Teaching Statement
Chelsea Clifford
April 2018

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 do provide an essential foundation upon which to build further knowledge. However, with years of life presumed still to come 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 the internet, alternative facts, fake news, native advertising, and predatory journals, and people must process this torrent well to serve as functional citizens, let alone as scientists. Advancing technology means that everyone must continue to absorb new skills, often through self-teaching and informal exchanges, long after they leave school.

I prefer to teach by encouraging students to ask smart questions, to observe thoughtfully, and to learn through doing. Large classes are logistically efficient for disseminating basic information and skills, but students learn more deeply when I mentor them in small groups or one-on-one. A greater proportion of what I teach tends to stick if I get to know my students well enough to understand what uniquely interests them. This advantage helped me 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. It served with a group of master's of forestry students interested in geospatial analysis whom I advised a project on the legacies of historically racist planting of trees in our city, and as they continued to engage with this issue politically and academically after the course. Relating people's personal interests and experiences to subject material can help them to act as well as to learn. People feel empowered when they realize they all have knowledge to contribute to environmental discussions and decision-making, no PhD needed. When I have approached ranchers and fishermen about potential conservation projects in the ecosystems in which they work, my ideas greatly improved, and they became more open to and interested in the benefits of undertaking conservation-based practices, when I framed our time together as a dialogue, rather than just as an opportunity for them to learn.

A simple but powerful lesson premise that I have employed at all education levels is taking students out of the classroom, and teaching them to read whatever their very local landscape is ecologically. They begin to learn to actively make knowledge, rather than just passively receiving it, when I coax them to notice interesting details of their environment in the field. Students practice thinking creatively and expressing ideas comprehensibly when I encourage 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 facilitated this process. The imprint of historic decisions and timescale of environmental change became tangible, in a tree. These skills, and this awareness of their surroundings, serve students well whether or not they stay in environmental science as a career.

Ideally, my students and I do not just observe a landscape, but also actively engage with it through measurement and experimentation. My students learn that they can not only ask questions, but answer them. Any age group can benefit from practicing this skill; even my elementary school junior rangers, who made sailboats out of excess okra and raced them, learned

something about designing and testing. For advanced students, engaging directly with scientific literature first helps them believe that infinite scientific questions remain, many interesting and important. I hear statements beginning something like, "I can't believe we don't even know…" and off they go. Through the use of real scientific tools, they learn what scientists can measure, and how well, and what we cannot yet. Thus, they come to understand the powers and limits of scientific inference. When I directed groups of undergraduate ecology students through designing, executing, and analyzing their own small studies, I could see the impact of those, "Oh my goodness, this actually worked!" moments on their faces when they found a trend, pattern, statistically significant result, or demonstrable lack thereof. I also heard the challenge of new ways of thinking as they discussed results that they did not anticipate. In the process of going through the scientific method, from forming a question to presenting their conclusions, my students learn that they personally can grow humanity's understanding of the world, however incrementally. They also inevitably experience some of the many pitfalls and joys of physically doing environmental science, from stumbling upon baby turtles or copperheads, 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. Only after doing a few scientific studies can students really know if they want to pursue a career in science or not. Even if the answer is no, they retain an understanding of and appreciation for science that no textbook can teach.

My goal as a teacher is to produce thoughtful and empowered citizens, 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 ecology, and prevent my own research from going stale. I cannot think of a way I could be more positively impactful than this one.