

annual report

NATIONAL CENTER FOR SCIENCE EDUCATION | 2016







Our Mission

NCSE defends the integrity of science education against ideological interference. We work with teachers, parents, scientists, and concerned citizens at the local, state, and national levels to ensure that topics including evolution and climate change are taught accurately, honestly, and confidently.

Our work is made possible by our members and other generous donors.



Letter from the
Executive Director



As 2016 drew to a close, NCSE looked back on the year with pride. Our national survey of climate change education practices, published in the journal *Science* in February, was the first of its kind to explore exactly how climate change is being taught in our nation's science classrooms. Our new programs—NCSEteach, Scientist in the Classroom, and NCSE Science Booster Clubs—are thriving. Our teacher network has grown to over 6,000 teachers. Over 100 teacher-scientist partners have worked with more than 3,000 students. In Iowa, where the Science Booster Club program was piloted, more than 54,000 people participated in fun, accessible, hands-on evolution and climate change activities during community events. The program is having a measurable impact: in one community where the local club held six activities, science literacy rose 20%. That's something to be excited about!

But all is not rosy. These are troubling times for science education. As the year came to an end, we watched with concern as a president-elect who declared climate change a Chinese hoax and a vice president-elect who had denounced evolution from the floor of the House of Representatives, began assembling their cabinet and setting their policy priorities. We are concerned that their very public rejection of established scientific conclusions will make it even more difficult for teachers to cover evolution and climate change accurately and completely.

As we have for over thirty years, NCSE is ready to help any community that faces threats to the integrity of science education. We'll also expand our teacher network, get more scientists into classrooms, and spread Science Booster Clubs into as many communities as possible.

There have been a few changes at NCSE. Josh Rosenau and Minda Berbeco, both Program and Policy Directors, have moved on to new positions where their organizing talents and passion for good science will serve them well. Claire Adrian-Tucci, who caught the NCSE bug as an intern for the Science Booster Club pilot in Iowa, is now coordinating the NCSEteach and Scientist in the Classroom programs, and starting a booster club in Washington, DC. NCSE's board of directors bade a fond farewell to president Brian Alters after twelve years. He is succeeded as president by the renowned evolutionary biologist Francisco Ayala. The board also welcomed Kenneth R. Miller, evolutionary biologist and textbook author, and Barry Polisky, molecular biologist and biotech entrepreneur.

We are grateful to our board members, our many enthusiastic volunteers, and our thousands of donors, who make it possible for NCSE to fight the good fight.

Sincerely,

A handwritten signature in black ink, appearing to read "Brian Alters". The signature is fluid and cursive, written in a professional style.

The Challenges

On scientific topics that are socially controversial, there is a substantial and dismaying mismatch between the views of scientists and the public. Evolution and climate change are the most prominent cases in point. While 87% of scientists—and over 97% of climate scientists—accept that climate change is mostly due to human activity, only 50% of the public agrees. Similarly, while 98% of scientists—and 99% of working biomedical scientists—accept that humans have evolved over time, only 65% of the public agrees. Worse, the public is generally unaware of the scientific consensus.

THE SCOPE OF THE PROBLEM

Formal attempts to undermine science education have included banning the teaching of evolution or climate change, “balancing” the teaching of these topics with supposed alternatives, and belittling the scientific consensus on evolution or climate change as “only a theory.” In the last dozen years, over seventy anti-science education bills were introduced in state legislatures. Evolution and climate change education have also been attacked during state science standard adoptions across the country.

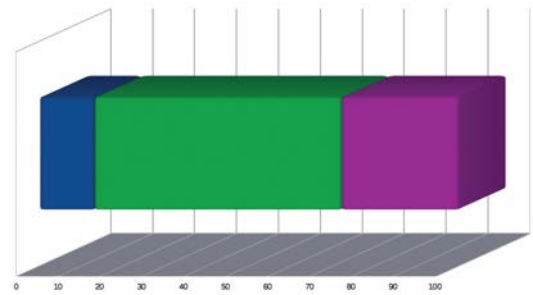
The mismatch is also evident in individual classrooms across the country. In a national survey of public high school biology teachers conducted in 2007, only 28% presented evolution properly, 59% presented it only halfheartedly, while 13% explicitly advocated creationism. In a similar survey conducted in 2014, 54% of public middle and high school science teachers were presenting climate change properly, but 36% were presenting it halfheartedly and 10% were explicitly advocating climate change denial.

What influences whether teachers present the science properly or misrepresent it? The surveys suggest various influences: the political and religious beliefs of the teachers themselves; the political and religious beliefs prevalent in the communities in which they teach; and the amount of training in evolution and climate change the teachers received.

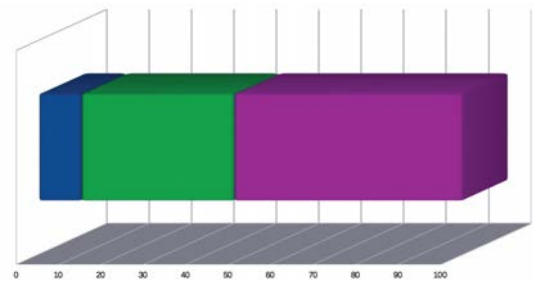
Not all of these causes can be addressed directly. But NCSE’s new suite of programs is aimed at improving the confidence of teachers to present these topics and the willingness of their communities to support them in doing so.

Of course, direct threats to the integrity of science education have by no means disappeared. NCSE continues to monitor attacks occurring at the state level—in legislatures, at state boards of education, and during standards and textbook adoption. And as always, NCSE is ready, willing, and able to provide advice and counsel to anyone encountering a threat to the integrity of science education. But the hope is that the Science Booster Clubs, NCSEteach, and the Scientist in the Classroom program will equip local educators and communities to resist such attacks and threats.

Evolution

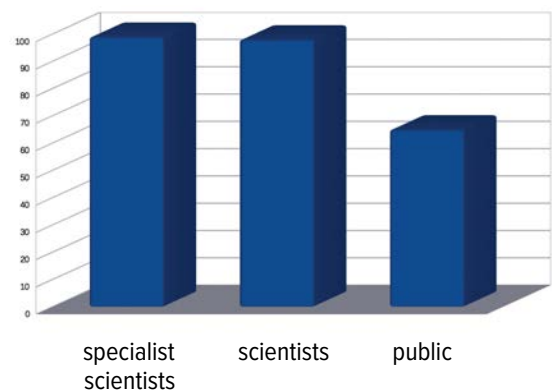


Climate Change

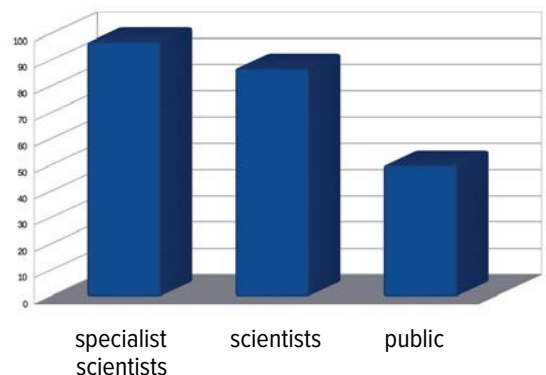


■ denial ■ avoidance ■ sound teaching

Acceptance of Human Evolution



Acceptance of AGW





Research

In collaboration with the Penn State Survey Research Center, and with generous funding from Lorne Trottier (a member of NCSE’s board of directors) and the Wallace Global Fund, NCSE conducted the first nationally representative survey of science educators to focus on climate change. (The full report, “Mixed Messages: How Climate Change is Taught in America’s Public Schools” is available at <http://ncse.com/files/MixedMessages.pdf>.)

The survey investigated:

- How many students receive instruction about recent global warming?
- What relevant topics and scientific principles are they taught?
- Are teachers well-equipped to teach climate change effectively today and in the future, when enhanced attention to climate change will be required by new state content standards?
- How much do non-scientific ideas and ideologically motivated reasoning find their way into public school classrooms?



1/4 Teachers give “equal time” to rejection of the consensus

Data was collected from 1500 public school teachers from all fifty states, including representative samples of middle school science teachers and of high school teachers with primary responsibility in biology, earth science, chemistry, and physics.

568 Middle School
308 Biology
285 Earth Science
183 Chemistry
156 Physics

1500 Teachers Total

The key findings of the survey, on what teachers present in their classroom:

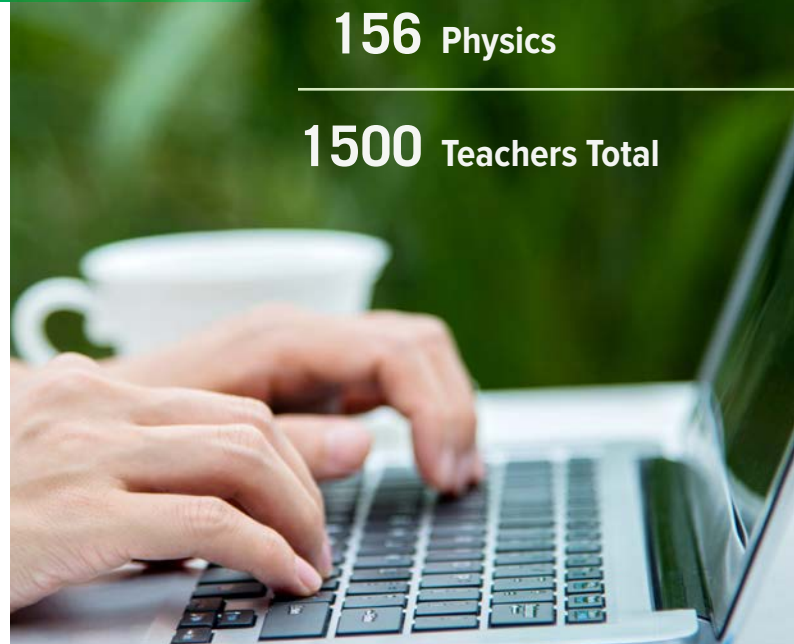
- Climate change is widely taught. Teachers cover the essential topics and link science to action.
- But many students are receiving mixed messages about the primary causes of global warming. As many as 30% of teachers emphasize both that scientists agree that human activities are the primary cause of global warming and that “many scientists” attribute global warming to natural causes.
- Teachers use many approaches to manage conflict over climate change. Unfortunately, more than a quarter give “equal time” to doubts about the scientific consensus.

What of the educational background and scientific knowledge of teachers? The key findings:

- Teachers rated their knowledge of climate change as lacking compared to their knowledge of other topics in science. Many teachers had a shaky understanding of the greenhouse effect in particular.
- Most were unaware of the scientific consensus on the causes of recent climate change.
- Their prior training in climate change was limited, although many expressed interest in professional development in climate science.
- Only two thirds agreed that human activities are the primary cause of recent global warming.

How do political and cultural forces and personal values influence how teachers present climate change? The key findings:

- Few teachers reported explicit pressure to teach or not teach about the human causes of recent climate change.



- The more that teachers question the role of government, the less likely they know that most climate scientists believe that human activity is the major cause of global warming.
- Most teachers are unaware of the degree of scientific consensus, even those teachers who agree with the scientific consensus.

So far NCSE staffers have collaborated on four articles reporting and discussing the survey. The most notable was “Climate Confusion Among U.S. Teachers,” published in *Science*. The survey received wide media attention, including from *The Guardian*, *Newsweek*, *The Washington Post*, *Mother Jones*, *InsideClimate News*, *Time*, *The New York Times*, *New Scientist*, and even *The Onion*.

The results of the survey have important implications for educational policy. NCSE hopes that the survey will contribute to more effective science education on climate change and, ultimately, increased scientific literacy.



Science Booster Club Program

NCSE is building programs to help communities rally around climate change and evolution education by decreasing stigma, increasing science literacy, and building support for teachers. In 2016 our pilot Science Booster Club program in Iowa brought interactive, engaging, free science programs to over 54,000 people at community events like farmer's markets and county fairs. We ran a tuition-free summer camp that brought friendly, accessible, high-quality evolution education to dozens of kids from rural areas. By raising funds from the community, we were able to fill requests for durable equipment for fifteen teachers, aiding the education of nearly 4,200 students in the region.

The Science Booster Club program is run as a research study through the University of Iowa, which allows us to collect data on science literacy in the communities where our programs operate. We're beginning to see evidence that our programs significantly increase adult science literacy—a notoriously difficult metric to move.

Why Does It Work?

What makes the Science Booster Club program so successful and effective? Our friendly, no-conflict approach. We interact with people warmly and respectfully, focusing on giving them the opportunity to do science, rather than be “told” science. When we encounter deniers, we avoid a debate. Instead, we talk about something we have in common to de-escalate the situation, then return to the science. This polite flipping of the script calms most people down, makes them feel heard, and helps them become more willing to hear us. We focus on applying the scientific method to data, rather than teaching everyone the same facts. This means that participants of all



backgrounds and abilities can use the method to learn at the level appropriate for them.

Our goal is to build relationships in communities so that people see science as something that is relevant and important in their understanding of the world. NCSE's Science Booster Clubs provide accessible materials that don't compromise on scientific integrity, and that help people feel connected to topics like evolution and climate change.

Next Steps

Our Science Booster Club program is rapidly expanding. Now that we've tested our model in several Iowa communities, it's time to scale up. We have volunteers starting clubs with NCSE support in thirteen states: California, Colorado, Michigan, New York, Pennsylvania, Ohio, Oregon, Rhode Island, Tennessee, Texas, Virginia, Washington, and West Virginia. We'll supply these clubs with startup kits—materials and funds—for their first few events, as well as advice related to community organizing, grant writing, and local communications.



Our operations in Iowa have been largely funded by local individuals and high-tech and biomedical corporations, and generously supported by the University of Iowa. Although we have raised money locally and via our web site to get our thirteen new clubs off the ground, a rapidly growing network requires a lot of resources. We'll teach local club leaders successful grant-writing skills, as tested at our pilot site, and continue to seek national-level funding to develop this important new outreach branch of NCSE.





Scientist in the Classroom

Two years ago, NCSE decided that we needed to have a closer relationship with science teachers. After all, they represent the front line in the effort to make sure that students learn about evolution and climate change without equivocation. We wanted to make sure that teachers knew about NCSE and that we are always available to help them cover these topics even in the face of pressure not to.

When we launched NCSEteach in early 2014, we had only about 300 identified teachers in our database. Now we have more than 6,000. Every month, these teachers receive a newsletter from NCSE that provides links to the best resources we can find on teaching evolution and climate change, tips on handling doubt or denial in their classrooms, suggestions

on using debate appropriately, and opportunities for professional development.

But NCSEteach isn't a one-way street. We frequently survey our teachers to find out whether they're facing any problems in teaching evolution and climate change, and what NCSE might do to help. In one of our very first surveys, we got the same answer from lots and lots of teachers: "We want scientists to visit our classrooms when we teach these topics."

That's why we started the Scientist in the Classroom program, which has, since September 2015, brought more than 100 early career scientists on 202 classroom visits serving more than 1,500 students.

We worked with a small group of NCSEteach members—our Teacher Advisory Council—to design the Scientist in the Classroom program so that it would be most helpful to teachers and most workable for scientists. We wanted the barriers to be as low as possible. What are the key elements?

Teacher and scientist work as partners

We offer a training webinar to all participants that likens the classroom visit to a dinner party. The teacher is the host and the scientist is the welcomed guest. The teacher and scientist work together to develop an activity related to the scientist's research that reinforces a curriculum topic of the teacher's choice.

The scientist visits only twice

On the first visit, students get a chance to ask questions and get to know the scientist. On the second visit, the scientist and teacher lead the collaboratively developed hands-on activity.

We recruit graduate students as visiting scientists We tap into a diverse pool of early career scientists who are closer in age to the students, helping to bust the stereotype of scientists as old men in white coats. The program gives these graduate students invaluable experience in public outreach.

Is the program working? In our participant surveys, we find that enthusiasm for the program is high. Teachers feel supported by the scientific community and report that their students are very enthusiastic about meeting the scientists. Scientists report that they gain confidence in their ability to communicate about science.



CASE STUDY:

David A, a biology teacher from New York, was paired with Laura S., a PhD student who studies the physiological and behavioral responses of animals to environmental challenges.

On the first visit, Laura showed up with nets, tags, and the other instruments of her trade and demonstrated what scientists do when they are out bird collecting. Students then watched videos of animals engaging in unknown behaviors and began formulating their own hypotheses as to what was going on—a first-hand experience of how science works.

Later in the semester, Laura returned to the classroom to help David with an activity exploring allele frequency of sickle cell anemia and malaria resistance. Laura also stuck around to discuss her career path with many students after school.

David's students really enjoyed working with Laura. He noted that "students were able to see a future in science, which was helpful, especially for girls."

As for Laura, "I was really surprised that the students envisioned scientists as older, white men who worked over bubbling test tubes. After working with the students, I believe they had a better sense of the diversity of people in science and gained perspective on the range of activities scientists engage in."

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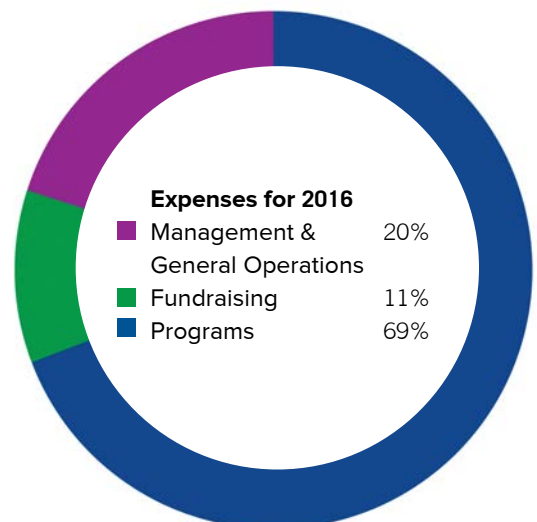
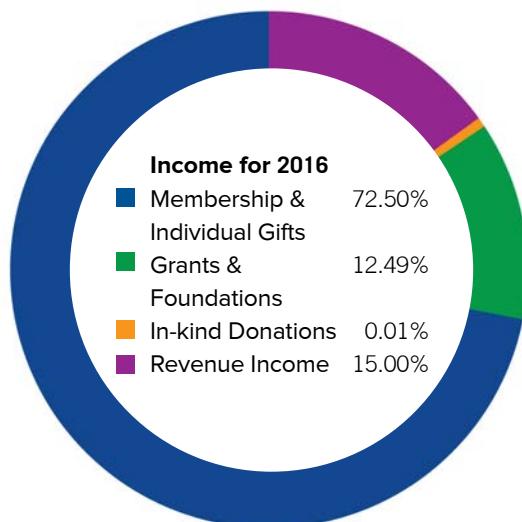
Ex Officio, Executive Director

Ann Reid

Financial Report

PROFIT & LOSS PREVIOUS YEAR COMPARISON

Income	2016	2015
Support		
Membership & Individual Gifts	824,596	790,824
Grants & Foundations	142,681	250,000
In-kind Donations	7,156	0
Total Support Income	974,433	1,040,824
Revenue Income	170,946	56,693
Total Income	1,145,379	1,097,517
Expenses		
Management & General Operations	246,364	226,581
Fundraising	132,906	108,267
Programs		
Communications	238,971	...
Teacher Network	122,765	...
Scientist in the Classroom	46,889	...
Booster Club	272,025	...
Surveys	12,675	...
Travel Services	55,159	...
Member Services	127,838	...
Total Program Expenses	732,135	962,356
Total Expenses	1,255,591	1,297,204





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