PHILOSOPHY OF TEACHING AND LEARNING

I am an educator because I want to promote a society filled with intellectually curious people, people who are motivated to ask questions and who are equipped to find the answers. **I see the teacher as a friendly provocateur, one who challenges students to continually evaluate their current understanding in light of new information and who fosters curiosity by encouraging keen and careful observation.** In other words, I view the teacher as a facilitator of the scientific method, someone who guides students from initial observation to ultimate discovery. Broadly, this is a two-step process: The teacher first piques student curiosity by introducing compelling new information and then follows through to ensure the student has the tools and strategies necessary to investigate, understand and internalize that information.

The journey from observation to understanding depends heavily on student learning being self-motivated, and I take the task of developing intrinsic motivation in my students very seriously. One relatively simple way I develop intrinsic motivation is to connect course objectives to material students are already inherently interested in. To do this, I make a concentrated effort to get to know my students and what they are interested in through short, informal surveys at the beginning of the semester. However, I also work to broaden students' thinking beyond their previous interests and to develop their desire to ask and answer biological questions about the natural world and the organisms in it. To do this, I unearth students' natural curiosity through inquiry based activities and lectures carefully designed to engage and fascinate.

DEVELOPING SKILLS TO SOLVE COMPLEX (BIOLOGICAL) PROBLEMS

Once students are primed to curiously investigate the world around them, my role is to equip them with the knowledge necessary to satisfy their newfound curiosity. This involves introducing them to classic literature illustrating fundamental biological concepts with concrete examples. This also involves providing many opportunities to develop and practice the skills necessary to solve complex biological problems. I focus on helping students develop the skills that I have found helpful in my own academic career and those that have been reported to me as helpful by students. These include:

- **The ability to carefully articulate and distinguish hypotheses from predictions.** This skill is vital in designing and interpreting scientific studies and helps students learn how to carefully organize and communicate their ideas. As a TA in an upper level course, I helped students develop this skill by providing feedback on weekly "mini-quizzes" which asked students to identify hypotheses and predictions from a real abstract, taken from primary literature relevant to the topic we were discussing in class. Students were initially surprised by the difficulty of this task, but by the end of the semester reported a significant increase in their understanding of how to construct and evaluate hypotheses and predictions, as well as their ability to critically evaluate the support for hypotheses presented in the literature.
- **The ability to synthesize information from a variety of sources.** This skill is fundamental for making connections and developing a broad understanding of the topic at hand. This ability is also critical for identifying what is known and unknown about a topic and identifying the edges of current understanding across a field. As a TA and lab instructor for introductory biology courses, I helped students develop this ability by implementing the use of graphic organizers to synthesize material covered in lecture and apply it to activities in lab. As a TA in an upper level course, I organized and implemented a writing project, asking students to develop or improve a Wikipedia article related to one of our course topics. This required a thorough investigation and synthesize of primary and secondary sources and resulted in some significant contributions to Wikipedia's knowledge base. This skill is also emphasized in the final project for the behavioral genetics course I recently designed, in which students are required to identify an open research question and work in teams to propose methods to address the question.
- **The ability to identify gaps in one's own understanding.** Identifying and carefully articulating relevant, unanswered questions is an important skill for biologists, medical personnel and lay people alike, as

such, my students practice this skill frequently. Students interrupt my lectures to comment, question and connect previous material. Class time is primarily spent working in groups to exchange ideas, and completing inquiry based activities and assessments that are structured to illustrate and correct common misconceptions. For instance, as a teaching assistant in an upper level course, I wrote weekly assessments asking students to interpret the results and validity of analyses in the primary literature. Students completed these problem sets individually, and were then placed into groups where they worked together to solve the problems, and were thereby required to interrogate their own way of thinking and justify their reasoning to their classmates.

- **Critical engagement in intellectual exchange.** Evaluating old understandings in the light of new information is at the heart of the scientific method and this practice permeates my classroom. Research has shown that factual information alone is not enough to correct misconceptions (and in some circumstances may cause people to hold their misconceptions even more strongly). So, though students in my class are certainly exposed to new information, I primarily use classroom time to facilitate the exchange of ideas -- these exchanges can be internal (between the old uneducated self and the newly educated self), between students, or between student and teacher. To facilitate these exchanges, I cultivate a classroom culture of respect; for example, I use rubrics to set clear expectations, provide ongoing feedback through formative assessments, and respect students' time and other commitments by working together to set important due dates throughout the semester.

TEACHING AS A REFLECTIVE PRACTICE

My experience in the classroom taught me that effective teaching a learned practice and is not simply dependent on intuition or in-born talent. Effective teachers endeavor to understand how their students learn and to develop a wide toolbox of techniques to use in facilitating that learning. One of my primary goals as I continue to develop as a teacher is to engage in continuous self-reflective teaching practices, such as keeping careful notes on the success and failures of different lessons or lectures, asking students for frequent, short feedback and implementing mid-semester student evaluations.

I have actively sought out opportunities to develop as a teacher, both through practice and training. In 2016, I received Duke's Bass Instructional Fellowship as an instructor of record. For this award, I designed and taught a new course, Genetic Basis of Behavior, an advanced undergraduate seminar. I also have extensive experience as a teaching assistant, in both introductory and upper level biology courses. Importantly, I have also pursued opportunities to hone my teaching ability outside of a research intensive university setting. For instance, I participated in the Duke Biology Department's "externship" program, where I worked with a professor at a local community college to plan and teach a series of four lectures and laboratory sessions to students pursuing their Associates Degree. I also taught an intensive two week mini-session to a group of highly advanced high-school students at the North Carolina School of Science and Math (a very competitive boarding school for students gifted in science and math). I've also enjoyed volunteering in local middle schools, where I have led outreach activities focused on basic science literacy, as well as activities closely tied to my lab group's work with charismatic wild baboons.

Because I believe teaching is a practice that can be learned and improved, I have also pursued opportunities for pedagogical development. During my Ph.D, I completed Duke University's Certificate in College Teaching Program. Through a combination of coursework and hands-on time in the classroom, this program promotes current best practices in teaching and learning, an appropriate use of instructional technology, systematic assessment of student learning outcomes and a reflective teaching practice (including peer observation). Other pedagogical training I have received includes 9 hours of coursework designed for biology educators (completed during my Master's program) and over 65 hours of TA observation and training (include workshops on rubric design, classroom management and assessment strategies).