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Teaching Statement

Science is an essential tool for learning, critical thinking, innovation, and decision making. As a biologist and a teacher, my goals are threefold: to impart knowledge and excitement about the natural world, to give students the tools to learn and to think critically, and to provide opportunities for experiential learning. It is important not only to teach the facts and concepts of biology, but to help students become scientists themselves by involving them in scientific discovery. By doing so, I will provide students with the necessary tools to learn, to critically evaluate information, and to incorporate science into their everyday lives.

Science is not only a collection of facts and terms, it is a way of knowing, a process of gaining information through asking relevant questions, collecting information, and making informed decisions. Of course, this process can be used in scientific inquiry, but can be an important process to make everyday decisions. Therefore, it is critical that students view science as a dynamic process in which they can be actively involved. In the classroom, I work to achieve this goal by incorporating the scientific process into learning. For example, I ask students to answer a few simple questions before teaching a topic such as: "Where does wood come from?" when teaching plant biology. These questions can lead to hypotheses such as: 1) it is made from ingredients in the soil, or 2) it is made up of elements in the atmosphere (i.e. carbon). I can then evaluate students' prior knowledge and identify misconceptions. Revisiting these hypotheses also allows students to critically view and revise their perceptions. Repeating this cycle makes learning a process of re-evaluating ideas and concepts, just like science.

As a biologist, I am excited by discovery and understand that science can improve my everyday life as well as provide a deeper appreciation for the intricate beauty of the natural world. However, it can be a challenge to impart that attitude to students. One way to achieve that is to relate topics to current affairs and evaluate science in the media. Additionally, one of the most powerful tools is to have students experience the scientific process for themselves. For instance, I mentored students as they conducted independent research projects for an ecology class. That year, there was an extremely early frost causing massive leaf death on trees. These students, never having conducted research before, were curious about the implications of this early frost and wanted to compare nutrients in leaves that had died versus those that naturally senesced. I gathered funds to do chemical analyses and taught them the relevant lab techniques. Throughout the project, they experienced the thrill of discovery, realized the implications for everyday life, and gained an appreciation for how the natural world works. They encouraged their parents to use the high nutrient leaves as compost, and were concerned about the ecological consequences of this nutrient loss for the trees. In fact, they later presented their findings at an undergraduate research conference and had plans to monitor the implications for reproduction and survival. This is just one of many examples of how I was able to help my mentees behave as scientists and also demonstrates how I engage students' particular interest and foster creativity. By integrating scientific processes into active learning and supporting independent research, I provide the necessary tools for learning and critical thinking that are essential for scientists, professionals, and citizens alike.

As a teacher, it is important to help students develop skill sets that are useful for scientific inquiry, but are also valuable outside of the subject matter of the course. In my research, I use tools from multiple fields of biology such as physiology and population biology, to address

questions in ecology and evolution. As a student, I received feedback from faculty in diverse fields, ranging from insect physiology to community ecology. Such experiences not only furthered my research, but offered a deeper understanding of ecology and evolution that transcends taxa. The same is true for all students. For example, many students in my Rocky Mountain Flora course were more interested in wildlife biology than botany. I encouraged students to recognize plant species as critical resources for wildlife, illustrating the importance of plant identification to wildlife studies, but also incorporating other concepts of ecology such as habitat selection. By integrating learning material from one course into others, I demonstrated how knowledge can increase our integrated understanding of the world. Additionally, I emphasized that the process of plant identification is an important skill regardless of their career choice, and had them think of other pursuits that involve a process of careful observation and elimination. They realized that it can be applied in many settings, from identifying organisms to taking a multiple choice test. By building these types of skill sets, in addition to knowledge, students have more critical-thinking tools at their disposal to tackle challenges. Further, having a wider variety of skills encourages independence, creativity, and innovation.

In order to be an effective teacher and mentor, it is my responsibility to provide an environment that is conducive to learning for students of all types. In the classroom, I achieve this goal by using a variety of teaching methods, including lectures, group discussion, and inquiry-based exercises. For example, instead of lecturing students on how to present their research, I got up in front of over 100 students and purposefully gave a terrible lecture. I then invited students to critique my performance by identifying errors and suggesting improvements. Several students said that it was the most helpful lesson on presentation style they had ever seen. In this way, I work to provide students with constructive feedback and interactive discussion, and am not afraid to take risks to illustrate a point. I also make sure that I offer them freedom to be creative, which is critical to the process of science. My approach to mentoring students in my own lab will follow the same philosophy: allowing students the freedom to explore their own research interests, while providing feedback and guidance that is tailored to individual needs. My students can, and will be encouraged to, develop research on topics that extend beyond my own projects. As needed, I will engage students in activities such as discussing journal articles and involving them in existing projects, which will build knowledge, skills, and inspiration for their own independent pursuits. I will also provide forums, such as regular lab meetings and seminars, for students to communicate and discuss research with other members of my lab and department. Science is a way of knowing, and it can have profound impacts on how we view the world and how we make decisions every day. As a professor, I hope to be an integral part of that learning process, through teaching, mentoring, and involving students in research.