Teaching Statement

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The primary purpose of an education is to teach people how to educate themselves, so that the process continues beyond school. The basic facts and concepts that I convey as a teacher help provide the foundation needed to build further knowledge. However, with years of life hopefully ahead in a rapidly changing world, my students will need to assimilate new ideas long after our classes together. Sources of information proliferate in this time of social media, alternative facts, fake news, native advertising, predatory publishers, and artificial intelligence. People must process this torrent well to serve as functional members of their communities, let alone as scientists. Advancing technology means that everyone must continue to absorb new skills long after formal education.

I prefer to teach by encouraging students to ask smart questions, to observe thoughtfully, and to learn through doing. In classroom teaching, I avoid lecturing, and instead tend toward experiential activities. For example, as a teaching assistant and sometimes lecturer in graduate level Urban Ecology at Duke, I divided students into groups that analyzed perspectives of different stakeholders in lawn maintenance before discussing as a class.

My favorite way to learn and teach is to take people outdoors and practice reading whatever the local landscape is ecologically. Folks used to passively receiving knowledge begin to learn to actively make it when I encourage them to notice details of their surroundings. Students practice thinking creatively and communicating when I ask them to propose explanations for what they observe. They learn the fundamentals of critical thinking and problem solving when I help them to apply logic to verify and discard those explanations as possible, and figure out what information they need to finish the task. As a naturalist in a forest, for example, I have pointed out lower branches of an old oak tree that have mostly rotted away. From there, my students and I envisioned the landscape's transition, in the last century or so, from open field with a few trees, to brushy thicket, to forest. Then we discussed changes in human activity that underly this process. The imprint of historic decisions and timescale of environmental change became tangible, in a tree. Observational and analytical skills thus practiced serve students well wherever their lives go.

Ideally, my students and I do not just observe a landscape, but also actively engage with it and its people, through measurement, experimentation, and discussion. My students learn that they can not only ask questions but answer them. Engaging directly with scientific literature shows students that infinite scientific questions remain, many interesting and important. I hear new researchers begin statements like, "I can't believe we don't even know…" and off they go. My students have thus developed and begun to answer questions about prevalence of salt marsh lawns, temperature limitations on denitrification in drainage water, flashiness and agricultural flooding, belowground changes over years of prairie restoration or cover crops, and earthworm and shrub co-invasion of floodplains. Using real scientific tools, they learn what scientists can measure, and how well. Thus, they come to understand the powers and limits of scientific inference.

A greater proportion of what I teach tends to stick when I can get to know my students well enough to understand what uniquely interests and matters to them. I grasped this advantage when I used an 11-year-old camper's fascination with violence to interest him in multiple trophic levels of invertebrates through the hunting behavior of an assassin bug. Often, the most

important environmental issues for students stem from their identities and values. These motivations can benefit environmental science, which needs a much greater diversity of people to engage in it fully than historically have gotten access, to right its injustices and blind spots. More importantly, students deserve the space, safety, and grace to bring as much of their whole selves to school as they wish. So, I encourage students to freely discuss and work on what feels most necessary to them. For example, I advised a group of Duke Master of Forestry students interested in geospatial analysis on a project on the legacies of historically racist planting of trees in our city, and they continued to engage with this issue politically after the course.

Relating people's personal interests and experiences to subject material can guide them to action as well as to learning. Dialogue with ranchers, fishermen, and groundskeepers about potential conservation projects in the ecosystems in which they work expand their options, educate my students and me, and improve outcomes. My students benefit from connections with a greater variety of experts than academics, a variety which can mirror the value of the students' own voices. I also trade favors with other experts to directly add their highlights to education I provide and vice versa. For example, I took a graduate class from the Virginia Institute of Marine Science and a local marine contractor to Machicomoco State Park to hear about problems there from park staff, gather data, and recommend adaptive management. Such sharing leads to ideas and collaborations that otherwise lay dormant.

In the process of the scientific method, from forming a question to presenting their conclusions, my students learn that they personally can incrementally grow humanity's understanding of the world. They also inevitably experience some of the many pitfalls and joys of physically doing environmental science, from stumbling upon copperheads or baby rabbits, to examining their shriveled feet after a day in wet socks, to feeling the air change and hearing the birds quiet as the sun rises. I include disabled students in such experiences; everyone is capable of environmental science. All of us engage in lively discussions, usually over food, of scientific findings in journal clubs I have started and run. Each of us has endured the overwarm air of our top-floor computer spaces and occasional teasing when we leave the lab with goggle prints still on our faces or dusted in finely powdered soil. We all take breaks as needed, and facilitate expression of each other's individual strengths by dovetailing on tasks accordingly. Across jobs, students with disabilities and other difficulties have learned to come to me, that we will adjust work together until we meet their needs.

Only after doing a few scientific studies can students really know if they want to pursue a career in science. Even if the answer is no, they retain an understanding of science that no textbook can teach. My students and I together have produced and share knowledge with direct value to water conservation, and I could not be prouder of them. Even when their future career paths take some of them away from science, I know they will use abilities that I helped them to develop to do more good in the world, some in ways I cannot currently imagine. My goal as a teacher is to produce thoughtful and empowered citizens of Earth and their local communities, with experientially based understandings of and appreciations for nature, science, and knowledge. My shared experiences with my students remind me why I chose a career in environmental science. Our collaborations protect the research I co-produce from going stale and from neglect. I cannot think of a greater positive impact I can have.