

Communicating Science: Tools for Scientists and Engineers

(from the American Association for the Advancement of Science, at
<http://communicatingscience.aaas.org/>)

Most of the fundamental ideas of science are essentially simple, and may, as a rule, be expressed in a language comprehensible to everyone. — Albert Einstein

Scientists and engineers who foster information-sharing and respect between science and the public are essential for the public communication of and engagement with science. Although traditional scientific training typically does not prepare scientists and engineers to be effective communicators outside of academia, funding agencies and research institutions are increasingly encouraging researchers to extend beyond peer-reviewed publishing and communicate their results directly to the greater public.

In response to this need in science communications, the AAAS Center for Public Engagement with Science and Technology has provided resources for scientists and engineers, both online and through in-person workshops to help researchers communicate more broadly with the public. *Communicating Science: Tools for Scientists and Engineers* includes learning the basics of communication, how-to tips for working with reporters, strategies for using online media effectively, and more.

Workshops are available for scientists and engineers interested in learning more about science communication tools and techniques. Please contact us if you are interested in hosting a workshop at your institution.

Communication 101

"What is that we human beings ultimately depend on? We depend on our words. We are suspended in language. Our task is to communicate experience and ideas to others."
— Niels Bohr

Communication is one of the most important aspects of science. How you communicate depends on whether you are publishing research results in a peer-reviewed journal, talking to a reporter, interacting with students, or discussing your research with the public. To build skills that will help you more effectively communicate with public audiences, read through these "Communication 101" pointers. You will find ways to apply the basics of communication to the specialized nature of scientific topics.

Define Your Audience

Before preparing a communication, you must first think about your audience. Who is your audience?

- Subject experts?
- Scientists from another field?
- Non-scientists?
- Journalists?
- Policymakers?
- Children?

Use the Right Words

While scientific or technical terminology is useful in a particular field, it is often difficult for non-scientists to understand. For example, consider how biologists and physicists may use similar language with vastly different meanings. Imagine how difficult it must be for individuals who do not regularly encounter scientific terms to understand their meaning.

How do you communicate so that individuals outside your field can understand the meaning?

- **Experiment:** Try out language on friends, families and colleagues who do not hold the same technical background as you. Use their feedback to learn which words work and which words don't.

For example, your musician brother or lawyer friend could help you practice explaining how you "break open cells" instead of "induce lysis" to make your message more digestible to a wider range of audiences.

- **Learn from Others:** Actively read and follow other successful science communicators in your field to help expand the terms and analogies you can use that work with public audiences.

You can start by reading science news, following blogs, and viewing multimedia. Check out public events that demonstrate communication with audiences holding varied degrees of scientific background, such as AAAS public engagement events, science festivals, and science cafes.

- **Trial and Error:** Learn from your experiences and take the chance to adjust your word choices when you notice situations where communication hasn't gone as well as you had hoped. Take note and try out other ways of saying or explaining what you want to convey. It may even be useful to literally take note – start a journal or blog of your science communication experiences.

Develop Your Message in 3 Points

How do you translate detailed and complex material into a clear, streamlined structure?

- **What's the Point?** Start out by explaining the "big picture" and why the audience should care. Then go into an appropriate level of detail to emphasize your points.
- **3-Point Structure:** What are the three things you want your audience to remember? Organize your message around these points.

How do you choose just three? Think about your audience and what they want to know. You could talk about 3 focuses

of your research, 3 results, 3 reasons your work is important, 3 potential applications, etc.

Illustrate Your Points

How do you incorporate anecdotes, slides, or videos to enhance, not distract from, your message?

- **Verbal Tools:** Verbal tools, such as examples, stories, and analogies, often more clearly illustrate your key messages than technical information. Identify stories or examples that fit with the audience's experience – not necessarily your own. Test your analogies and stories with non-scientists, perhaps family or friends, in advance of using them.
- **Use Slides Sparingly:** The popular visual tool of slides can be an effective enhancer as long as you are conscious of what will work best given the situation and audience. Slides can be a distraction, especially when text-heavy. If you're preparing a public talk, consider if traditional text-based slides suits the audience's needs or if an alternative visual (or no slides at all) would be better. Don't feel obligated to use slides just because you always have or your colleagues do. If you anticipate a conversation with a smaller group or other setting where slides could be too formal, just go without.
- **Beyond the Bullet Points:** Keep in mind that outline-based, bullet point slides are not the only option when it comes to visuals. You can enhance the audience's interest by choosing a handful of images that reflect your message and display them in the background. Take care to not use too many or change them too quickly. Even image-based slides can be distracting. Consider also that "visual" can mean video clips. Video can be tricky to use since it means taking a break in your presentation, but it can be useful when relevant and intriguing.

Nonverbal Communication

The majority of face-to-face communication is nonverbal. The way you sit or stand, your hand gestures, and tone of voice all convey a message about your attitude and emotions and can create trust or confusion in your listener.

What can you do help successfully deliver your message beyond using words?

- **Stance:** Stand comfortably and alert, shoulders back, with your hands at your sides. If seated, sit forward and erect. If seated at a desk, keep your hands above the desk. If sitting on a couch or casual chair, don't clasp your hands in your lap. Don't tap the table or chair with your hands or bounce your leg.
- **Tone and Pace:** Make sure you aren't speaking too fast and that your voice doesn't sound strained or blocked. Practicing your presentation in advance will help calm nervous jitters that may affect your normal speaking voice. Avoid speaking in a monotone as this conveys boredom and disinterest.
- **Eye contact:** Eye contact, or lack thereof, can communicate many things, including interest, friendliness, hostility or deceit. Eye contact with your audience increases your credibility and will also help you gauge the audience's reaction to your presentation. Don't shift your eyes when answering questions because it connotes that you are trying to avoid an issue.
- **Gestures:** Use purposeful and deliberate hand gestures to convey confidence. Don't fidget with your hands or play with clothes, hair, pens or other objects. Pay attention to nodding your head—if you nod your head when listening to a question or another speaker, it may convey your agreement.

- **Clothes:** Consider the formality of the event to decide on your clothing. You want to strike a balance between showing respect for your audience and appearing too stiff. If you are doing a TV presentation, dark clothes look the best, and avoid patterns or other designs which can cause problems with color TV images. Avoid large, jangling or reflective jewelry.

Note: This is copied, with permission, from the AAAS communicating science website in 2014. The site has since been updated and redesigned; you'll find more information, including videos and demonstrations, at <http://www.aaas.org/communicatingscience>. From there you can navigate your way through all of the AAAS public engagement material as well.