Teaching Philosophy *Tad Dallas*

I believe the ability to teach effectively requires the teacher to not only communicate information well, but to inspire student curiosity. The moments when I feel most like a scientist are the moments right before I reason my way through a complex problem. The feeling of being incredibly confused, but on the verge of understanding some threshold concept, is a relatable feeling to both scientists and students alike. As such, one of my main goals as a teacher is to promote an environment where students can be confused without becoming frustrated or disinterested, instead viewing confusion as a motivating influence that further stimulates curiosity. To accomplish this, I have three overarching teaching goals, which include **1.** promoting student critical thinking by linking real-world examples to underlying theory, **2.** effectively communicating principles to students of different ability or education levels, and **3.** encouraging student curiosity as a means to develop confidence and analytical reasoning.

Teaching critical thinking and an appreciation for underlying theory

Leonardo da Vinci was attributed with saying that one "who loves practice without theory is like the sailor who boards ship without a rudder and compass and never knows where he may cast." Students that are able to conceptually link case studies and in-class examples to an underlying theoretical concept are much more likely to understand the material and transfer it to a novel situation. Apart from a desire to promote curiosity, I believe that effectively teaching requires the inclusion of ecological theory. To this end, I have used simple mathematical models, taught using the *R* statistical programming environment, to teach many topics that have a firm theoretical basis but are often taught through case-studies. By example, when giving a largely theoretical lecture in a graduate level niche modeling course on the use of *big data* in species distribution modeling, I used a running empirical example and executable code chunks to clearly communicate concepts, which was described in a teaching review as providing students "a sense of empowerment."

Adaptively teaching to students of different backgrounds

Growing up in a foster family in a south suburb of Chicago, I quickly found the value in diversity, as having hispanic and black foster brothers exposed me to different friend groups, music, and experiences that I would not have had otherwise. Those experiences have highlighted both the challenges and benefits associated with diversity. While I believe science is inclusive by nature, it can sometimes, in practice, be exclusionary. By inclusive, I mean that the scientific process is agnostic to gender, ethnicity, sexual orientation, or socio-economic status. However, science can become exclusionary when students ideas are marginalized or dismissed. It is a goal of mine to create a safe and inclusive setting where diverse groups of students can learn how to think scientifically.

I believe a variety of teaching methods are necessary to effectively educate students with various backgrounds. A foremost personal goal in becoming a more effective teacher is to hone my ability to gauge interest and understanding of students, and adaptively change teaching styles. For example, early into a guest lecture in an upper-level population and community ecology course on community assembly, I realized the students had not been exposed to the concept of the niche, which is crucial in teaching principles of coexistence and community assembly. In response, I had students define the niche through discussions with their classmates, and then had them hypothesize why the niche concept is closely tied to community assembly. Apart from classroom teaching experiences, I have mentored two students in their research; Michael, a rural high school student interested in biological research, and Trianna, a black undergraduate student from a small college in Mississippi (Tougaloo College). I met with both students daily to discuss interesting papers, experimental design, and potential analyses, helping guide students in their science, but allowing them to formulate and address their questions with independence. Both of these mentorships have resulted in conference poster presentations and academic publications. These experiences have been deeply rewarding and have motivated me to continue building expertise with different teaching styles, and to strive to communicate effectively with students of different backgrounds and interests.

Promoting curiosity in the classroom

In my experience, scientific inquiry is driven by the curiosity of the researcher. This curiosity is at the heart of both the ability to formulate scientific questions, and the doggedness often required to answer them. I believe one goal of science education is to help students develop into independent scientists. Much of science is driven by personal curiosity, and curious students are more likely to be actively engaged in learning. This makes the promotion of curiosity in the classroom a paramount task. To this end, I have been involved in inquiry-based teaching of introductory biology labs, in which I challenged students to develop and address their own scientific questions as collaborative teams of 3-4 students. Throughout this process, I stressed the use of hypothetico-deductive reasoning in order to formulate interesting and testable scientific questions. This helped establish student confidence, and many students claimed that this exercise had "challenged them to think outside of the box" and helped them "learn a lot about the scientific process" (student reviews available upon request). I also actively maintained a website for this course, allowing students access to lab materials, as well as external links to videos, research articles, and popular science pages to further fuel curiosity and to link lab exercises into a coherent framework.