



Scientific Institutions Should Support Inclusive Engagement: Reflections on the AAAS Center for Public Engagement Approach

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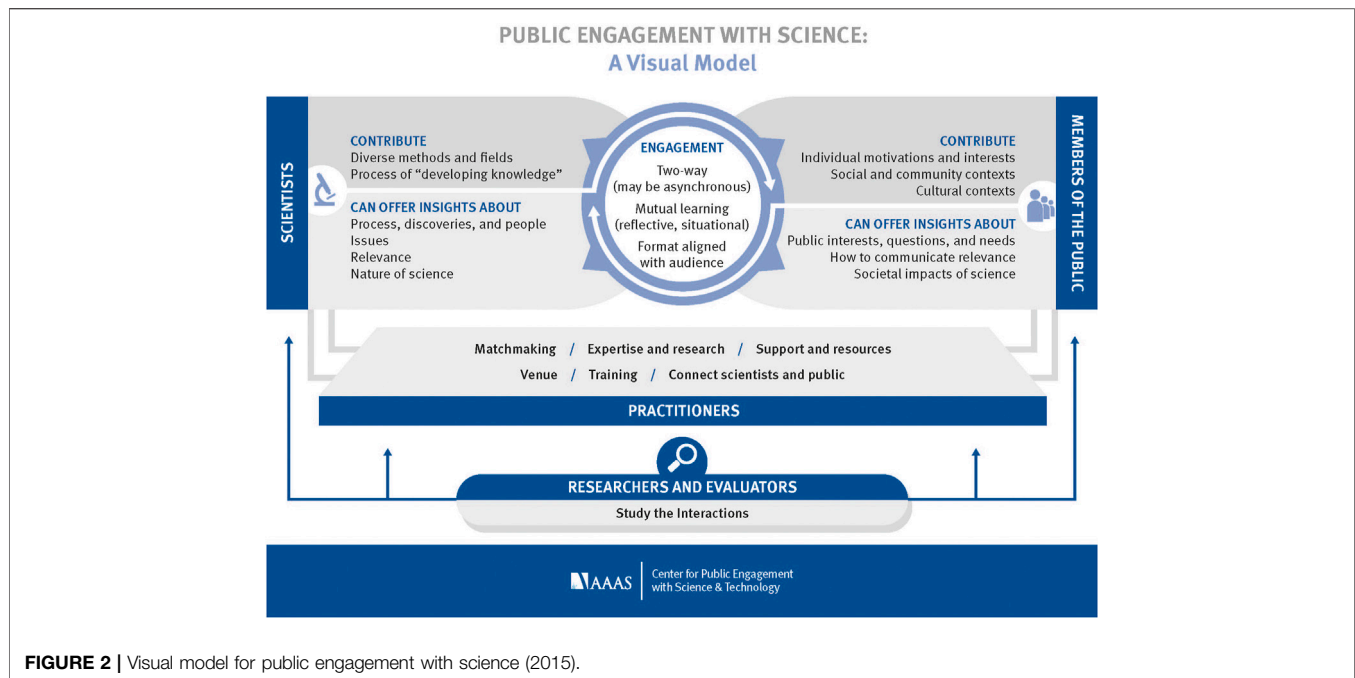
Scientists' engagement with society on critical environmental and health issues is essential to reaching positive and equitable long-term outcomes. We argue that stronger institutional support for public engagement is necessary and that inclusive practices should be built into public engagement training and relationships. The American Association for the Advancement of Science (AAAS)'s Center for Public Engagement with Science and Technology provides a model of support for scientists that we believe other scientific institutions can replicate and expand on. This model prioritizes representative and accessible science communication training, resources (e.g., funding and staff and peer support), opportunities to practice engagement, and rewards and incentives for doing engagement. We describe our programs in each of these areas and reflect on how well each builds scientists' engagement skills and institutional capacity, and whether each embodies and models thoughtful, accessible, and representative engagement. Through these various approaches, the Center communicates to other scientific institutions that engagement by scientists should be valued, celebrated, and supported, and builds capacity for individual scientists to do effective engagement. We argue that these supports can be applied by other scientific institutions to reflect and incorporate society's diverse needs and concerns, thus truly serving the public and making science and scientific institutions stronger for it.

Keywords: science communication, public engagement, institutional change, inclusive engagement, health communication, climate communication, science communication training, engagement incentives

INTRODUCTION

Scientists' engagement with society on pivotal environmental and health issues is essential to reaching equitable outcomes. To be successful, scientists require support in the form of training, resources, and incentives. We argue for increased institutional support for public engagement and reflect on our holistic approach as a catalyst for discussions on doing this well, considering especially whether our programs are inclusive, accessible, and representative.

The Center for Public Engagement with Science and Technology ("the Center") at the American Association for the Advancement of Science (AAAS) was founded in 2004 with the vision of facilitating dialogue between science and society and providing scientists with training and opportunities to thoughtfully engage the public in two-way dialogue (Leshner, 2003).



thinking is integrated into both projects and careers (Risien and Storksdieck, 2018). This approach prioritizes thoughtful planning and responsiveness to audiences (including listening and being openminded—e.g., what can the scientist learn from the public?) while also providing guidance on how to be clear and succinct to capture attention and enable conversations. The training also introduces different methods of engagement, including 1) informal “public dialogue” with the goal of learning occurring both by experts and the public, 2) “policy deliberation” with the goals of exchanging views about science policy, 3) “knowledge co-production” wherein scientists partner with members of the public to collaboratively do research, and 4) “University-led cooperative engagement” such as engagement done through university extension offices (Storksdieck et al., 2016).

To reinforce both the importance of approaching public engagement thoughtfully and strategically, and that support for this work exists, we encourage institutional leaders to make remarks during workshops and, when possible, point participants to resources at their institutions. Post-workshop survey results tell us that trainings establish some momentum for scientists wishing to engage or increase their engagement. In 2020, three-quarters of participants reported being more aware of and feeling more connected to colleagues doing public engagement, likely a result of small-group discussions with colleagues during workshops, and two-thirds reported new awareness of their institution’s support for public engagement. Often, hosts ask us how to build on this momentum and we encourage them to highlight or create resources to support scientists who wish to engage, the pillar we explore next. Training, when provided in isolation, is not enough to enable scientists to effectively engage.

An additional critical component of this program is accessibility: ensuring everyone has access to quality training

that meets their needs is one part of ensuring public engagement itself is inclusive and representative. AAAS models this in our trainings by employing accessible design (Murchiea and Diomede, 2020), informed by a style guide with one simple typeface and a colorblind-compliant color palette (Cramer et al., 2020), and making plain-text versions of presentations available. When facilitating training events or giving talks, staff use microphones and Microsoft PowerPoint closed captioning (Cooke et al., 2020).

We have seen this commitment to accessibility influence our customers. During planning calls with hosting institutions, we ask about participants’ accommodation needs. Often, hosts have not thought about this. In 2021, one host shared that this question made them realize their program needed to think more about accessibility.

In 2020, the Center launched virtual training products, opening them to individuals, and to institutions with remote staff, for the first time. Although opening workshops to individuals has allowed us to reach more scientists, we acknowledge that our registration fees are a barrier to entry and are exploring developing additional resources to meet this need. The program continues to evolve with insight from pre- and post-workshop evaluations, longitudinal feedback, and facilitator experiences.

RESOURCES

Providing scientists with training and inspiring them to act is an important first step, but it must be combined with dedicated resources to enable action, including funding, staff support, and

peer networks. These resources sustain public engagement efforts to drive societal change, inspire new generations of scientists, and fulfill institutions' missions. Here we examine two programs providing such resources.

IF/THEN[®] Ambassador Program

In 2019, the Center created the AAAS IF/THEN[®] Ambassador program in partnership with Lyda Hill Philanthropies' IF/THEN[®] Initiative³, which aims to close the representation gap for women in STEM, particularly as viewed through the media and pop culture. The program is designed to help middle school girls see themselves as the scientists of the future, engaging them at a critical time when science curricula become more challenging, and girls are not encouraged to pursue science in the same way boys are (Geena Davis Institute on Gender in Media, 2018).

Through the AAAS IF/THEN[®] Ambassadors project, the Center recruited and empowered a diverse cohort of 125 women in a range of STEM careers. Ambassadors received initial professional development via a 3-day summit. They also received a monetary award, the opportunity to apply for a \$10,000 "She Can Change the World Project" grant, an online network of ambassadors and support staff, weekly resource emails, and connections with IF/THEN[®] Coalition members including the Girl Scouts, Nepris (which connects industry professionals with classroom educators), and the Association of Science and Technology Centers (ASTC). Continuing professional development and one-on-one coaching from AAAS staff help assist ambassadors in becoming high-profile role models in the media and in developing learning materials, engaging directly with middle-school girls, and writing grants for public engagement project funding.

The IF/THEN[®] "She Can Change the World Projects" have allowed ambassadors to apply their training and invest in engagement projects with audiences they care about. For example, Tiffany Panko, a deaf physician, created a women's health book, *H is for Hormones*⁴, to promote accessible health information and elevate the visibility of deaf women in STEM. Panko began by engaging focus groups of her desired audience, deaf 5th grade girls, using their feedback to inform the book currently in production.

Paula Garcia Todd, along with Science ATL⁵, set up partnerships between teachers and STEM professionals in the Atlanta region. Todd reported that because of the partnerships and the activities they spawned, "schools got new gardens, some classrooms got creative with "brown bag" STEM kits that were picked up at the school for activities to be done at home, we had winners in the local Rube Goldberg competition, and an underwater robotics team that won their regional competition and advanced to nationals thanks to help from their STEM professional" (Todd, 2021).

In a 2020 survey, ambassadors said they found the program valuable, reportedly doing more public engagement thanks to the

support, and had positive attitudes about their abilities to engage. Evaluation of the IF/THEN[®] "She Can Change the World Projects" projects is currently underway.

Leshner Leadership Institute

The AAAS Alan I. Leshner Leadership Institute for Public Engagement with Science⁶, launched in 2015, provides both training and resources for enabling public engagement, including seed funding, staff support, and peer networking, to cohorts of 10–15 scientists working within a related subject area (e.g., climate change, infectious disease). These scientists commit to a year of intensive public engagement and advocating for support within their institutions, as one of the goals of the program is to shift institutional culture and capacity through empowering these leaders.

AAAS Leshner fellows have reported that AAAS' credibility helps them drive institutional support for public engagement within their professional communities, including through seeking out engagement-related leadership positions, establishing awards (such as Wendy Jepson's work on the Public Engagement Award for faculty at the Texas A&M University College of Geosciences), co-writing articles in society journals (Jefferson et al., 2018; Kenney et al., 2020), and organizing engagement-related sessions at society meetings, in one case resulting in an engagement-focused section in *Freshwater Science* (Hopfensperger et al., 2021). At the University of Minnesota's Institute on the Environment (IonE), three Leshner fellows, including Institute director Jessica Hellmann, infused a greater public engagement focus and incorporated AAAS material into the IonE Associates program⁷ which supports early-career faculty doing public-oriented research.

Fellow Kate Brauman illustrates the effectiveness of bridging training and resources to enable long-term, influential science-society interactions. In 2019, Brauman was invited to participate in a Congressional hearing on biodiversity losses based on her work as a coordinating lead author on the Global Assessment of the Inter-Governmental Platform on Biodiversity and Ecosystem Services.⁸ At her request, Center and AAAS government relations staff provided coaching that helped her prepare for providing testimony and answering lawmakers' questions. Brauman later became a AAAS Science and Technology Policy Fellow⁹ placed at the U.S. Department of Defense where she helped to develop a methodology for assessing water security risk at military installations.

AAAS conducted an external evaluation of the program in 2021 with a 70 percent response rate from the five cohorts of fellows. The results were encouraging, with 72 percent of respondents saying the fellowship contributed to their career advancement, 78 percent of respondents saying they are now regularly advocating for placing a higher value on public engagement with their leadership, 65 percent saying they had

³<http://www.ifthenshecan.org>

⁴<https://www.tiffanypankomdmba.com/abc-book>

⁵<https://scienceatl.org>

⁶<https://www.aaas.org/lli>

⁷<http://environment.umn.edu/fellows-grants/ione-associates>

⁸<https://www.congress.gov/event/116th-congress/house-event/109573>

⁹<https://www.aaas.org/programs/science-technology-policy-fellowships>

started or increased expectations for students, advisees, or junior staff to participate in public engagement, and 48 percent saying their engagement is influencing audiences' lives, work, or decision-making. Findings from this evaluation (publication forthcoming) will inform ideas for future cohorts including improved training, stronger peer networking, and guidance for pursuing collaborative public engagement, such as community partnerships.

New to this program, AAAS is holding focus groups to gather input on the framing, focus, and goals for the next cohort of fellows, and future resources will also incorporate existing inclusive public engagement guidance from sources such as the Equity Compass (YESTEM Project UK Team, 2020), the 2020 Inclusive SciComm Report (Canfield and Menezes, 2020), and the CAISE Broadening Perspectives Toolkit (Center for Advancement of Informal Science Education, 2021).

PUBLIC ENGAGEMENT IN PRACTICE

A third pillar of support is facilitating opportunities to practice engagement and highlighting examples of replicable engagement. Institutions can provide logistical support and connections to underserved audiences for individuals, who should not bear the sole responsibility of creating and maintaining engagement efforts. We reflect on two projects as examples for scientists and institutions.

Family Science Days

The Center launched the AAAS Family Science Days¹⁰ program in 2004 as a free public science festival with hands-on activities for children and their families. Held alongside the AAAS Annual Meeting, which takes place in a different city each year, the program sought to increase engagement between meeting attendees and the local public.

An essential element of the program is demonstrating the concept of public engagement and its value to Annual Meeting participants, again with an aim of creating overall culture change. Booth exhibitors include local science groups, such as the neuroscience and genome sciences departments at the University of Washington for the 2020 event in Seattle, and repeat exhibitors, including Science Storytellers¹¹ and Math Matters to Me.¹² The “Meet a Scientist” stage show features scientists, including meeting participants, who give interactive performances incorporating visuals or props.

In recent years, the Center committed to assembling a more diverse lineup of scientists for the stage show by featuring both a range of scientific disciplines and scientists with a broad spectrum of identities and lived experiences, ensuring a wider range of children could see themselves represented. This was a change from a tradition of featuring well-known scientists, often from

similar backgrounds. When able, Center staff also worked with local organizations or schools to provide transportation and lunch to children who otherwise would not have been able to attend, actively pursuing a representative audience to increase access to science. The Center also committed to being inclusive, providing accommodations including a sensory friendly hour.¹³

Attendees have indicated in post-event surveys that the event had an impact, sharing reflections such as, “My daughter . . . put up a “lab” in her room and is recording her experiments in the notebook she got at the event. Great inspiration to make science fun!” In a 2020 survey, three-quarters of exhibitors and stage show speakers agreed that “this public engagement activity provided me with an opportunity to learn from the broader community” and four out of five agreed they “felt enlightened by ideas shared by participants at this public engagement event.”

How We Respond

In addition to opportunities to practice engagement or see it in action, scientists need to see varied examples of effective, two-way engagement. The Center launched the How We Respond¹⁴ climate communication project in 2019 to demonstrate the many ways scientists can collaborate with communities to respond to climate change. The project highlights community-level responses via 24 multimedia stories and a plain-language report about climate change responses and includes Spanish translations.

The Center sought to be inclusive by convening representative advisory committees and focus groups to shape the project. The project also featured a diversity of responses and communities, considering geography, population density, demographics, and ways of knowing. Based on participant feedback on the first round of stories in 2019, the Center actively recruited more communities of color to feature in 2021, aiming to support and highlight them and not appropriate their stories and images. A 2019 accessibility audit also informed modifications to the project's website, including increasing color contrast for better readability and incorporating alt text.

REWARDS

Institutions who highlight successful, replicable engagement show they prioritize it and provide a bridge from training to application. A final pillar for demonstrating the value of public engagement is offering incentives. Awards and incentives recognize scientists for excellent public engagement, encouraging others to pursue similar paths and elevating the profiles of scientists who engage. AAAS's public engagement awards provide an example of ways to meaningfully reward scientists whose efforts might otherwise go unrecognized.

¹⁰<https://www.aaas.org/programs/center-public-engagement-science-and-technology/family-science-days>

¹¹<http://www.sciencestorytellers.org>

¹²<https://mathmatterstome.com>

¹³A sensory friendly hour provides attendees with clear expectations for what they might experience, such as light and sound stimuli, giving them more agency to choose how to interact with an event.

¹⁴<https://howwerespond.aaas.org>

Public Engagement Awards

AAAS offers two awards recognizing scientists for significant contributions to public engagement¹⁵, the AAAS Mani L. Bhaumik Award for Public Engagement with Science, established in 1987, and the AAAS Early Career Award for Public Engagement with Science, established in 2010. Recipients of each award receive a monetary prize, a commemorative plaque, and recognition at the AAAS Annual Meeting. In providing monetary awards, AAAS reinforces that public engagement is important, encouraging other institutions to prioritize it in professional portfolios. We also publicly recognize finalists for the Early Career Award, to amplify additional excellent public engagement and because recognition is particularly impactful for early-career scientists who might be discouraged from pursuing activities deemed outside of professional responsibilities.

Awards also highlight scientists modeling replicable engagement strategies. Fairfield University professor and former college basketball player John Drazen, the 2020 AAAS Early Career Award recipient, engages sports enthusiasts. Early in Covid-19 pandemic, Drazen connected infectious disease experts with sports podcast hosts, bringing scientific expertise to a community grappling with impacts such as the 2020 NBA season's cancellation (Brockmeier, 2020). University of Illinois Urbana-Champaign Assistant Professor Esther Ngumbi, the 2021 AAAS Mani L. Bhaumik Award recipient, works with farmers, using insights from her research on insects, plants, and soil microbes to introduce them to new techniques, for example, and engages university students in Kenya in projects to reduce rural hunger there (Cohen, 2021).

Recently, the Center prioritized making the awards nomination process more equitable and engagement-focused. Previously, letters of support—often written by high-profile academics prioritizing academic prestige—were the primary nomination vehicle. Now, the Center requests statements addressing nominees' efforts to prioritize dialogue and curriculum vitae highlighting public engagement work. The result has been more representative nomination pools, increases in self-nominations from researchers in unsupportive academic environments, and letters from community members who say more about nominees' impacts. To build on this, we are collecting demographic information, providing reviewers with anti-bias training, considering review committee composition,

and ensuring evaluation metrics aren't inadvertently exclusionary.

CONCLUSION

Through training, resources, practice, and rewards, the AAAS Center for Public Engagement with Science and Technology builds capacity for scientists to engage the public on societal issues and signals that public engagement should be valued, supported, and celebrated. Even for larger organizations like AAAS, there are barriers to implementing and sustaining public engagement programs including funding and staffing constraints, limiting our ability to more adequately and equitably serve scientists. For example, we recognize that registration fees for Communicating Science workshops are a barrier to entry, we see a need for more sustained alumni networks with staff support, and we acknowledge that greater fellowship and ambassadorship project seed funding might allow them to do more. Despite these and other areas for improvement, we encourage other institutions to consider these approaches and we welcome conversations about inclusive public engagement support mechanisms that serve the public and strengthen the scientific enterprise.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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¹⁵<https://www.aaas.org/page/awards>

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