

DAY ONE PROJECT

Modernizing the Relationship
between Scientists and the Public

Mary Woolley

Jenny Luray

Sarah Ackerman

September 2020



Summary

The COVID-19 pandemic has pushed science to the forefront of public attention. For many Americans, following daily reports about the novel coronavirus represents the first time they are seeing science and scientists operate in “real time”. This experience is new for scientists too. Scientists are not trained to engage the public, despite the fact that scientific research is put to work daily to help improve lives, address the needs of diverse communities, and solve problems at a national and global scale.

We propose a dedicated effort to give federally-funded Ph.D. students in science, technology, engineering, and math (STEM), specific training to enable them to engage effectively with the public. Participation in a Public Engagement (PE) course would enable the next generation of scientists to demonstrate accountability to the public by building awareness of the importance of connecting to diverse community needs and meeting societal expectations. Specific course components would include development of communication skills and an understanding of the roles and expectations of policymakers, government agencies, academia, industry, patient groups and other NGOs, families and small businesses, and additional components of society that together comprise the “public context” of science.

Implementing PE training will help to ensure that new generations of American-trained scientists become increasingly visible and more comfortable in the broader community and better able to understand how science functions in its public context to serve society. This in turn will increase trust in and support for the scientific enterprise, drive stronger interest in STEM careers, set the stage for faster response to threats, and build a stronger, science-driven U.S. economy. At a local level, taxpayers will benefit directly as more scientists are trained to engage regularly and meaningfully with schools, community institutions, and local governments.

Challenge and Opportunity

Many scientists do not know how to talk clearly and effectively to the public about their fields. Scientists generally work in settings that provide little exposure to public expectations and priorities. Over time, this gap between scientists and broader society has contributed to a number of threats to our future, from a drop in student interest in entering the STEM fields, to our ability to combat crises such as COVID-19, to perpetuation of health disparities and underrepresentation of people of color in the sciences, and to declining US prominence in science, and thus our ability to compete globally.

A large majority of Americans believe it is very important for scientists to inform the public about their research and its impact on society.¹ Though public engagement hasn’t been a norm in

¹ Research!America (2020) “America Speaks Poll Data Summary Vol. 20” Available at https://www.researchamerica.org/sites/default/files/Publications/RA_PollDataSummary_Booklet_screenRes.pdf.



science education or practice, it is reasonable for the taxpaying public to expect greater visibility and accountability from the scientific community. In addition, too often science is not viewed as an attainable career for students of color, nor are students of color who do enter the STEM fields properly supported.

There is clear evidence that many Ph.D.-level STEM students are ready and willing to be trained in public engagement. Microgrant programs such as those offered by Research!America and the National Science Policy Network have grown in popularity, enabling groups of Ph.D. students to develop and participate in outreach initiatives benefiting their local communities.^{2,3} There is an appetite for much more. As Dr. Peter Hotez, a world-renowned vaccine biologist from the Baylor College of Medicine, has said, "I would love to see [an] initiative that builds in public engagement science training for Ph.D.'s ... If you build it, they will come."⁴

Plan of Action

We propose that Ph.D. students in STEM who are funded through federal grants complete a PE course. There is precedent for federally funded, Ph.D.-level researchers to participate in specific coursework: the Responsible Conduct of Research (RCR) course educates federally-funded Ph.D.-level researchers on the principles, regulations, and rules that govern research.⁵

There is also precedent for federally funded scientists to consider their relationships with the wider community. Since 1997, the National Science Foundation (NSF) has required grantees to explain how their research will contribute to achieving societal goals through meeting "broader impacts".⁶ Broader impacts can be achieved directly through research itself, through project-related activities, or through complementary activities. As former NSF Director, Dr. France Córdova, stated, "As a federal agency, we need to stay relevant with those who entrust us with taxpayer funds."⁷ PE curriculum development will benefit from NSF's experience in broader impacts.

To speed the normalization and adoption of PE as a valued aspect of graduate training in STEM, and to test curriculum, we propose that the National Academy of Sciences, Engineering and Medicine (NASEM) host annual sessions for the first groups of trainee cohorts. Effective communication of science has been well studied by the NASEM, which has an ongoing

² Research!America (2019). "Civic Engagement 2019 Microgrant Initiative". Available at

<https://www.researchamerica.org/advocacy-action/civic-engagement-2019-microgrant-initiative>.

³ National Science Policy Network (n.d.). "Funding Opportunities". Available at <https://scipolnetwork.org/page/funding-public>.

⁴ Research!America (2020). "Alliance Member Call with Dr. Peter Hotez". <https://www.youtube.com/watch?v=kThgdrSus3Y>.

⁵ U.S. Department of Health and Human Services. (2009). "Notice NOT-OD-10-019". National Institutes of Health, Office of Extramural Research. Available at <https://grants.nih.gov/grants/guide/notice-files/not-od-10-019.html>.

⁶ National Science Foundation (1997). "Merit Review Final Recommendations". Available at <https://www.nsf.gov/pubs/1997/nsbmr975/nsbmr975.htm>.

⁷ The National Academies of Science, Engineering, and Medicine (n.d.). "The Science of Science Communication: A Research Agenda". Available at <https://www.nationalacademies.org/our-work/the-science-of-science-communication-a-research-agenda>

DAY ONE PROJECT

commitment to public communication and engagement. The NASEM could coordinate with the White House Office of Science and Technology Policy (OSTP) on this annual training session and related efforts. For instance, OSTP could host a White House Summit on Science and Public Engagement with the NASEM to draw attention to the importance of PE in science and build cross-agency commitment to enhancing the relationship between scientists and the public they serve.

With the COVID-19 pandemic placing science at the center of our daily lives, the importance of modernizing the relationship between scientists and the public has never been greater nor more potentially impactful. Ensuring STEM Ph.D. candidates receive public-engagement training is a timely, tangible and crucial step to strengthen connections between scientists and broader society. PE training will in turn deliver many important short- and long-term benefits to our nation and to communities across America.



Frequently Asked Questions

Why do scientists need to be trained in public engagement (PE)?

Scientific research is the backbone of the medical and technological innovation we look to every day to improve our lives, address the needs of our communities, and solve global problems. Though science serves the public's interest in these ways, scientists are too rarely exposed to the public context of their work. Likewise, scientific research remains unfamiliar and opaque to the vast majority of Americans. Over time, this has caused students to be less interested in entering STEM fields, left our nation ill-prepared to combat crises such as COVID-19, lowered U.S. prominence in science, and caused research universities to be perceived as elite, inaccessible institutions. Public-engagement training would enable scientists to better communicate their work, become more visible in and accountable to society, and connect the dots between scientific progress and public support of research. This in turn would strengthen public appreciation for science and lead to stronger interest in STEM careers.

In a 2008 essay published in *Science*, Dr. John Holdren, who subsequently became White House science advisor and the Director of the OSTP, expressed his concern about the widening gap between science and society.⁸ Dr. Holdren argued for all scientists to pledge to interact with the public. We agree with Dr. Holdren but we believe the science community will be better equipped to rise to the challenge if we purposefully broaden the education of scientists to include public engagement.

Why can't universities implement PE training without involving the federal government?

Graduate-level science curricula tend to be tradition-bound. Change often requires a nudge from outside the academy. Linking federal research funding to PE training will help ensure that PE training becomes a standard part of graduate education in STEM across the board, instead of at just a few individual institutions.

Wouldn't this additional training and coursework impose an unwelcome burden on students?

While graduate students are extremely busy with their research and core disciplinary courses, we have seen an increase in student interest in developing public engagement skills through the microgrant programs offered by Research!America and the National Science Policy Network. This is notable given that such programs rely on individual students taking the initiative to pursue public engagement, usually on top of their graduate research and course requirements. Today's Ph.D. students are eager to learn how to improve their science communication skills and connect

⁸ Holdren, J.P. (2008). Science and Technology for Sustainable Well-Being. *Science* 319, 424-434. Available at <https://science.sciencemag.org/content/319/5862/424.full>.



with their local communities. Integrating PE training into graduate STEM curricula is a natural solution, legitimizing student interest and normalizing public engagement.

How will a requirement for PE training benefit taxpayers?

89% of Americans believe it is important for scientists to inform the public about their research and its impact on society. Yet 75% of Americans cannot name a living scientist.⁹ Linking federal research funding to PE training will help bridge this gap.

As scientists become more engaged with the public, it will drive greater interest in STEM careers, set the stage for faster response to threats, and build a stronger, science-driven U.S. economy that is viewed as relevant to, and supported by every member of the public. At a local level, taxpayers will benefit directly as more scientists are trained to engage regularly and meaningfully with schools, community institutions, and local governments.

The COVID-19 crisis has shown us now more than ever, the power of scientific research and the importance of scientists being able to communicate effectively with the public.

What are examples of other “public accountability” requirements for graduate students?

There are precedents for federally funded graduate students to complete specific training. These include:

The National Institutes of Health’s (NIH) Responsible Conduct of Research (RCR): In 2009, NIH released a policy instituting clear guidelines for RCR training at all institutes receiving NIH Research Training Grants.¹⁰ The policy requires substantial face-to-face discussions, at least eight hours of training, and instruction at least once every four years. In some institutions, the RCR training is required in the first year of a Ph.D. program.

Institutional Animal Care and Use Committee (IACUC) Training: The federal Animal Welfare Act of 1966 and Health Research Extension Act of 1985 together generated the Public Health Services Policy, requiring all graduate students conducting animal research to complete graduate-level animal-care training.

Are there any requirements now for scientists to engage with the public around their research?

Since 1997, the National Science Foundation (NSF) has required all grantees to explain how their research will contribute to achieving societal goals through explanation of “broader impacts”. Broader impacts can be achieved directly through research itself, through project-related activities, or through complementary activities. Unlike our proposed public-engagement course,

⁹ Research!America (2020) “America Speaks Poll Data Summary Vol. 20” Available at https://www.researchamerica.org/sites/default/files/Publications/RA_PollDataSummary_Booklet_screenRes.pdf

¹⁰ U.S. Department of Health and Human Services. (2009). “Notice NOT-OD-10-019”. National Institutes of Health, Office of Extramural Research. Available at <https://grants.nih.gov/grants/guide/notice-files/not-od-10-019.html>.



NSF's broader impacts requirement is not aimed at Ph.D. students, does not involve a training component, and may be met by the research institution rather than by individual scientists.

How will this new course be implemented?

At the direction of Congress or through executive branch action, science agencies would implement public-engagement training through universities with the goal of reaching 100% of new federally-funded Ph.D. students in STEM disciplines within five years. OSTP could host a White House Summit on Science and Public Engagement to build agency involvement; the National Academy of Sciences could offer training to initial cohorts to test curriculum, speeding the adoption and normalization of PE into Ph.D. curriculum.

What will the course consist of?

We expect the course will include the following key components: development of communication skills; discussion of social, economic, ethical, and global issues facing science; demonstrating understanding of the role of patient groups and industry; and basic civics. It is possible that the structure of the PE course could follow that of the RCR course by including a minimum number of course hours.

How would the course be funded?

The course could be funded with a small increase in existing training grant awards over a several-year period to enable institutions to develop their course curricula.

About the Authors



Mary Woolley is the president and CEO of Research!America. Woolley is an elected member of the National Academy of Medicine and served two terms on its Governing Council. She is a Fellow of the American Association for the Advancement of Science and serves on the National Academy of Sciences Board on Higher Education and the Workforce, having previously served on the Board of Life Sciences. Woolley is a Founding Member of the Board of Associates of the Whitehead Institute for Biomedical Research. She has a 30-year publication history on science advocacy and research related topics and is a sought-after speaker.



Jenny Luray is Vice President of Strategy and Communications at Research!America. Jenny served as Chief of Staff to former Senator Barbara Mikulski, Legislative Director to Congresswoman Nita Lowey and Deputy Assistant to the President in the Clinton White House. She directed U.S. policy and government affairs for life-science and medical-technology companies BD and Abbott, and led the Susan G. Komen Advocacy Alliance as its president. Jenny is a member of the Governing Committee of the FDA-supported NESTcc, and the Advisory Council of the Brown University School of Public Health.



Sarah Ackerman is a Science Policy Fellow at Research!America. She received her Ph.D. in biomedical science from the Rockefeller University in 2019. Her Ph.D. focused on the link between breast cancer and obesity. While at Rockefeller, Sarah led the Science and Education Policy Association (SEPA), a graduate-student-run science-policy organization. Sarah is also a founding member of the National Science Policy Network (NSPN) and served as the Eastern Hub Co-Chair for NSPN from 2018–2020.



About the Day One Project

The Day One Project is dedicated to democratizing the policymaking process by working with new and expert voices across the science and technology community, helping to develop actionable policies that can improve the lives of all Americans, and readying them for Day One of a future presidential term. For more about the Day One Project, visit dayoneproject.org.