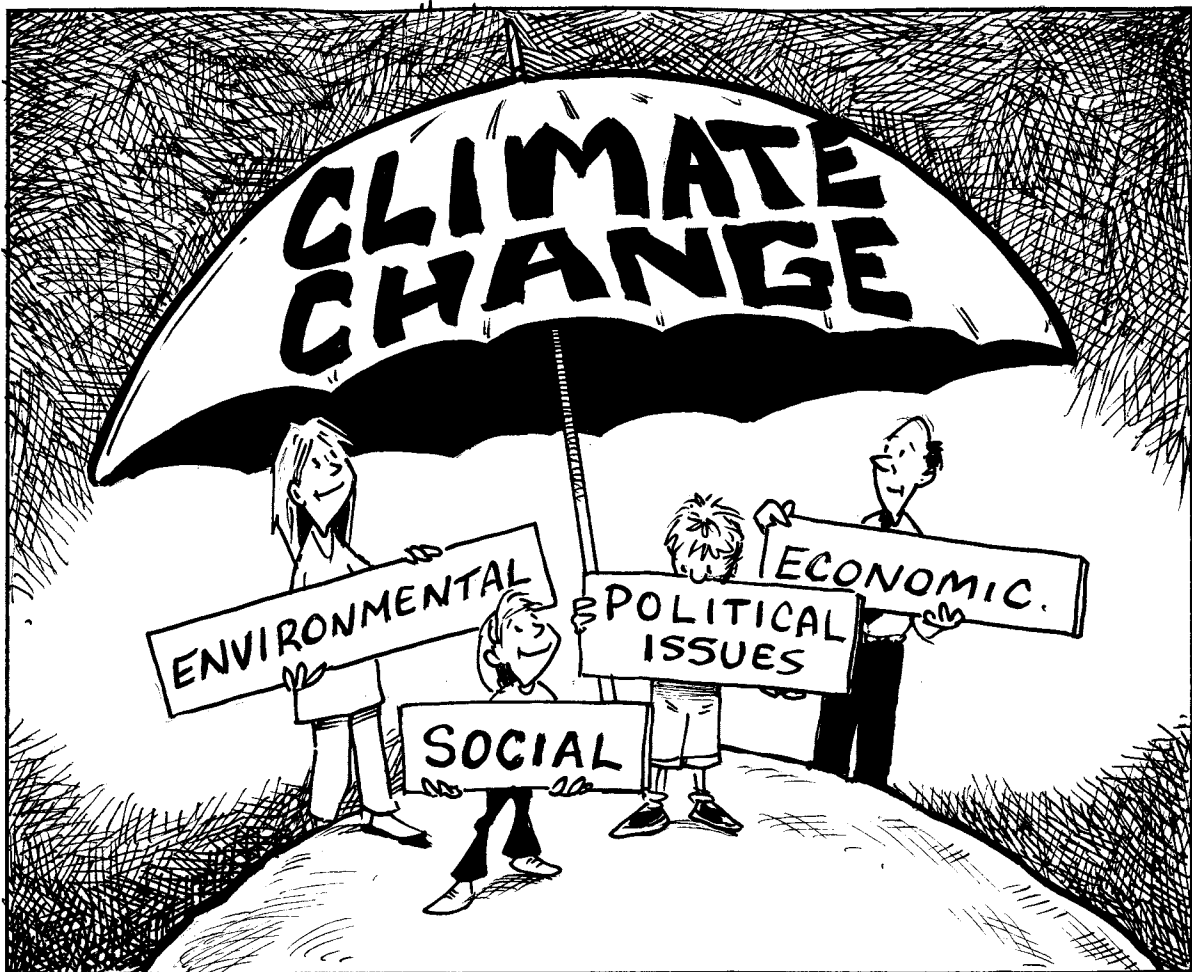


Rethinking Climate Change Education

Everyone wants it, but what is it?



Illustrations: Tom Goldsmith

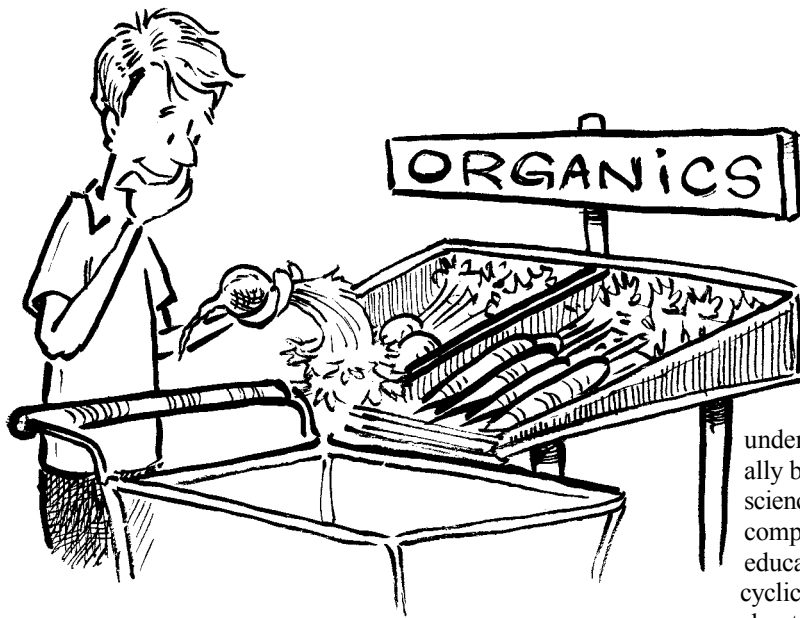
By Rosalyn McKeown and Charles Hopkins

LAST MONTH, NASA ISSUED A REPORT that predicted 2010 would likely end up as the warmest year on record, due to the combination of global warming and El Nino¹. Because the vast majority of climate scientists agree that the earth's climate is warming, many organizations and individuals are calling for the implementation of climate change education. Though no one doubts the importance of education in both ameliorating (i.e. lessening) and adapting to this ostensibly man-made phenomenon, there is no agreement of what climate change education is or should be.

In reviewing climate change curriculums and Internet sites, we notice that much of the early work was done by scientists as well as science and geography teachers (CISH-DGC, 2002). We applaud their efforts. While science and geography are reasonable starting points, we know climate change, like so many other sustainability issues, has social, economic, environmental, and political roots. As a result, climate change education should also reflect this complexity.

Through systematic scientific investigation, we have known the causes of most environmental problems for several decades. Similarly, the effect of increasing levels of greenhouse gases in the atmosphere has been known for years. However, this science-based knowledge has not brought about policy changes, legislation, or wide-spread behavior changes that are required to adequately address climate change. Solutions to climate change will require engaging the social sciences, in order to develop the societal understandings, cultural keys, and political will that are needed for change to occur.

As we look at the history of education, we see a number of examples where natural science education alone fell short of creating desired changes. For example, sex education that only taught the anatomy of human reproduction did not lower the pregnancy rate. Anti-smoking education that focused solely on naming the toxic and carcinogenic components of tobacco smoke did not reduce smoking. We know from years of experience in environmental education that knowledge and awareness alone do not bring about large-scale societal



change. However, education that includes awareness, knowledge, skills, values, and opportunities for participation does bring about in-depth learning and behavior change. We need to keep this in mind as educational systems around the world define and implement climate-change education.

Climate change: an umbrella paradigm

Climate change is an umbrella paradigm for a host of social, economic, and environmental changes, problems, and issues. Global climate change comes with alterations in the frequency of extreme weather events, agricultural zones, habitat for plants and animals, and geographic ranges for diseases as well as many other consequences. People’s livelihoods and patterns of daily life are changing and will continue to change. In some cases this change will be slight and in others substantial. For example, an affluent urban dweller experiencing a rise in temperature and a decrease in rainfall may install air conditioning and pay higher utility costs for electricity and water. To these urbanites climate change may seem like an affordable nuisance. In contrast, farmers who have planted traditional crops for many years may find that drought now shrivels the plants in their fields. They will need to learn how to adapt to this change by selecting low-water crops that are appropriate for the new rainfall and temperature regimes. These farmers will also have to locate new sources of water, not only for their crops but also for their own household use. For them, climate change is life changing.

For both these farmers and their children—who often assist on the farm—it is important that education systems teach more than natural science and mathematics. It needs to embrace teaching people how to adapt and plan for change. The World Health Organization (WHO) defines life skills as “abilities for adaptive and positive behavior that enables individuals to deal effectively with the demands and challenges of everyday life.” Everyday life is changing rapidly and will continue to do so, in part because of climate change.

Years ago when the pace of change was slower, one of the goals of education was to help pupils understand the workings of our society and how to be successful in it.

However, with technological advances and greater international communication and exchange today, the pace of change has quickened. Teaching how to be successful today without looking to the future is outdated. Enabling young people to predict and cope with change is part of a quality education in the new millennium.

Climate change education: what to teach

Climate change education has two obvious parts: climate and change. The climate part obviously falls under the umbrella of the natural sciences and has traditionally been taught in geography (e.g., climatology) and earth science (e.g., meteorology). Climate includes atmospheric composition and processes. This part of climate change education can be easily updated in formal education through cyclical revisions of the science curriculum that take place about every seven years.

The second part—educating for change—is where the thought-provoking discussions on climate change education need to occur. What does it mean to educate for change? What change is predicted so that we can prepare people to adapt to it? We need to distinguish between educating *about* change—history courses have done that for years—and educating *for* change. We posit that educating for change will help people lessen negative changes, adapt to change, and to promote positive change. Educating for change will require engaging social science and humanities teachers, as well as others.

We think there are six important components to the change portion of climate change education:

- issue analysis,
- community and personal decision-making,
- political processes,
- social justice,
- inter-cultural sensitivity and inter-cultural competence, and
- behavior change

The following are short descriptions of each of these six components. Implementing anyone of these will require far greater description and discussion than space allows.

Issue analysis

Climate change is an umbrella concept that encompasses environmental, social, economic, and political problems and issues facing communities around the world. We think it is important for people to have ways to investigate the things that challenge them and then propose solutions to those challenges. Issue analysis guides people through a process that can be used with any issue. It is a “generic” process that can be applied to a wide range of environmental, social, and economic problems. There are many good methods of issue analysis in the educational literature (Clarke 2000; Ramsey, Hungerford & Volk 1989). See sidebar.

Issue analysis gives individuals and groups the background information they need to understand issues and to

begin to evaluate proposed solutions. Issue analysis skills assist people in untangling the complexity of issues so they can see the roots, consequences, and paths forward. It helps people perceive the values that underlie the opinions of others who support opposing solutions. As such, issue analysis can contribute to informed decision-making processes.

Community and personal decision-making

In a changing world, the ability of individuals, organizations, and communities to select the best course of action amongst many options will be critical. For example, where small-scale farming is the major occupation, changing temperature and rainfall patterns will threaten the food security and source of income for farm families. To choose new crops to grow, they will have to be able to look at many different factors, including nutritional values, soil characteristics, and local markets, etc. Such decision-making is complex. Decisions—both good and bad—will affect the well-being of many people.

Issue analysis and community decision-making are distinctive skill sets. Issue analysis can be the foundational inquiry that helps communities learn about their problem from multiple perspectives and identify options for change. A community decision-making process then uses this information to create an action plan to address those problems.

Political processes

Community decision-making, while a powerful tool for change, has its limitations. For example, in urban areas, if citizens desire changes that involve construction or alteration of major infrastructure (e.g., public transportation and recycling centers), community decision-making alone will not result in those changes being made. Political processes are also involved. In order to change major systems, the

public will have to understand the strengths and limitations of the political systems—local, national and international.

Although many students take courses in government and civics, they may still lack the understanding of the political process (e.g., executive orders, legislation, annual budgetary approvals) and grassroots action (e.g., petitions and town meetings) necessary to move solutions forward. All too often those who understand the mechanics of government only from textbooks and classrooms do not have the opportunity to participate in such efforts, so they have no experience or skill interacting with the public within this context.

Social justice

The world is far from being equitable. The gap between the haves and the have-nots is growing, aggravated by the recent global recession as well as climate change. Students arrive at school knowing that things are not right in the world. Many want to know why and would like to do something about it. Issue analysis helps students to understand why, but it takes more than conceptual awareness to undertake effective action. Political action is one means but other avenues for social change exist.

Studying social justice helps pupils put a framework around their feelings of inequity and gives them peaceable paths for action. As with other forms of educating for change, social justice is more than just awareness and knowledge. It also includes analyzing values and providing opportunities to participate, especially through volunteerism.

Inter-cultural sensitivity and competence

If the predictions of planetary change come true, we can expect nearly 150 million environmental refugees over the next 40 years (Conisbee & Simms, 2003). They will be leaving submerged coastlines and regions facing sustained

Issue Analysis

Name of issue: _____

Definition or description of issue: _____

1. What are the main historical and current causes (i.e., physical/biotic, social/cultural, or economic) of the issue?
2. What is the geographic scale, the spatial distribution, and the longevity of the issue?
3. What are the major risks and consequences to the natural environment?
4. What are the major risks and the consequences to human systems?
5. What are the economic implications?
6. What are the major solutions currently being implemented or proposed?
7. What are the obstacles to these solutions?
8. What major social values (e.g., economic, ecological, political, aesthetic) are involved in or infringed on by these solutions?
9. What group(s) of people would be adversely impacted by and bear the cost of these solutions?
10. What is the political status of the problem and solutions?
11. What is a change you can make or have made in your daily life to lessen the issue?
12. Beyond changes in your daily life, what is the next step you could take to address the issue?
13. How is this environmental issue related to other issues?

McKeown-Ice, R., & Dendinger, R. (2008). A Framework for Teaching, Learning, and Assessing Environmental Issues. *Journal of Geography*, 107, 161 – 166.

flooding or drought. Will all of these people relocate in neighboring states and countries? History has repeatedly shown that when people from different cultures are forced together, dissimilarity creates tension that can lead to distrust, which often escalates to hatred and violence. To prevent this escalation, part of climate change education should include preparing some people to leave their communities and preparing others to accept the refugees. This will require a high level of intercultural skills and competence.

Students who go on international exchange programs receive cultural-sensitivity training, as do the people who host them. Similar efforts to raise intercultural competencies will be needed before major migrations occur.

Behavior change

Lessening climate change will require widespread voluntary action by the public. We know that dozens of daily activities contribute to an increase in greenhouse gases in the atmosphere. Daily decisions about what we eat, how we go to work, what we do for recreation, etc., have an impact on the amount of carbon dioxide we contribute to the atmosphere. For the public to reduce CO₂ production in their personal lives, we need to create awareness and, more importantly, a willingness to act.

In the past, education for behavior change has occurred primarily in the field of psychology, and in the preparation of public health workers and other professionals who engage in individual and larger-scale change. However, with relatively large scale changes looming before us, perhaps it is time to teach elements of behavior change to everyone. Behavior change would then become an intentional process to both alter individual habits and actions, and work effectively with others toward a common goal.

A number of tools for social and behavioral change exist. For example, social marketing recognizes and addresses the complexity of changing human behaviors (McKenzie-Mohr & Smith, 1999). Generally, social marketing is a process of: uncovering barriers to and benefits of a particular behavior, building commitment, prompting desirable behavior, modeling and establishing norms, providing incentives to enhance motivation to act, and removing external barriers. We could benefit greatly by extracting lessons from previously successful campaigns to change behavior (e.g., anti-smoking and anti-litter).



Integrating climate and change education

In climate change education, climate and change are both important and interrelated. It is equally important that the change element is informed by the climate element, and the climate element is taught mindful of the social and economic consequences and complexities of change. These two elements—climate and change—cannot be separated, taught independently, and later woven together at an undetermined time or point in the curriculum. We cannot expect students to make linkages

between the climate and change elements. The interconnections must be overtly and purposefully taught.

ESD: the best framework

We expect that a great deal of effort will be placed on defining climate change education. We think it is best addressed through the Education for Sustainable Development (ESD) framework. ESD has four thrusts: (1) access to and retention in quality basic education, (2) reorienting existing education programs to address sustainability, (3) increasing public awareness and training, and (4) providing training for employees in all sectors of the economy (i.e., public and private). Although many of the current discussions on climate change education revolve around curricular change within the second “reorienting” thrust, climate change will effect far more than curricular issues within educational systems. For example, climate change affects children’s access to and retention in basic education as a result of poverty, migration, disease, and other factors. It will take good governance and policy implementation to deal with these issues within educational systems. In the western world, climate change also will require school boards to consider the carbon footprint of such actions as school construction and renovation, purchasing, transportation, and breakfast and lunch programs.

Like ESD, climate change education should be locally relevant and culturally appropriate. Communities around the world will be facing different expressions of climate change. Each community has its own environmental, social, economic and political contexts. As a result, climate change education will look different in each community. One size will not fit all.

Teachers in every discipline can contribute to climate change education. Students arrive at school with many different skills and interests and it is the teachers’ responsi-

bility to engage those different learning styles to teach the mandated content. The same is true of climate change education. Some students will learn through science — observing natural phenomenon, recording and analyzing data, and learning theory. Others will engage through the arts, such as writing, music, painting, and photography. Yet, others will learn through taking action such as awareness campaigns, raising funds, and volunteering their time to address a societal need or a social justice issue. Accordingly, it is important that many approaches are enlisted. We will only reach a small segment of the population if we teach climate change education from a strictly natural science perspective.

Life-long learning

Good climate change education programs will focus on life-long learning and not be limited to primary and secondary education. Public awareness and education programs for citizens of all ages are important, as is training of the current workforce. For most of the world's population, climate change was not included in their school curriculum. Everyone needs to be informed so they can make decisions in their personal and professional lives that will lessen climate change or adapt to it.

Effective climate change education will require coordination of various efforts so that people of all ages, not just pupils in primary and secondary schools, gain the knowledge, skills, and values they need to understand and create solutions for the many issues associated with a changing climate.

Climate change education involves large decisions. What is the scope and sequence? What key messages should the public receive? Which behaviors should be targeted for change—the low-hanging fruit or the highly impactful?

Conclusion

Although we propose two parts—climate and change—and six components for the change portion, we know that climate change education will vary from one geographic region to another depending on local environmental, social, and economic contexts and its impacts on each locality (e.g., drought or flooding). For example, in regions where jobs will change so much that individuals will need new career options, teaching entrepreneurial skills as well as emphasizing creativity and ingenuity is a good strategy.

We are not of the opinion that we have figured out all the answers. Our list of six components of educating for climate change stem from our particular worldviews and the context of our lives and travels. Our aim here is to add to the ongoing dialog. It is our hope that lively discussion ensues about which components of education for change should be in local and national curriculums. We welcome the ideas of other educators and educational policy makers. Perhaps, together we can create quality climate change education programs for all.

Learning is essential to the resolution of climate change issues. Our current textbooks and our existing knowledge base do not contain the answers to the many problems and issues associated with climate change. Our own and the next generation will have to learn their way towards equitable solutions.

Charles Hopkins is a UNESCO Chair on Reorienting Teacher Education to Address Sustainability at York University in Toronto, Canada.

Rosalyn McKeown is Secretariat to the UNESCO Chair and the International Network of Teacher Education Institutions. She is a former classroom teacher and teacher educator, who can be reached at rmckeown@edu.yorku.ca.

Notes

1 NASA Goddard Institute for Space Studies, [gistemp2010_draft0319.pdf](#), March 19, 2010.

References

(CISHDGC). Center for Integrated Study of the Human Dimensions of Global Change, Carnegie Mellon University. (2002). Teacher's Guide to High Quality Materials on Climate Change and Global Warming. <http://hdgc.epp.cmu.edu/teachersguide/teachersguide.htm>. Accessed 2 May 2010.

Clarke, P. 2000. Teaching controversial issues. *The Green Teacher* 62 (Summer): 29–32.

Conisbee, Molly and Simms, Andrew. 2003. *Environmental Refugees: The Case for Recognition*. London: New Economics Foundation. http://www.neweconomics.org/gen/z_sys_PublicationDetail.aspx?PID=159 (Accessed 27 October 2006).

McKeown-Ice, R., & Dendinger, R. (2008). A Framework for Teaching, Learning, and Assessing Environmental Issues. *Journal of Geography*, 107, 161 – 166.

McKenzie-Mohr, D., and Smith, D.: 1999, *Fostering Sustainable Behavior: An introduction to community-based social marketing*, New Society Publishers, Gabriola Island, B.C.

Ramsey, J. M., H. R. Hungerford, and T. L. Volk. 1989. A technique for analyzing environmental issues. *Journal of Environmental Education* 21(1): 26–30.

UNESCO. (2010). Focusing on Effective School Health. http://portal.unesco.org/education/en//ev.php-URL_ID=36637&URL_DO=DO_TOPIC&URL_SECTION=201.html. Accessed 2 May 2010.

Green Teacher

Bulk prices available on our recent special issue exploring connections between Native/Aboriginal and Western views on science – a great way to add new perspectives to your curriculum



This special themed issue includes articles and activities for grades 3-12 including:

- studies in astronomy, outdoor habitats, and Aboriginal technology
- attitudinal and environmental impacts of objective/subjective perceptions of nature
- using chemistry to understand Native medicines
- a description of how one school district is integrating Native and Western world views in its environmental education programming

Prices and ordering information:

Single copy \$7.95; 10-49 copies \$3.50 ea.; 50-99 copies \$3.00 ea.; 100+ copies \$2.50 ea. (plus shipping and taxes where applicable). Copies of the digital edition cost \$2/school with a minimum of 15 schools. Contact Green Teacher at 888-804-1486, or via info@greenteacher.com.