

Great public engagement with science is

Evidence-based

Advancing Public Engagement Across LTERs



Great public engagement with science is:

- **Strategic** - guided by clearly articulated, audience-specific goals and objectives
- **Cumulative** - supports ongoing, positive encounters between scientists and publics via multiple pathways
- **Reciprocal** - grounded in two-way exchange and mutual meaning-making
- **Reflexive** - operates in iterative loops of reflection and adaptation
- **Equitable** - recognizes systemic injustices in science and society, acknowledges biases, and is intentionally inclusive
- **Evidence-based** - builds from knowledge about how people learn about and use science

Identifying and Applying Evidence

1. **Set your goal** and then identify the relevant evidence base(s). Which theories, data, and/or past experience speak to the goal?



2. **Set objectives** by looking to that evidence base. What do people need to believe and feel in order to achieve the goal?



3. **Select tactics** by looking to that evidence base. How should the scientist communicate in order to achieve the objectives?

What does it mean to be evidence-based?

Being an evidence-based communicator means making engagement choices based on theory, studies of effective engagement practices, and careful observation. In practice, it often means extracting insights from theory and past practice to make engagement choices in new contexts. Many scientists may not be familiar with the social science evidence base that supports effective public engagement with science (PES). Partnering with social scientists who do know this work can be an effective way to learn how to apply this theory and research to practice.

The need for behavioral goals

Behavioral goals point to the evidence you might draw upon. For example, if you want someone (including scientists) to consider engaging in a behavior, you might start by drawing on established behavior change theory. Similarly, if your goal is to increase the likelihood that people turn to scientists for guidance (or that scientists turn to someone else) then you might start by drawing on established theories of trust.

From behavioral goals to communication objectives

Theory should also point you to the next stage of evidence-based engagement, because such work also suggests specific cognitive and affective communication objectives that can make those behaviors more likely (i.e., what beliefs and feelings make it more likely someone will do a behavior). For example, behavior change theory and research suggests that people's behaviors are shaped by the degree to which they see that behavior as (1) beneficial rather than risky (i.e., positive attitude), (2) normal and expected, and (3) feasible given available resources and skill. Similarly, trust research suggests people will be more likely to trust those who they see as (1) competent (high ability), (2) caring (benevolent), and (3) honest (high integrity).

Deciding on priority objectives and tactics

Having a behavioral goal and a set of potential objectives is just a start. Here too, existing research can help prioritize objectives with the greatest potential for change. For example, most people already believe that scientists are intelligent and competent people and so there is often little to gain by prioritizing communication aimed at (further) ensuring that an audience sees scientists as having expertise.

Once communicators have prioritized cognitive and affective objectives, the next step is to decide on tactics. The evidence-base at this point is often thin, but the key is having reasonable arguments for why a communicative behavior is likely to affect an audience in an expected way. Tactics could focus on the message being shared, style/tone, channel, or source; tactics are often where there's the most room for creativity.

Case Study: Evidence-based PES in Action

By Anthea Lavallee, Executive Director and Brendan Leonardi, Education Manager

The Hubbard Brook Research Foundation (HBRF) is the public engagement arm of the Hubbard Brook project. HBRF's Young Voices of Science (YVoS) is an ongoing, semester-long virtual training program for environmental students that combines expert-led communication workshops with real-world practice. Evidence-based strategies include refinements to the format and content based on participant feedback.

Following a series of five communications workshops, participants apply what they learn through public engagement projects of their own design, including op-eds, podcasts, events, interviews, and visual art. Our behavioral goals are to (1) encourage students to share their perspectives in compelling ways, while (2) building confidence in their abilities (i.e., self-efficacy), so that (3) decision-makers recognize them as activated, agile, and adept environmental communicators (i.e., trustworthy). Now in its fourth year, YVoS has served 180 students from 90 academic institutions across the U.S. and around the world.

HBRF staff monitor success and opportunities for improvement through post-program participant evaluation surveys. According to aggregated survey results from all seven cohorts, 97% of the participants indicated they are more likely to engage in science communication and outreach efforts in the future, while the other 3% indicated they may be more likely to engage in science communication and outreach efforts in the future. A 2021 participant shared, "Before being in the program, I never thought that I would be able to write a piece and have it accepted for publication in an outlet like The Globe and Mail." Student project completion is another key indicator of success.

The YVoS team continually refines the program in response to participant feedback to add value and adapt to student priorities. For example, in response to participant requests for more time to build community as a cohort, YVoS staff now host social events (e.g., coffee chats, game nights, etc.) in addition to the workshops.

Learn More

Besley, J. C., Lee, N. M., & Pressgrove, G. (2021). Reassessing the variables used to measure public perceptions of scientists. *Science Communication*, 43(1), 3-32. [\(to read more about the key components of trust\)](#)

Besley, J. C., & Dudo, A. (2022). *Strategic Science Communication: A Guide to Setting the Right Objectives for More Effective Public Engagement*. JHU Press. [\(to learn more about identifying evidence-based goals, objectives, and tactics\)](#)

Jensen, E. A., & Gerber, A. (2020). Evidence-based science communication. *Frontiers in Communication*, 4(78). [\(to learn more about issues facing the science communication field and a path forward toward evidence-based approaches\)](#)

Montano, D. E., & Kasprzyk, D. (2015). Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In K. Glanz (Ed.), *Health behavior: Theory, research and practice* (5th ed., pp. 67-96). Wiley-Blackwell. [\(to learn more about what causes people to change their behaviors\)](#)

Ethics

A recurring challenge with strategic communication is that it remains up to communicators to behave ethically. For example, it may be possible but inappropriate to use tactics that instill fear, disgust, or guilt to affect behavior. Ideals such as reciprocity also mean that science communicators need to have humility when deciding whether to try to affect others' behaviors. It is often reasonable to make an argument for a specific behavior (e.g., smoke less, avoid fossil fuels, get vaccinated) and there may also be times when it is inappropriate. Scientists need to continuously update their own goals in dialogue with the rest of society.

Context matters

When it comes to PES, there is no one-size-fits-all set of objectives or tactics. Much of the current academic literature focuses on understanding when something is likely to work and when it might not; the challenge for the evidence-based communicator is thus to do their best to understand the wide range of contexts that might make some beliefs (or emotions, or frames) more or less impactful in a given situation.

Evaluation planning

The social sciences are one broad evidence base to support PES. Strategic science communicators might also create their own, local, context- or community-specific evidence base. For example, formative research might be conducted to learn what an audience believes and feels about a research topic, and then used to help prioritize communication objectives. Similarly, science communicators might use specific tactics to share their work and then gather evaluation data about audience attitudes to track whether and how they shift. Some tactics are likely to be based on research logic and others might be based on practitioner logic, and an understanding of what has seemed to work well in the past. Tracking the use of tactics, how they are applied, and what effect they have allows researchers and practitioners to consider the portfolio of tactics being used and make strategic, evidence-based decisions moving forward. Given the lack of research on tactics in action, strategic communicators might also study the use of one tactic or set of tactics in changing behaviors over time as a way to contribute to this evidence base and not just learn from it.