

Anne K. Armstrong, Marianne E. Krasny, and Jonathon P. Schuldt, **Communicating Climate Change: A Guide for Educators**, Ithaca, NY: Comstock Publishing Associates, 2018, 131 pp., \$19.95 (paperback).

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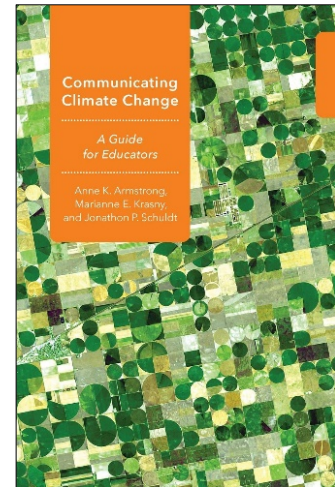
At the time of publication, the authors of **Communicating Climate Change: A Guide for Educators** were faculty and graduate students of Cornell University. The starting premise and challenge of this text is that despite a wealth of information and a high level of awareness of climate change, we have yet to see the kind of action needed to reduce or eliminate its many associated threats. This is linked to the diversity of viewpoints and politicization of the climate change concern.

The authors show how environmental educators can optimize programs for attaining climate literacy and action to address mitigation of greenhouse gas emissions, and, when necessary, adaptation to changes already taking place. Their aim is to provide an understanding of how audiences engage with climate change information and of how to apply empirically tested communication concepts and tools. Their focus is on identifying climate change education outcomes and resources, assessing audiences, and strategizing programs.

The first section provides an overview of climate change science and climate change attitudes and knowledge, in relation to desired education outcomes. The second applies psychological research to explain the complex ways in which people interact with climate change information. In the third, communication strategies are presented that build on research into framing, metaphors, and messengers. The final section describes the approaches of four educators to climate change education programs, to illustrate connections between their teaching strategies and communication research.

In covering the science of climate change, the book notes that natural patterns of climate change do not explain the rapid warming that the earth has experienced since the onset of the industrial revolution. Instead, multiple sources show that increases in human-emitted greenhouse gases are responsible. The principal impacts are identified as acidification of oceans, rising oceanic temperatures, melting of ice and rising sea levels, changes in local and regional weather, and threats to human safety, health, and well-being. Absent mitigation, the earth's average global surface temperature could exceed 4 degrees centigrade above the preindustrial average by 2100. A 2012 World Bank study has concluded that there is no certainty that adaptation to such a world is possible. The major economic sectors responsible for emissions are electricity production, transportation, and industry.

Given the gravity of the situation, how is it conceivable that the world has not yet overcome the challenge to the very survival of the human species? What can be done to change people's attitudes and knowledge? And if attitudes change, will that be enough, given that the relationship between attitudes and



behavior is not straightforward? High-emitting countries are among the least worried, and awareness and risk perceptions vary markedly within and between countries.

Knowledge is shallow: Many Americans conflate ozone layer depletion with climate change, are unaware that there are many important sources of greenhouse gases other than carbon dioxide, and are exposed to mixed messages about climate change. Teens' level of knowledge is similar to that of adults, and teens' understanding of the causes may be greater. Intergenerational programs that bring together parents, teens, and friends may be most effective in helping to develop audiences' sense of collective efficacy. In dealing with audiences who are more skeptical or less aware, educators may target knowledge and awareness as preliminary outcomes, also seeking to identify areas of common ground, such as shared experiences in their communities, that enable positive dialogue with audiences even where there is disagreement about certain aspects of climate change.

Outcomes that define success in environmental education include individual outcomes like climate literacy, attitudes, self-efficacy, and behavior change; community outcomes like collective efficacy, social capital, and collective action; and direct environmental outcomes such as mitigation (e.g., planting trees, switching to renewable energy) and ecosystem-based adaptation. Individual outcomes rest on the concepts of climate literacy, incorporating knowledge, awareness, skills, and corresponding attitudes—values, beliefs, and emotions (e.g., hope, fear—emotions that relate to goals, pathways, and motivations), and environmental literacy, which is the ability to make informed decisions concerning the environment and to act on these decisions. The concept of resilience refers to the ability of individuals, communities, ecosystems, and social-ecological systems to respond to change.

Educators are recommended to learn the basics, study audience attitudes and knowledge, design a program that aligns with their strengths, and take comfort in the fact that the majority of people in the United States believes that the climate is changing. The authors highlight a number of psychological theories that can help environmental educators better understand their audiences and more appropriately craft and direct their messages to them. These show how educators can assess an audience's perceptions of climate change based on that audience's identities and values and thus in turn shape their own communication and education strategies to achieve their outcomes.

Identity theories connect cognitions to people's preferred images of themselves and the images they want others to perceive. People typically have various identities. Any one identity can be activated or can become salient in response to a given message designed to guide behavior in a particular direction. Social identity can affect the way that people process information. But people may process new information in ways that align with their current group commitments—this is called *motivated reasoning*, which affects which information people consider as they think about a given issue and how they use that information to make judgments or draw conclusions. Identity-protective cognition is a type of motivated reasoning whereby people avoid beliefs that might alienate them from their chosen group. The result can be confirmation bias whereby people look for information that confirms what they already know or think. Identity-protective cognition as applied to climate change is often linked to political affiliation. Race and ethnic identity also affect climate change attitudes and behaviors.

Climate change messages are more influential when relevant to their audiences. One method of increasing relevance is to underline how climate change impacts local people and places. The authors cite the Oxford Handbook of Environment and Conservation Psychology for research evidence that people in the United States view climate change as a distant problem, one that is temporarily, spatially, and socially removed from the here and now (Clayton, 2012, pp. 165–17). Construal level theory holds that psychological distance affects how people mentally represent objects and events. Compassion appeals may help in decreasing the distance. Other theories deal with psychological denial mechanisms. Thoughts about death may elicit such defenses. People may engage in ego-protective processes by telling themselves that threats are unlikely or distant, or they may find ways of bolstering their self-esteem that are distracting. Such defenses can be undermined by messages that balance descriptions of threat with opportunities for action.

Accordingly, environmental educators are advised to understand audience attitudes toward climate change and the relevant social identities that may come into play. Message constructions should resonate with particular audiences. Human stories that elicit compassion may be appropriate. Messages should be hopeful and solutions based, offering easily adopted actions that audiences can participate in and that reduce cognitive dissonance.

Critical to this are the ways in which messages are framed, in terms of either equivalency or emphasis. Both kinds of frames link concepts together, assisting the audience in recall and interpretation. Emphasis frames use specific words to appeal to particular areas of an audience's knowledge or interest. Equivalency frames present logically equivalent information but emphasize one part of the information to affect preferences, sometimes emphasizing consent over contention. Framing can take account of identities and emotions, self-efficacy, solutions, values, and particular audiences. Frames that provide few practical and effective actions for audiences may lead them to tune out the message. Framing in terms of debate, controversy, and uncertainty can enhance people's perception, wrongly, of a lack of scientific consensus. Sensationally framed information can lead to higher levels of knowledge retention but may hinder willingness to act.

Most U.S. environmental educators use local frames, focus on solutions, and view science frames as aids in maintaining political neutrality. Focusing on the human side of issues may also be more effective in eliciting emotional responses. Frame categories include global impacts-based, local/proximal, science-based, human impacts-based, collective solutions, and individual solutions. Subtle differences in wording can have important effects on how people process climate change information.

When frames are solutions oriented, the solutions should match the scale of climate change as a global and intergenerational issue; otherwise messages are more likely to be ignored. Solutions should appear to match the significance of the threat. Messages that focus on individual solutions can be more effective if audiences share their individual actions through social networks. Community-level solutions are a means of providing audiences with hope and self-efficacy, which are related to willingness to engage with climate change information. When framing for values, climate change messages can consider altruistic (welfare of other people), biospheric (welfare of the environment), and egoistic (one's own

welfare) possibilities. Altruistic values that are related to social justice may be stronger motivators than biospheric ones.

The first core framing task is to identify the problem and to explain who or what caused the problem (diagnostic framing); the second core task is to propose solutions to the problem (prognostic framing); and the third task is motivational framing, a call to action that encourages audiences to be agents of change who work toward those solutions.

Metaphors ground abstract concepts in concrete physical reality and involve an implicit comparison between contents that are unrelated but share common characteristics. They can enhance retention of information. But metaphors that are stretched too far can give rise to misconceptions; for example, to talk of greenhouse gases as a "heat-trapping blanket" may give the impression that global warming could quickly be resolved by tossing the blanket, which, of course, in climate change is not easily done. Analogies compare similar features of two domains, and they run similar dangers. It is important that educators identify where metaphors and analogies break down. Finally, people tend to trust messengers who hold views similar to their own. Credibility is as important in climate change communication as in any other.

In the elaboration of climate change frames, therefore, educators should think about their audiences' values and knowledge, test out new framing ideas in program planning, frame climate change in a hopeful and empowering way to avoid engaging with terror management responses, use metaphors and analogies to create common connections between audiences' understanding of concrete issues and their understanding of climate, and consider partnering with an opinion leader or trusted messenger who can establish credibility.

The book concludes with a series of climate change communication case studies: a marine mammal center, Sausalito, California; climate change literacy, climate change action, and positive youth development in Kentucky; building soil to capture carbon in a school garden in New Mexico; and psychological resilience in Denver, Colorado. All four demonstrate how educators think carefully about audience values, needs, and knowledge and use what they know about their audiences and environmental education practice to frame their program message. All four emphasize the importance of staying positive and building self-efficacy and collective efficacy among their audiences.

This book serves as an excellent pedagogic primer for the planning of climate change programs, though it will need to be supplemented by many more sources on the science of climate change and its consequences. It is also an excellent source of communication theory and of case studies of campaign planning relevant to major issues of universal importance.

References

Clayton, S. (2012) *The Oxford handbook of environmental and conservation psychology*. New York, NY: Oxford University Press.