As a student, my education was shaped by dedicated instructors and mentors who went above and beyond to help their students learn. Those professors who opened their office doors to my questions or who spent countless hours with me in the lab made a great impact on my development as a scientist and inspired me to follow in their footsteps. With their foundational example, **my teaching philosophy centers on individualized instruction and a strong personal investment in helping *all* students learn and succeed.**

Teaching Objectives

In order to achieve meaningful learning, it is essential that students make connections between previous concepts and new information. To help students accomplish this type of learning**, my goals as an educator are to: 1) provide a foundational knowledge of a subject area, 2) foster scientific reasoning abilities to apply this knowledge to a diverse range of problems, and 3) encourage the development of effective learning strategies.** These teaching objectives are intended to provide students the tools to think critically about the world around them and to engage in meaningful learning throughout their lives, regardless of their personal background or goals.

Teaching Practices

The typical classroom includes a diverse array of inquiring minds; with different backgrounds, experiences, strengths and challenges. Therefore, it is important to gain an understanding of each student's knowledge, background, and goals prior to beginning a course. I accomplish this through "Get to know you" office hour sessions at the beginning of the semester, where I meet one-on-one with students to learn about their personal experiences. In larger classes I also give pre-course surveys that include questions such as, "Why did you enroll in this class?" and "What is your intended career?". These practices allow me to get to know my students on a more personal level and tailor my teaching to their varied backgrounds and interests. **I've found that adding a personal dimension to my teaching creates a more dynamic learning environment, where students are more engaged in class and are comfortable asking questions.**

In addition, concept inventories on pre-course surveys allow me to identify gaps or misconceptions in a student's knowledge base. I have found that in-class polling is an effective way to address these misconceptions. For example, in my general chemistry course, I pose several polling questions throughout every class. Students have time to work on these questions individually and submit an answer. If between 50-75% of the class is correct, students are then asked to discuss the question with a partner, arrive at a common answer, and resubmit. If fewer than 50% of students get the question right, we then discuss the answers provided as a class, which allows us to address the common misconception. This practice **strengthens students' foundational knowledge to build strong connections to new concepts.**

Formative assessments such as polling questions are essential to include throughout a course to ensure deep and meaningful learning. To provide additional formative assessment opportunities in class, I employ worksheets which are completed in groups. These worksheets give students the opportunity to practice the skills they are learning and collaborate with their peers. I scaffold these assignments so that **students are challenged to think on a variety of cognitive levels and apply their knowledge to a diverse range of problems.** For example, as part of the unit on electrochemistry, students are first asked to give definitions of the cathode and anode and identify these components on a diagram of an electrochemical cell. Then, students are required to calculate cell potential when given half-cell reactions. Finally, the students are asked to identify an unknown electrode using information on the voltage of a cell

and the Nernst equation to calculate the standard reduction potential of the unknown half-cell. This exercise not only requires a basic knowledge of important chemical concepts, but also an ability to use higher order thinking skills to apply these concepts in different contexts. In addition, assessing student comprehension of the material can guide my teaching. I accomplish this by reviewing the students' worksheets, and by having students complete "Learning Log" assignments, where they are prompted to identify topics they understand well and areas where they struggled. This practice encourages beneficial self-reflection on the part of the student and allows me to immediately address knowledge gaps throughout the course and to gauge if my teaching methods are effective.

Finally, I believe it is important as an instructor to inspire and assist students in becoming motivated and skillful self-learners. I promote metacognitive learning strategies by encouraging active reading and self-reflection, through the use of guided reading assignments and exam wrappers, respectively. I meet one-on-one with students who do poorly on the first exam, to help them adjust their study strategies. I also seek to motivate and inspire my students by including "Chemistry for Good" segments in my classes, where I highlight an example of how the concepts we are learning in that unit can be used to serve those in need. Encouraging students to develop their own scientific inquiries is another way to increase motivation. For example, I am developing a course-based undergraduate research experience for biochemistry students. In this course, students will explore the effects of mutation on enzyme activity, developing their own hypothesis and designing their own experiments to investigate previously unanswered research questions. These independent projects foster appreciation for the scientific process and can motivate students to pursue further study. **These methods help students gain the skills that are essential to being a successful scientist, while engaging and motivating them in their own learning.**

Taken together, my teaching practices reflect a belief that learning should be a student-guided process. Because each student is unique in their background, strengths, and weaknesses, I aim to give students the ability to define their own path towards mastery of a subject. **Providing a structured learning environment where students take an active role in their learning, develop effective learning strategies and explore their interests helps them to build deeper connections to new topics and creates a positive perception of learning that will transfer beyond the classroom.**

Teaching Development Plan

I am constantly evolving as an educator. I believe that every class period is an opportunity to gain feedback with a view toward the continuous improvement of my teaching methods. Providing students with a means to provide anonymous comments, either through online media or note cards provided in class, allows me to dynamically address challenges to student learning throughout a course. I also plan to continue researching teaching strategies through attendance at professional development workshops and review of the literature.

Conclusion

Through my teaching, I hope to instill in my students the same enthusiasm for science and learning that I possess. I find that connecting with individuals in the class and tailoring instruction towards their varied interests and backgrounds is especially effective in cultivating this enthusiasm. While pursuing a career in teaching, I plan to continue to learn and grow alongside my students, and to explore teaching strategies that most effectively shape the next generation of scientific innovators.