

Communicating Science to the Public: A New Graduate Course and Practicum

In the world of politics, it is said that candidates campaign in poetry, but govern in prose. Applying this sentiment to the scientific world, the long and complicated process of laboratory research is much like writing in prose, but when researchers communicate to the public they need to present their scientific findings with the precision and beauty of verse. However, the process of learning to communicate to a public audience is complex, as scientists try and often fail to translate the jargon of their fields and communicate a message that is interesting and relevant for the general public. They find it hard to fight their instinct to call it “substrate” when all they really mean is “dirt.”

Both writers of this proposal have experience trying to communicate scientific ideas to public audiences through outreach events in the Saint Louis community. What we have both realized is that it takes more than simply motivation and excitement to communicate with non-experts—it takes skill and practice.

To this end, we propose adding a new professional training component in the form of a one-credit hour course that teaches students how to communicate their work to the public. This course has two components: 1) in-class training that teaches communication theory and 2) projects featuring hands-on experience talking about research and science to an array of non-specialists. Graduate students will learn to speak about their research to non-experts—on whose support they depend for publicity and funding—and help bridge the knowledge and social gap between scientists and the general public. Finally, such skills open up new career opportunities for students interested in science journalism, science policy and other communication-oriented scientific careers

Teaching Communication Skills

We think a viable and useful curriculum would train graduate students how to communicate with different groups of non-experts. This course, titled “Communicating Science to the Public,” consists of guest lectures by experienced communicators. Specifically, we envision the curriculum beginning with how to communicate to the general public, such as K-12 students and local groups curious about science. Local science teachers and science center educators will serve as guest lecturers and discuss how they make science information accessible and relevant to broad audiences.

Next, university faculty will speak about how they communicate with two other non-expert audiences: undergraduate students and grant panelists. While these two groups are familiar with scientific research, using clear language is still crucial for effectively communicating and teaching. Finally, lessons on how to speak to policy-makers and the media will wrap up the course. Local journalists, university public information officers and politicians will cover how to make research presentations approachable and persuasive for their respective audiences and how to make research applicable to people’s daily lives.

One might worry about the feasibility of sustaining guest lecturers from the community from year to year, or how programs who do not have access to guest lecturers could implement such a

course. We think that hearing from expert communicators is ideal, but another version of this course that draws from the existing knowledge base, such as online resources about communicating science, would be quite effective as well.

This new coursework contrasts with standard graduate education. Throughout their education, graduate students are taught to present research using the highly specialized language of their fields to people who are knowledgeable about their work. This peer communication takes the form of academic journal articles and presentations to colleagues at laboratory meetings and conferences. On the other hand, speaking to the public about one's research means re-thinking and re-wording what is important about the data to make it approachable for a broader audience.

Providing Opportunities to Practice Communication

To extend learning beyond the classroom, we propose a year-long practicum for students to apply lessons from the new coursework. The first semester of the practicum will be the mandatory hands-on portion of the course where students communicate with local audiences. A second semester will be available for students keen to develop their skills further by communicating beyond the local community, at the regional and national levels.

To begin the practicum students will communicate at the local level, bringing their research to local audiences. These audiences will include the student's institution, K-12 students as well as local groups who have an interest in learning about science.

Within their university, students can contribute press releases to the daily newsletter or write a science column in the student newspaper. In the local community, students can partner with groups that share an overlapping interest with their research. For example, plant biology students can discuss technological advances with community gardeners who share an interest in food production.

Extending the practicum beyond the required semester, graduate students can participate in regional media outlets as well as connect with local political leaders. Regional newspapers and public radio stations cover major university findings and rely on expert contributors. Graduate students can help connect media outlets to university scientists, as well as participate in writing stories and curating content with journalists to improve regional scientific coverage. This provides training in mass media to students while they work with journalists to tell scientifically sound stories. Students can also present to local politicians to inform them on scientific issues relevant to their policy decisions.

Finally, students can practice communicating on a national scale by becoming involved with science policy and by contributing to national media markets. Students can connect to lobbying groups like the American Association for the Advancement of Science as well as federal science policy advisors. Closer to home, students can work with their state's congressional delegation to support effective legislation to improve science policy nationally. Additionally, students can contribute op-ed pieces or articles for national media outlets. Many national publications, such as *Scientific American*, host blogs where it is easy for students to contribute.

We see social media outlets, such as Twitter, and personal blogs as great opportunities for students to communicate directly with the public. Students can control their message and contribute regularly to informal discussions about science. This has the potential for students to become a public authority in their area by establishing a personal connection with the public.

Conclusions and Implications

Science communication should be a training experience required of all graduate students. Such training would ensure a scientific workforce equipped to communicate about and advocate for science. It would also provide alternative career opportunities to graduate students, especially as it becomes increasingly difficult to place all graduating scientists in traditional research jobs. Acquiring the skills necessary for speaking to broad audiences while in graduate school will strengthen students' positions in the job market.

Although we believe this new curriculum is unique in its proposed structure, we are responding to changes in scientific institutions in recent years. Both the National Science Foundation (NSF) and the American Association for the Advancement of Science (AAAS) propose increasing the role of scientific outreach in the modern scientific profession. The NSF requires that all proposed research demonstrate the “broader impacts” of the work, while the AAAS advocates “public engagement” that de-emphasizes one-way communication in favor of mutual learning by both scientists and the public. Effective outreach—to schools, communities, regions and governments—strengthens the scientific profession by ensuring broad public support and sufficient funding. Yet, we lack skilled science communicators.

Our vision is the development of a new generation of researchers who can communicate effectively to both their peers and their communities. To this end, we propose a mandatory semester-long course and year-long practicum (with second-semester opportunities optional) on science communication. We believe that developing effective communicators will provide new career opportunities to students who want to bridge the divide between researchers and the public. Furthermore, we believe that all scientists will benefit from the ability to disseminate their work widely and to advocate for the important role of science in society.