. Through conversations and social media, opinion-leaders can also serve as direct peer-educators, informing and instructing their friends and family to increase climate science literacy; institutional, political, and social knowledge; practical consumer literacy

Identifying Types of Opinion-Leaders

Opinion-leaders rarely hold formal positions of authority and instead prove influential by way of their greater attention to a topic, knowledge, and their strength of personality and experience in serving as a central go-between for information among their network of core and loose ties. Previous research suggests four types of opinion-leaders that are likely to be important depending on the type of climate change education initiative. Survey scales have been developed to reliably and validly identify these categories of opinion-leaders. Shortened versions can be embedded in email or web surveys by organizations or within social setting observational techniques have been used to identify opinion leaders (see Nisbet & Kotcher, 2009 for discussion.)

Influentials or public affairs generalists. These individuals track public affairs news and issues more closely, have overall higher levels of civic involvement and political participation as measured by group membership and involvement, and tend to score higher in terms of strength of personality.

Climate change-specific opinion leaders. These individuals are unique in that they pay very close attention to news and information about climate change and energy and otherwise share similar traits with influentials.

Market mavens and communicative adopters Consumer behavior research has identified “market mavens” as a special class of consumers who take pleasure in shopping, follow closely the release of new products as well as sales and discounts, and enjoy sharing this information with others. Communicative adopters are not only generally first generation purchasers of new products and technologies, but they also evangelize and recommend the product to others.

Energy-specific opinion leaders. Sharing strong overlap with climate change-specific opinion leaders, these individuals not only track closely the science and politics of the issue, but also focus on spreading recommendations about energy efficient products and behaviors.

A NEW COMMUNICATION INFRASTRUCTURE AND PARTICIPATORY CULTURE

Opinion leaders already function as natural go-betweens and information brokers, passing on messages about climate change and energy conservation that speak directly to their otherwise inattentive peers, co-workers, and friends. Yet in order to serve as a resource in climate change education initiatives, opinion-leaders need to be recruited and trained. They also need to be provided the tools, resources, and contexts by which to engage in peer-education and influence.

In this section, I discuss the training of opinion-leaders while also proposing that opinion-leaders be used in connection with the sponsorship of deliberative forums on climate change as well as the creation of climate change-specific digital news communities.

Regional or Population Segment Initiatives

These initiatives obviously require dedicated resources and planning. My recommendation is they be regionally, locally, or population segment specific. Criteria for selecting regions or segments might include:

Political context. For example, leading up to the next Presidential campaign the states that will be the subject of the heaviest campaigning are also the states where many Republican and Democratic members of Congress remain undecided about climate change legislation. These states include, for example, Ohio, Florida, Wisconsin, Minnesota, Michigan, Nevada, Arizona, New Mexico, Florida, and Maine. It is in these areas that the need for citizen participation and engagement might be highest since representatives and candidates in these states will be key decision-makers relative to climate policy and should be informed by the preferences and civic voice of their constituents and stakeholders.

Climate change vulnerability. Regions or population segments can also be selectively invested in based on the level and nature of their vulnerability to climate change. This might, for example, include focusing the proposed climate change education initiatives on the Gulf region or on the Southwest. Similarly, this could include a Spanish-language initiative, given that Latinos and Hispanics are among the most vulnerable populations to climate change impacts and otherwise may not have access to quality sources of information in their first language.

Existing communication infrastructure. Finally, as mentioned earlier, given the historic distress to the news industry, many major cities or regions of the country are without quality reporting, news, and information about climate change. Investment in these regions such as the California Bay Area—which already has a strong base of university and science centers—may serve as valuable test models.

Training Opinion-Leaders

Within a specific region or population segment, recruiting opinion-leaders as part of a formal climate change education campaign may appear as risky to scientific institutions and agencies which traditionally prefer that only official organizational representatives speak on their behalf, for fear of the risk of losing control of a message or promoting false information. Yet this fear only underscores the importance of training, follow-up, and monitoring of opinion-leaders.

There already exists a successful model for science organizations to consider: At zoos, museums, and science centers, volunteer docents are typically the main contact point for visitors. Well trained opinion-leaders should be considered organizational docents who are at large in the real world.

The best published work on the training and use of opinion-leaders in peer-education has been done relative to HIV education campaigns. This research concludes that the activities of recruited opinion-leaders need to be programmatically reviewed, supported, and sustained over time (Kelly, 1994; Nisbet & Kotcher, 2009). Different types of training activities could take place at science centers and universities across the country and also online via training modules. Digital sites and tools can also be created for opinion-leaders to share success stories, materials, and insights with others while receiving updated training and coordination (Nisbet & Kotcher, 2009).

Regular “reunions” or booster sessions of opinion-leader cohorts can be used to reinforce training and to maintain volunteer enthusiasm. Between reunions, opinion leaders can set goals for themselves, such as number of contacts, in order to forge a sense of purpose and keep track of their progress.

In this case, relative to policy choices facing a communication, opinion leaders should be trained as peer-educators who initiate conversations with friends and acquaintances, passing on and recommending important news coverage about climate change and energy, encouraging turn out at upcoming events, and providing advice and insight on how to participate, learn, and connect with others on the issue. Relative to encouraging energy-efficient behaviors such as use of public transportation or in facilitating the diffusion of new technology, past research suggests that opinion leaders should emphasize the benefits and advantages of the behavior or technology; recommend practical ways to enact the behavior; and personally endorse the behavior as something they are already doing. In addition, during training, opinion-leaders should be introduced to audience research that informs successful communication about climate change; shown by trainers “models” of how conversations might play out; and be asked to extensively role play different types of conversational situations, reviewing video of their interactions (Kelly, 1994; Nisbet & Kotcher, 2009).

Creating Contexts for Deliberation and Planning

Apart from recruiting and training opinion-leaders within a region or population segment, it is also important to sponsor face-to-face and/or web-based interactive contexts where experts, stakeholders, and the public can come together to discuss, plan, and learn. In these public forums or meetings, invited or recruited participants receive background materials in advance, and provide input on the types of questions they would like addressed at the meeting.

Importantly, public forums should not simply involve a single expert lecturing to an audience about climate change, but should be structured around presentations from a diversity of experts and stakeholders followed by facilitated discussion among attendees that results in structured feedback to forum organizers (see Einsiedel, 2008 for an overview).

Within a region, for example, a deliberative forum on climate change could be held every month at a major population center or across a diversity of institution settings from schools and labor unions to churches and malls. Each meeting would be framed around a different dimension of climate change in a way that might resonate and connect with the host site and intended participants. Examples might include deliberative forums on the local ecological impact of climate change; the impact on agriculture and farming; the potential for economic growth through energy retro-fitting and technology development; the national security implications of climate change; or public health.

These forums should not only discuss the causes and context for climate change-related impacts or risks, but also seek to identify and diffuse local and national solutions. Recent deliberative exercises on climate change provide models for structuring and sponsoring forums. These forums were also successful in minimizing the influence of extreme dismissive views or misinformation (Danish Board of Technology, 2010).

Past research finds that carefully designed public forums can achieve a range of goals and outcomes that relate strongly to civic education on climate change. For example, through participation in these types of carefully designed public forums, research finds that not only do individuals learn directly about the technical nature and risks of an issue, but they also learn about the social, ethical, and economic implications (Besley, Kramer, Yao, & Toumey, 2008; Einsiedel, 2008).

A second key outcome of public forums is that participants also feel more confident and efficacious about their ability to effectively take action and/or participate on the issue, they often perceive relevant institutions as more responsive to their concerns, and they say that they are motivated to become active on the issue if provided a future opportunity to do so (Besley et al. 2008; Powell & Kleinmann, 2008).

Deliberative forums, if carefully organized, can also shape perceptions of experts and their institutions as open to feedback and respectful of public concerns, perceptions that predict eventual acceptance and satisfaction with a policy decision, even if the decision is contrary to an individual's original preference (Besley & McComas, 2005; Borchelt & Hudson, 2008).

In particular, on climate change, these public forums are likely to increase feelings of both internal and external efficacy on the part of attendees, a key predictor of participation on an issue (Goidel & Nisbet, 2005). Forums can boost participants' confidence that they have some level of control over how climate change relates to and affects their lives and that they have a say in collective decisions and policies (Einsiedel, 2008).

In addition, these public consultation initiatives should also be conceived of as informal mechanisms for "democratizing" decisions related to climate change and the management of related risks. In particular, adapting to climate change will require the identification and consideration of matters related to ethics, values, equity, social justice, and economic trade-offs and then giving weight to public preferences relative to these dimensions.

Public consultation initiatives, by localizing discussion and focus, also have the potential to lessen the partisan and ideological differences over policy that commonly occur in national-level news and policy debate. Research also finds that attendees who are more committed to one position on an issue--following participation—are more willing to compromise and are more willing to accept a final policy decision, even it goes against their original preference (Besley & McComas, 2005).

Digital News Communities that Catalyze Dialogue, Learning, and Participation

A major method for augmenting reduced capacity at local newspapers--while also taking advantage of the many new digital tools and innovations that lead to a participatory news culture--is to launch government and foundation-supported digital news communities that cover issues related to climate change, energy, and sustainability specific to a selected region or sub-population such as Spanish speakers.

These digital news communities can include original reporting and professionally edited news content, features, and commentaries along with a range of user-generated and social media functions. This content can also be shared and distributed to partner organizations in the region such as public media organizations and/or the local newspaper.

Importantly, a digital news community's "top down" news focus on climate change can be complemented and enhanced by a "bottom up" generated discussion among a variety of users, particularly a community's opinion-leaders, professionals, and stakeholders who share experiences, expertise, and insight on needs, risks, interventions, and adaptation strategies.

A digital news community would also serve as the central information hub for a regional climate change education initiative. Much of the overall education campaign's "brand" would focus in part on creating awareness, traffic, and use of the site. Interpersonal connections and opinion-leader recruitment forged at face-to-face or web-based public forums can be strengthened and expanded by using the digital news community, as attendees find out about

events via the site and then continue their conversations online (see Aufderheide et al, 2009; Nisbet & Scheufele, 2009; Knight, 2009).

WHAT WOULD A REGIONAL CIVIC EDUCATION CAMPAIGN COST?

For a twin state area such as Minnesota and Wisconsin, not including institutional overhead, I estimate the cost of a civic education campaign involving recruited opinion-leaders, monthly public forums, and the creation of a digital news community at \$500,000 to \$1,000,000 per year of the program.

This would include building upon and cost-sharing with activities already pursued by major universities in the state, science museums and centers, and public media organizations. Examples include the work of university research news offices and extension offices, the adult and Web programming of museums, and digital news hubs that are being created by public media. Social scientists with relevant experience and expertise at regional universities would be supported as PIs in organizing and evaluating deliberative forums; recruiting, training, and evaluating opinion-leader initiatives; and in evaluating the digital news community. Faculty and students at regional journalism and media schools would be supported as content creators and designers of the digital news communities. A full time news editor, staff writer, online community organizer and free-lance budget would be provided. Across regions, the same methods and digital media templates and design would be replicated.

The cost would not only be supported by grants from national funding agencies such as NSF, NOAA, and the Energy Department, but also supported by national foundations dedicated to supporting environmental initiatives, civil dialogue and public media. Funding would also be raised from regional foundations and/or regional corporate sponsors such as utilities and major companies. As new policy proposals in Congress are debated that would generate revenue around either cap and trade or a small tax on carbon, part of this revenue could be invested in formal and civic education initiatives on climate change.

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