

Teaching Statement

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We live in a world permeated by science. However, the low level of science literacy in the public is alarming to many who appreciate its benefits. Though we do not expect all of our students to become professional scientists, the products and methods of science have filled their everyday lives, from the smartphones in our pockets to life-saving medical technologies. Carl Sagan said in *The Demon-Haunted World*, “We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology.” This, he warns, may be a recipe for disaster.

For too many people, science has come across as a list of dry facts. However, I have been fortunate to meet many scientists and “fans of science” who appreciate the curiosity and creativity inherent in the scientific process. My goal is to foster that appreciation in students in higher education so that non-scientists can understand that this process affects life decisions, such as what to eat or why carbon emissions are important. In addition, this will encourage those with goals of doing science for a living to become better learners and appreciate the actual methods and experiences of science earlier in their education.

In the summer of 2010, I taught a 300-level astronomy course, “Life Beyond Earth.” Since it was a very small class, I encouraged as much discussion as possible about the opinions, ideas, and data presented in lectures. For such a broad and diverse subject area, it was particularly important to describe not only the scientific concepts involved but also how we came to understand these concepts. For this, I had to branch into less familiar territory, such as evolutionary biology and space colonization. I tested the students’ reasoning with questions such as, “Would you believe this science headline if it came out this year?” The students did an excellent job in deciphering what was plausible and what was not and in defending their arguments with their knowledge of the latest research. In order to support a community of learning, I had the students evaluate each other’s drafts for their term paper. I was delighted that they took their classmates’ comments to heart in the final drafts and spent a good bit of time researching appropriate literature sources to back up their claims.

I would like to continue to work on these goals while designing my introductory astronomy course that does not rely heavily on jargon or algebra, both of which can be an immediate turn-off to non-science students. Instead, quantitative reasoning and learning “how we know what we know” are important to understanding the scientific process. I already keep these goals in mind when I participate in public outreach. In blogging for the Discovery Channel, I keep jargon to a minimum and explain in a physically intuitive way

the phenomenon being studied. This can be challenging to accomplish in an entertaining way that attracts an audience, but several positive comments from writers, astronomers, and readers have encouraged me to keep at it.

Development and practice of my teaching philosophy began as I tutored small groups of student-athletes at the University of Virginia. I began developing methods of communicating scientific concepts in ways that were effective, using simple diagrams, the room itself as a space in which to show the phases of the Moon, or a whiteboard eraser as a projectile, planet, galaxy, or whatever fit the lesson. It was rewarding after several sessions to hear from the students that I had made a concept that was troubling in class much simpler and more understandable.

Reducing jargon and providing a truly hands-on learning experience is crucial to Dark Skies Bright Kids, the after-school astronomy club for elementary school kids with which I volunteer. I have helped to create various lesson plans and activities, most notably a blinded sunscreen experiment with ultraviolet-sensitive beads. In addition to introducing an important scientific process of blinded studies, I show the elementary school kids one way that science is applicable in daily life. Our feedback from parents has been excellent, as we are told time and time again how much their children look forward to our weekly meetings. It turns out that such activities and demonstrations are thoroughly enjoyed by adults as well, as I entertain groups at events, such as the Atlanta Skeptics Star Party in September, with handheld comets and model asteroid impacts.

Exploratory, hands-on activities should be pursued in higher education, as well. Not only will it give non-science majors a firmer grasp of the process of science, it will also introduce budding young scientists to the creativity and uncertainty present in the scientific research they wish to pursue. In short, it is my goal to make science accessible and personal for all students of all ages and help inspire a crop of future scientists with a true passion for learning and experimenting.