**TEACHING PHILOSOPHY**

As a biologist, I am fascinated by the dynamic nature of life and our ability to adjust to an ever-changing world. From an educator’s viewpoint, I think it is my role to, not only, teach students foundational biological knowledge but also to help students become well-rounded, life-long learners who are exhilarated at the prospect of the future. This role is at the forefront of my mind during curricula and lesson plan design, assessment of instruction effectiveness, and mentorship of students. These qualities that I hope to instill in my students stem from creative and independent problem solving skills and strong communication skills.

Having the confidence and ability to critically think allows students to address unforeseen future challenges. In the design of an introductory biology course, I purposefully included opportunities for students to practice the process of addressing difficult, yet relevant, problems such as pollinator loss on agricultural ecosystems and antibiotic resistance. On the latter topic, students debated whether resistance is inevitable for newly discovered antibiotic and proposed actionable responses to antibiotic resistance from the viewpoints of government agencies, pharmaceutical companies, farmers, doctors, and consumers. Each student has a diverse and unique perspective to offer to these problem-solving activities. For undergraduates, their first scientific research experience can be technically and intellectually difficult, so it is important to progressively increase challenges for students. When training an undergraduate to score wasp social interactions, we first practice calling behaviors together until the student is comfortable. Next, the student confirms their new skill by scoring a social interaction on their own, which was previously assessed by someone else to ensure accuracy. Finally, the student independently analyzes the remaining social interactions. Although this approach worked well in the past, one mentee found this final step to be too large of a leap in their ability. Upon reviewing their approach, I discovered that the student’s desire to perfectly score each behavior slowed their progress and, contrary to their intentions, resulted in inaccurate evaluations. After reviewing each behavior again, we determined that a simple rule – to limit the number of views per interaction – not only improved accuracy and efficiency but also reduced the student’s anxiety and increased their confidence. This student eventually became the “go-to” undergraduate assistant for wasp video analyses. From this experience, I learned the value of tailoring my mentoring approach to each student’s needs.

Biological research is becoming increasingly collaborative, and strong communication skills are vital for successful relationships amongst scientists. I try to promote a learning environment that models this type of interaction by facilitating communication amongst diverse groups of students. For example, as a teaching assistant, I noticed that students chose to work with the same partner from the first week of lab and never interacted with other classmates. To challenge students to work with a variety of people, I decided to assign partners every week along with an “ice breaker” question, which helped the students become acquainted and feel more comfortable approaching one another. Additionally, I encouraged collaboration amongst groups when students were unsure or had disparate answers in order to help students clarify ideas through discussion and stimulate critical thinking. As the semester progressed, students developed better oral communication and social interaction skills, which are both necessary for effective collaboration. This approach proved to be so successful that the lab coordinator implemented rotational partners in all sections of the course. As an undergraduate research mentor, I think it is important to expose students to current literature and help students develop scientific writing skills. Prior to embarking on our project, an undergraduate mentee and I spent the entire first semester reading ancient human genomics articles (a new field for both of us) in order to determine what has already been accomplished, evaluate the scientific approaches and conclusions, and devise our own research question related to the genomic health of ancient hominids. In this upcoming semester, this student and I will finish analyses and write a manuscript for an invited submission to Human Biology. During the writing process, we will discuss each manuscript section in turn, drawing on examples from the ancient human genomics literature that we previously read.

Feedback from students, peers, and myself is vital for assessing my teaching ability and ensuring student success. Aside from end of the semester evaluations, it is imperative that I receive immediate feedback from students so that improvements can be made throughout the semester. One approach that I have used is electronic response systems, which permit low-pressure assessments that indicate to students and myself whether material was comprehended and areas that require further emphasis. During the Knaphus Fellowship, I learned the importance of self-evaluation following each class period in order to determine: 1) whether all goals were accomplished, 2) any follow-up points for the upcoming class, and 3) changes needed for the next course offering. Although I try to incorporate activities into the classroom, not all exercises fully achieve the goal to advance students’ learning. After a lecture on Kingdom Animalia diversity, I designed an activity where groups of students described and drew animals of their own creation, which the class later classified into the appropriate phylum. Following reflection on this diversity section, I realized that the lecture and exercise were fairly redundant and that the lecture missed a key learning objective of the unit – to identify characteristics of Kingdom Animalia. When given the opportunity to teach animal diversity again, I would focus class time on the activity and supplement additional material from the lecture during phyla classifications. Self-evaluation had a profound impact on my teaching, so I implemented a similar approach with biology lab undergraduate assistants. After each lab period, the assistant and I discussed the three aforementioned questions in addition to teaching related topics such as how to ask leading questions to help students reach the correct answer and how to encourage low-stakes failures to promote student learning. Compared with previous semesters, I found these undergraduate assistants were more engaged and helpful in the classroom.

With infinite and indeterminate futures to work towards, student success will depend on strong problem-solving and communication skills. I strive to cultivate a learning environment where students can develop these abilities in order to flourish both within and beyond the classroom.