Teaching Philosophy

Jesús Valdiviezo
Department of Chemistry

As a scientist, I find it very rewarding sharing my passion for Chemistry, Physics, and related disciplines with others, especially in a classroom where students have an educational environment to learn and discuss. As the first member of my family who has done academic studies on natural science and pursued a Ph.D. degree, I feel motivated to become a teacher and mentor people from different backgrounds. As a teacher, I want to help students digest scientific concepts that are commonly considered complicated or too advanced and develop their soft skills.

Each letter of the word “teaching” includes the key components that my teaching philosophy covers: **T**echnology, **E**xperimentation, **A**dvising, **C**haracter development, **H**onesty, **I**nclusiveness, **N**ameable lectures, and **G**rowth. Below I detail why I consider them essential in any teaching experience and how I have incorporated them during my time as a teacher at Duke University of two graduate-level courses: CHEM590 - Molecular Simulation (Spring 2020) and CHEM590 - Quantum Dynamics (Fall 2020). A colleague and I proposed the first course to the Chemistry Department, and a Bass Instructional Teaching Assistant Fellowship supports the second course.

Technology. My education before grad school occurred in an emergent country, Mexico. Natural Science classes during my secondary education were commonly taught using mostly whiteboard for the instructor and pen and paper for the student. It wasn't until college that I started getting exposed to activities where technology was present: visualization programs, presentations with animations, virtual labs, and virtual classrooms. Core concepts of subdisciplines of chemistry, such as organic chemistry, became easier to understand with the above tools. Experiencing technology's power in my higher education inspired me to incorporate in my classes open-source tools for active learning, such as Avogadro, for analyzing molecular structures, and Jupyter notebooks, for programming.

Technology is what has kept education moving forward amid the coronavirus pandemic. While teaching Molecular Simulation during Spring 2020, I was challenged to restructure the second part of the molecular simulation course, which included supervising small computational chemistry research projects. The recommendations that the Duke Keep Teaching website and many others gave, allowed me to be in close communication with students and provide them guidance while conducting their projects.

One of the positive aspects of teaching online during Fall 2020 is that we could make our Quantum Dynamics course accessible to students beyond Duke. Technology allowed participation from students from UNC and UC Berkeley, extending the impact that I as an instructor can make and contributing to my vision of making education accessible to everyone who desires to learn.

Experimentation. Students are at the core of any teaching experience. Therefore, they should take a role as active participants in the learning process. Any scientific discipline involves experimentation; knowledge in science comes from running experiments to test hypotheses. I believe teaching should be analogous to this process. Hands-on activities have proven to be successful in learning, and they offer the experimental component of the lecture.

The two Chemistry courses that I have taught during this year (Molecular Simulation and Quantum Dynamics) have been characterized for following a flipped classroom model. I participated in designing the course syllabi and the in-class activities, and I have made sure that hands-on activities have been present in each lecture. For the in-class activities, we picked tools that would be useful for the students, even after the courses end, based on my experience in the field. For the molecular simulation course, which involved predicting molecular properties, we used the same computational tools of my Ph.D. research. My goal was that undergrads and first-year grad students learned the tools I employ in my lab and incorporate them into their research endeavors. For the quantum dynamics course, we decided to use the python programming language instead of Mathematica; the programming language used when I took the class as a student. We thought python would be more useful for students in the long run, given its popularity in Academia and Industry. During the in-class activities, students write their code based on the topics covered in lectures.

Advising. For me, an excellent teacher is an approachable person, provides advice on mastering the course material, and is willing to share his experience and vision of the topics covered. During one-on-one conversations with students, I tell them about the beautiful concepts and exciting challenges in science and share the techniques I have used to study. Whenever possible, I offer guidance on career decisions.

Some of my former students continue using the computational tools that I taught during class. Occasionally, they ask me questions related to the course, which I'm more than happy to answer them. For me, the teacher-student relationship doesn't end after submitting final grades. I’m always open to offering advice to all my current and former students.

Character development. Martin Luther King used to say in his document The Purpose of Education: "We must remember that intelligence is not enough. Intelligence plus character – that is the goal of true education," and I identify myself with his quote. Teaching should also provide an opportunity for students to develop their character. I encourage discussions in my lectures and the participation of all students. When students contribute to the class, they feel more confident about the class material. Group discussions make students better at expressing their ideas.

The courses I have taught also include student-proposed projects instead of midterms or final exams. Conducting projects help students to develop their organizational and leadership skills. They submit final reports and present their projects, strengthening their writing and oral communication skills.

Honesty. Honesty builds trust, and trust is a critical component in any good relationship, including the teacher-student one. When presenting the material or answering questions, I make sure the facts that I give are accurate to the best of my knowledge. Adherence to the Duke Community Standard is expected for the students and me. I ask students to conduct honorably in the course and design the assignments so that it is possible to keep track of the student's effort and prevent questionable actions.

Inclusiveness. I like to think of a class group as a team, and as any successful team, all members should feel part of it. All students are unique; they have their preferred learning style and own academic background and experiences. They deserve a stimulating educational environment where they can share their ideas safely and take risks. I welcome all contributions from students and praise their participation. I have been fortunate to have many women and representation from the LGBTQ+ community in my classes. Their presence and contribution enriched the educational environment significantly.

Nameable lectures. I once read the quote of the American poet Maya Angelou: "People will forget what you said, people will forget what you did, but people will never forget how you made them feel." That quote made an impression on me, and I incorporated it into my teaching philosophy. When I teach my classes, I want to make sure students feel excited about the class topics and enjoy discussions to generate good memories. Associating good memories with a particular topic is what I think allows students to keep learning, even after the class ends. I take planning seriously so that students can have the best possible experience during lectures. When I lead the session, I typically send an announcement before the class, reminding the suggested reading. At the beginning of the lecture, I introduce the topic's significance, summarize the fundamental concepts, and

spend time in group discussion and hands-on activities. I end the class providing the take-home message and mentioning the activities for the next session.

Growth. The purpose of education is to contribute to the community's personal and professional development, and instructors play an essential role in the process. Teaching should stimulate student's growth in their critical thinking, communication skills, confidence, and autonomy. Nothing brings me more gratification than seeing how my students gain more confidence in expressing themselves throughout the course.

Teachers also need to keep growing and improve as communicators, mentors, and leaders. I consider myself with strong communication skills, and I've heard positive comments about how I explain seemingly difficult topics and make them look funny and straightforward. Nevertheless, I'm aware that there are still areas that I can improve further. During my time at Duke, I have been enrolled in the Certificate in College Teaching, attended professional development workshops such as "Online TA Skills: Getting Started in the Virtual Classroom" and participated in the Teaching Triangles program. I have received suggestions for teaching that have helped me grow as an instructor. I also take into account the opinion and feedback of students. I ask them to complete surveys at the beginning, middle, and end of the course, and I incorporate their suggestions in the course instruction.

In closing, teaching has been an invaluable experience, where I have had the opportunity of contributing to the development of my students, collaborating with outstanding co-instructors, and fostering an inclusive educational environment for everyone.