

Science communication: a career where PhDs can make a difference

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ABSTRACT Among careers for biologists with PhDs, science communication is one of the most diverse and rewarding pathways. Myriad options exist, from traditional journalism to new media, from writing for specialists to working in public outreach. Textbooks, mass-market books, and freelance writing that combines many of these pursuits are all viable choices. Communicating about science allows researchers to step away from the minutiae of a subdiscipline and to once again explore the breadth of science more fully through an ever-evolving array of stories. A doctoral degree can confer distinct advantages in the eyes of prospective editors and employers. Here I describe those advantages, possible career directions, and steps toward making such a transition.

Monitoring Editor

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Received: Nov 21, 2014

Accepted: Dec 16, 2014

INTRODUCTION

What is science communication? Broadly speaking, it is conveying news to the public about the scientific enterprise: research discoveries, their possible effects, and the processes of science. Science communicators are journalists, writers, editors, multimedia producers, authors, exhibit developers, and educators. They translate the language of science and the specifics of a research project into prose and images that inform, inspire, and illuminate. Many such stories simply create a sense of wonder about the natural world and our place in it. Increasingly, however, society faces crucial issues that require sound scientific judgment to address, such as the roles of genomics and technology in biomedicine, the continued threat of infectious diseases, and the health and environmental effects of climate change. Strong science communication can make a difference, both for naturally curious children and for adults who help steer policies with their actions, votes, and dollars.

Today, citizens read and learn about science through so many channels. The media landscape may seem hopelessly fractured, but in fact it is more open than ever before to entrepreneurial reporting about research and the people who do it. The best science communicators draw upon our desires to tell *stories* to one another. When we lose ourselves in an in-depth magazine article, an investigative blog post, or an engrossing online video, it is because the

creator has taken the time to tell us about scientists and their passions. In addition, when the stories describe a specific set of results, the best science reporters take time to get the details right—and to reflect the views of those who might not concur.

That's where former scientists can sparkle. If you've earned a PhD in the life sciences, you know how challenging it is to work in the lab. You know that research is far from a series of "Eureka!" moments. You know how long it takes for any finding to affect people through a policy change, years of drug trials, a new tool that might improve lives. In other words, you are in a strong position to serve as one of the effective translators that our society will continue to need.

However, transitioning from a research or teaching career into communicating about science is a big step. Some PhDs start writing on their own for awhile to test the waters, then look for work as professional communicators. Others seek training in the craft of science writing. I direct one such graduate program at the University of California, Santa Cruz. All such career-changing scientists share one quality: intellectual restlessness. They find the singular focus of research too limiting. The prospect of communicating about the sweep of science thrills them.

Over the years, ~40% of my students had earned PhDs before embarking on this new journey. Recently I asked more than a dozen of those PhDs to reflect on their profound transitions. I'll share some of their feedback here.

THE VALUE OF A PhD

My graduates agreed that it's not necessary to complete a PhD to be a successful science communicator. It's a competitive realm, however, and the degree can help open some job doors. Our alumni noted the following advantages from their doctoral training:

DOI:10.1091/mbc.E14-03-0813

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- **Richer, true-to-life writing about science.** “Getting through grad school really helped me understand lab life, lab politics, cycles of science, and other details of the research world that inform my reporting,” says PhD neuroscientist Alla Katsnelson, who writes for *Nature*, *The Scientist*, BBC, and other publications. Adds freelance journalist Jessica Marshall, a PhD chemical engineer, “The main benefit comes not from the pedigree but from the extra years of practice thinking like a researcher. This makes me better able to follow the logic of a study, point out alternative explanations, and understand just how messy science can be.”
- **Closer scrutiny of the literature.** “My Ph.D. taught me to understand scientific studies and to evaluate them critically—useful skills when trying to figure out which studies to trust,” says PhD microbiologist Sandeep Ravindran, who has written for *Popular Science*, *Proceedings of the National Academy of Sciences of the USA*, and other publications. Nadia Drake, a PhD geneticist and blogger for *National Geographic*, puts it this way: “One of the most valuable things I learned in grad school was how to read a scientific paper. Now, I read more papers than I probably did as a PhD student, and I couldn’t imagine trying to learn how to do that on my own!”
- **Credibility with academics.** “Scientists really appreciate a reporter who can speak at their level,” says PhD biologist Amber Dance, a writer for the Alzheimer Research Forum, *Los Angeles Times*, and other outlets. My graduates nearly always ask questions at a more basic level, however, and urge scientists to explain their work in publicly accessible ways. Otherwise, says Dance, “If I get into a nerdy, detailed chat with someone about *p*-values and the like, I may later find that I don’t have any quotes that a normal person would even understand.”
- **Access to jobs at trade publications and agencies.** “If you have a niche in which you are an expert, employers will seek you out,” says Davide Castelvechi, a PhD mathematician now working as a news editor at *Nature*. In recent years, University of California, Santa Cruz, science writing grads with PhDs have been hired as reporters at *Nature*, *Science*, *Science News*, *Proceedings of the National Academy of Sciences of the USA*, *Chemical & Engineering News*, *The Scientist*, *WIRED*, the Alzheimer Research Forum, and the International AIDS Vaccine Initiative and in news offices at the National Institutes of Health and many medical schools.
- **Higher starting salaries, on average.** A PhD can give a new journalist some leverage to ask for more money than writers with a bachelor’s degree might receive. This is especially true for positions at federal agencies, where pay grades can depend on degree levels, and at specialty publications, where editors are willing to pay more for expertise.
- **Confidence to tackle anything editors throw at them.** “Negotiating with my PhD supervisor about how to accommodate my unconventional career aspirations made me tougher than an old shoe. Toughness is a good trait for a writer,” says Erin Digitale, a PhD nutritionist now writing for the Lucile Packard Children’s Hospital at Stanford University. Alla Katsnelson puts it bluntly: “If I’m stuck on a story, I just think, ‘Well, I managed to write that damn dissertation, so I’m sure I can get to the end of this, too.’”

A RICH SET OF CHOICES

Career pathways in science communication have shifted dramatically in the past decade with the diminution of traditional media

outlets, especially newspapers. (Only one of my PhD graduates since 2006 still writes for a newspaper.) However, online media have soared in popularity, and writing jobs at research institutions also have helped take up the slack. Moreover, PhDs with data-handling and graphics or video skills are now recruited by major news outlets.

I closely track the career placements from my program and the ongoing work of our alumni. Our PhD science writers have no problem finding rewarding jobs or keeping busy as independent writers. Among the places they are in demand are the following:

- **Publications primarily read by researchers.** These include top-tier journals with news sections, such as *Science*, *Nature*, and *Proceedings of the National Academy of Sciences of the USA*, as well as trade magazines within disciplines, such as *The Scientist* for bench biologists and *Chemical & Engineering News* for chemists and biochemists. Editors at these publications preferentially hire writers with advanced degrees to cover a field in detail.
- **General-interest publications that value in-depth coverage.** Both *Science News* and *Scientific American* appeal to scientists and the public alike, and both have “beat systems” for their writers and editors: environment, biomedicine, physics and space, and so on. Scientifically trained writers also find long-term homes at *Discover*, *National Geographic*, and other major titles. All of these outlets now feature daily online news as well as their regular print publications.
- **Universities and medical centers.** All research institutions have at least one group of writers responsible for spreading the word about the accomplishments of scientists. Many major universities have several; for instance, Stanford University has news offices for its main campus, its medical school, its engineering school, and other research units. (Indeed, Stanford alone uses more science and medical writers than the greater Bay Area media combined.) PhDs find natural homes on such teams—back in academia, but on the writing side.
- **Federal research agencies.** Each funding agency devotes a major part of its budget to public outreach. The National Institutes of Health has teams of writers and producers, many with PhDs, at most of its individual institutes. In the physical sciences, NASA does an especially thorough job with its outreach on space missions and Earth-observing satellites. Writers with in-depth scientific training are sought out for these federal positions.
- **Biomedical resource sites.** The past decade has seen a profusion of news outlets specific to given field, especially within biomedicine. The most prominent include *Cancer Today* and the Alzheimer Research Forum, dedicated to covering the latest research developments for practitioners and for families of patients. Others have arisen, and they all employ writers with advanced degrees. They include the Simons Foundation Autism Research Initiative, the Multiple Sclerosis Discovery Forum, and the Pain Research Forum.

Many journalists with PhDs choose to work independently, allowing them to contribute to various outlets—and to raise families while writing on their own schedules. Others collaborate with senior scientists, especially later in their writing careers, on textbooks or popular books. It’s a dynamic array of options. Indeed, science writers learn something new with each assignment and each interview. In that sense, school’s always in session for us, albeit with deadlines rather than exams.

TAKING THE FIRST STEPS

When I interview prospective students for my program, I always ask whether they've started to explore communicating about science on their own. The ones who have done so, even while laboring on their dissertations, are much more likely to succeed professionally; they've got that deep-seated drive. To them, it feels almost miraculous to discover that one can make a living doing this, and they can't wait to get started. Here are some of the many options:

- **Cover science for a student publication.** Students at most research universities publish one or more periodicals for the campus community, ranging from weekly newspapers to quarterly or annual magazines. Examples in the San Francisco Bay Area include *Synapse* at the University of California, San Francisco, and *Berkeley Science Review* at the University of California, Berkeley, both run by graduate students. Editors of all such publications eagerly seek new contributors.
- **Set up an internship at the campus news office.** Universities and medical schools all prepare news releases, magazines, videos and blogs, and other materials for external readers. Find these articles and multimedia packages at your institution, read them, and set up a coffee chat with one of the campus science or medical writers. Most such offices will take good, motivated students as writing interns. Learning how to interview faculty members and how to write news or features about their research is superb preparation for this field.
- **Create a blog, report for it, and use social media.** If there's a topic you care about—something you love talking about with friends or family—start a blog and feed it regularly with your writing. Don't just sit down and write your opinions; anyone can do that. Get out and talk to people, report, write about new studies in that field, and exercise your creative and interpretive prose muscles. Some of the best blogs I've seen from prospective students aren't even about science. One applicant was passionate about sewing and quilting; another loved writing about sandwich shops. Put out the word via social media and attract new readers to your blog. Perhaps an editor will take note!
- **Write for a local news outlet.** Alternative news sites have sprung up online in most communities. Seek out one or two, read them for a while, and volunteer to cover science-related events or health news for them. It could turn into a regular gig. In the course of reporting such stories, you'll meet other editors and writers who can suggest new outlets to approach.
- **Submit an op-ed to your newspaper.** So many critical societal issues suffer from uninformed public debates (and,

all too often, irrational shouting matches). Scientists who write well can do a major service for their community by submitting thoughtful opinion columns to local or regional newspapers. Consider whether you can help change your neighbors' viewpoints on childhood vaccinations, genetically modified organisms, the use of animals in research, and other hot-button topics that benefit from calm and persuasive arguments.

- **Apply for the American Association for the Advancement of Science Mass Media Fellowship.** For 40 years, the American Association for the Advancement of Science has run an annual program for science students who wish to explore reporting for the public. This competitive program places ~15 young scientists (mostly graduate students) at newspapers, radio stations, and other media outlets around the country for the summer. It's a life-changing experience for many participants. Details are at aaas.org/program/aaas-mass-media-science-engineering-fellows-program.

Some enterprising new communicators take a few of these steps and then apply for national-level internships and jobs. Others start freelancing on their own, especially if they have an employed partner. Still others would rather seek formal training under long-time journalists. Although it's a rarefied field, a few universities admit such students to courses in science and/or medical journalism. They include my program at the University of California, Santa Cruz, New York University, Boston University, the Massachusetts Institute of Technology, Columbia University, the University of Wisconsin, Madison, the University of North Carolina, Chapel Hill, the University of Georgia, and Texas A&M.

The umbrella organization for our profession, the National Association of Science Writers, welcomes and supports new communicators from the ranks of scientists. The association's annual conference, held every October, is an ideal place to meet many practitioners and talk with them about their pathways into the field. Regional groups of science writers also meet regularly in several major cities, including New York, Boston, San Francisco, Seattle, and Washington, DC. Come join an event and start your own network of connections in the writing realm.

Such conversations will help you determine whether a career in science communication beckons. As an advisor, I try to give my prospective students a simple rubric to guide their choice: If you're still thrilled by *doing* science in detail, by all means continue. If you're fully ready to *interpret* science more broadly, please come join us. We're ready to help you put your PhD to a fascinating and fulfilling new use.