

Communication is the real work of leadership. –Dr. Nitin Nohria, Harvard University

The final performance of our tour was drawing to a close. After a year of preparation and ten days of traveling, performing, and sightseeing, we were about to sing our final set. As the president of the Amherst College Concert Choir, I had organized our group during the school year and helped prepare for this, our tour of Argentina. Our last pieces were traditional Argentine folk songs, and as we started, a thrill passed through the auditorium. I suddenly felt more connected to an audience than I ever had before. Our forty American voices were singing words that many of us did not understand, yet we were able to stir deep emotion in our audience. The music had enabled us to communicate, despite the language barrier. Similarly, there are barriers to be bridged in science—between disciplines, between the scientific community and the public, and for students who doubt their own scientific abilities. Effective communication is the antidote to these problems. It is my hope that by communicating scientific ideas both within and outside the scientific community, I will broaden the reach of science and deepen understanding and collaboration.

My own passion for science began in AP biology my sophomore year in high school, and is due to a teacher—Mrs. Weiland. I attended an all-girls Catholic high school in downtown Phoenix, and up until that point had harbored dreams of being an author or film director. From the very beginning of the class, Mrs. Weiland progressed at breakneck speed through the topics of biochemistry, cell biology, genetics, evolution, and ecology. She communicated each topic with absolute clarity, and I was amazed at how everything could fit together so beautifully. Her emphasis was on molecular biology, but she constantly reminded us to think within the context of evolution—a perspective that continues to influence my research interests. In addition to her ability to communicate scientific ideas effectively, Mrs. Weiland's sheer excitement about science was infectious, and after taking her class I began to reassess my goals and consider a career in basic science. She was one of the smartest women I'd ever met, and my tremendous respect for her coupled with her obvious passion for science made all the difference.

Knowing first-hand the impact a teacher can make, I have in turn spent a lot of time working as a tutor and teaching assistant. In high school, I tutored several girls at a school in downtown Phoenix where most of the students were Hispanic and came from low-income backgrounds. I struggled to balance simply being their friend and making them do their work, and learned that the more excitement I showed about a topic, the more attentive they were. I was thrilled whenever my way of communicating an idea suddenly made a concept clear in their minds. In college I also worked as a tutor. Many students come to Amherst with less preparation in the sciences than others and are overwhelmed by the introductory courses. As a tutor, I was able to review topics with them, paraphrasing and giving examples, to convince them that the material was indeed accessible, and that they shouldn't give up on science. In addition to tutoring, I worked as a lab TA for intro molecular biology and quantum chemistry, and a course TA for intro chemistry. In the lab, I was able to teach concepts and techniques while the students witnessed phenomena that they had previously only heard about. As a course TA, I attended class and held help sessions, working problems and reviewing concepts in front of groups of up to twenty. At first I was terrified to have so many students listening to my every word, copying down what I wrote on the chalkboard, but after several sessions I was able to relax, and simply speak conversationally. I learned to make eye contact with as many students as possible, and to read their faces to determine whether or not my approach was coming across effectively.

In addition to teaching students, I believe it is also essential to bring science to the general public. At Amherst, a small liberal arts college, the majority of students are not

scientists. I enjoyed writing an article published in Amherst's science magazine, *The Element*, targeting this audience. It was a challenge to use language that was accessible to everyone while not oversimplifying the subject matter. I was especially pleased that the final product spurred discussion among humanities and science majors alike. This summer I attended a workshop on using protein visualization software, and learned about the website www.proteopedia.org, where registered users can create pages that correspond to entries of the PDB. Users add text and create 3D scenes depicting different aspects of the structures that can change interactively in response to clicks from the viewer. The result is a free platform for communicating both functional and structural information about proteins. Later in the summer I held a workshop of my own, and taught students from my lab and another in the department how to use the website, and several students went on to write articles that they planned to submit for incorporation into Proteopedia.

Not coming from a scientific family and attending a small liberal arts college, I did not know anything about getting involved in research when I began at Amherst. Consequently, during my first year I turned to my biology professor, Caroline Goutte, for help. Caroline helped me secure summer research fellowships at the University of Arizona and Rockefeller University, hired me to work in her lab during my sophomore year and part of my junior year, and has been an amazing source of career advice. She is an incredible mentor, and has played an integral part in my journey toward becoming a scientist. Realizing the importance of such a mentor, I wanted to do the same for other Amherst students, so this summer after graduation I chose to remain on campus as an HHMI post-baccalaureate fellow and supervise the HHMI program, which allows undergraduates from diverse backgrounds to conduct scientific research. I lived in the same dorm as my students, ate in the same dining hall, and was a resource for them as they tried their hand at research for the first time. I held dorm events, arranged outings, and fostered a community where students could talk to me and to each other about the joys and struggles of "actual" science. I also arranged tours of research labs at UMass Worcester, where many of the students saw for the first time what a large research center is like, and realized that there are more options than medical school for the scientifically inclined. On top of these activities, I also organized a lunchtime lecture series for my students and the rest of the Amherst community. I asked professors from different science departments to present their research, and every week over lunch we heard experts from different fields discussing topics they were passionate about. I felt strongly that my students should be exposed to the different types of research going on at Amherst, and many professors also chose to attend to finally hear what their long-time colleagues in different departments actually study. No forum of this sort had been held at Amherst, spurring scientific discussion between scientists from different disciplines, and after one lecture I even overheard a geologist and a physical chemist discussing the possibility of a collaboration.

In the history of science class I took at Amherst, the most striking theme that emerged was that the greatest advances come at the boundaries of disciplines. As a professor at a university, I plan to conduct research that brings together the fields of evolution and biophysics, a powerful combination that will deepen our understanding of life as well as potentially aid in enzyme design. As a graduate student at Stanford, I will continue my work as a TA and mentor for younger students, especially women, who are considering careers in research. I also plan to start an online blog, where I will discuss current scientific discoveries in terms that will be accessible to the public, as well as demystify life as a scientific researcher. Receiving an NSF fellowship would be an honor, and give me the freedom to continue communicating information and excitement about science within the scientific community and to the general public, in an effort to deepen understanding and advance discovery.