Teaching Philosophy

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My scientific career, so far, has given me unique opportunities to work in great pedagogic environments and strongly engage with students in teaching and research activities. During my graduate study, I served as a teaching assistant in experimental physics, introductory physics, nanostructured materials and spectroscopy. Since graduate school, I successfully supervised more than ten undergraduate and graduate students, a task which has given me greater understanding of working with students and their needs. It has also improved my skill in teaching and mentoring. During my time at Columbia Universtiy, I was a Math and Science teacher at the Community Impact of Columbia University. I also taught several full lectures of *Quantum Chemistry* for undergraduate students on behalf of Prof. Benjamin Bostick at Barnard College, Columbia University and *Electro-magnetic Waves* for graduate students on behalf of Prof. Stephen Rand at the University of Michigan. Recently, I actively participate in outreach activities in local high schools, and supervise undergraduate and graduate students in their research projects.

My goal for student learning is not only to have them acquire deep scientific knowledge but also to develop essential skills such as communication, problem solving, self-learning, and teamwork. These soft skills are very important for students in both their future careers and as global citizens. In order to achieve the desired student learning, I will apply active learning techniques within an interactive environment, visualization, and hands-on experiences. One method to facilitate this style of learning is to divide the class into small groups and let them watch a short video or my presentation. In these groups, they discuss the material and then present their approaches, ideas and results to the class. Asking questions to the students, and encouraging students to ask questions themselves, will make the classroom more interactive. I also like to apply modern techniques to make the class more active, such as applications in smart phones or tablets, virtual collaboration, or using clicker systems such as Socrative or Rwpoll to create learning cases and assessments.

For me, teaching is not only a transfer of knowledge to students but also a chance to inspire them, excite their curiosity and teach them how to learn by themselves. Beside the common lecture and activity format, I plan to have students work on small projects as a group and, where possible, employ a flipped-classroom format in which the students watch online webinar/movies before the class and then do in-class-activities during lecture time. Since teachers should also be willing to learn from their students, I plan to create surveys at the middle and the end of the semester. By getting feedback about the projects and class work, I will continuously improve my teaching.

It is important to connect the material being taught to everyday student experiences, no matter the level of the students. Especially in the areas of physics and chemistry, you can find examples from daily life or in the lab. I believe that bringing in simple experiments into the classroom, and providing students with hands-on experiments, significantly enhances the learning experience. For example, when teaching about the wave nature of light, I will design and bring into the classroom a simple kit with a laser pointer to demonstrate the double slit experiment. I will ask students to perform the experiment and answer the questions. I will also encourage students to design and complete an experiment by themselves. In more advanced topic areas, I will bring small research projects into the classroom and encourage students to participate in scientific research in my laboratory. It is important to continually update the lessons with scientific news and recent research discoveries including my recent research results.

A good teacher is one who never stops learning. To strengthen and broaden my knowledge, I often take online courses from the top-ranked institutions, using edX or Coursera; and often attend seminars and workshops including scientific teaching and learning. In the past, I have completed intensive courses on *Fundamentals of Teaching* and *The Essentials of Teaching and Learning* by Columbia University. From these courses, I have learned how to use various active teaching and learning techniques in the classroom, along with student-centered learning approaches. I look forward to continuing to learn about ways to teach effectively at my future university.

Lastly, my teaching interests include courses for advanced undergraduate and graduate students in Quantum Mechanics, Introductory Physics, Mathematics for Physics, Physical Chemistry, Condensed Matter Physics, Atomic and Molecular Spectroscopy, Nonlinear Optics, Functional Nanostructured Materials, and the Physics of Opto-electric Devices. These courses would be taught in the way including both quantitative skills and critical thinking. I am also interested in teaching introductory courses for non-science majors because they are such an important part of the course offerings and they can be effective recruitment tools to introduce STEM to the diversity of students in the University. I am also willing to develop and teach online courses.