Teaching Philosophy & Experience
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Philosophy
I did not always want to be an astronomer. But after enrolling as an undergraduate in an introductory astronomy class, my life changed dramatically. I owe this to my professor, Dr. Bob Mathieu. His accessibility led me to join his research group, and after an observing run to Kitt Peak I changed my major and entered the world of astrophysics. Thanks to Bob, I understand first-hand the dramatic influence one teacher can have on his or her students.

But a teacher’s influence steps beyond what major his or her students choose to pursue. Instead, a teacher’s fundamental role is to equip them with tools they need to parse the vast amount of information they encounter each day and tackle new and completely foreign concepts. As such, my primary goal is to help students understand how a conclusion is reached. Not only does this help them understand the scientific process, but it leads them to realize that science is not beyond their grasp. So, when students remarked that I helped them to “understand the process of a problem ... instead of just getting an answer,” I felt I had done my job — they had learned how to learn.

Beyond this goal, I take a tiered approach to teaching at different levels. With non-science majors, I aim to impact their world view, forcing them to rethink their place in the Universe. Connecting the material to their fundamental perception of our pale blue dot is a powerful engagement tool — one that will also encourage them to be life-long students of science. For science majors and advanced students, I also connect the classroom with the practical skills of modern research — including keeping up to date on current publications and computing methods. In either case, like my first great professor, I remain accessible to students, providing a window through which to view both a personal connection to science as well as real research in action.

Experience
When I started graduate school, I was immediately offered a funded research position. I turned it down. Instead, I wanted to jump into the classroom because I knew that teaching is a skill only developed via extensive practice, opportunities for which I actively sought.

In the summer of 2016, I had the pleasure of teaching Astronomy 1: Exploration of the Solar System at Dartmouth College. In the 10-week course with roughly 40 students, one of my goals was to craft each session to engage without overwhelming, as I knew from previous experience teaching introductory astronomy at Wyoming that one of my missteps was trying to cover “too much.” To do this, I solicited feedback from my students about what they wanted to learn and geared many classes toward their particular interests. Often this method helped to spark deeper discussions.

There were two aspects of this course I found particularly effective. The first was bi-weekly readings of current astronomy news stories. Students were asked to analyze the stories for scientific content as well as identify well-reported science journalism — a skill that will help them long after leaving my classroom. In lieu of a final exam, I implemented a creative project, in which the students could explore the content of the course in the context of their own interests. One student wrote a java script solar system simulation. Another created a “director’s casebook” for a play with astronomy influences, incorporating class concepts into everything from the character’s personalities to the costume design. The window this provided into how the students had internalized the material into their mental framework was inspiring. My greatest reward came from the following comment in my evaluations (appended at the end of this statement): “Professor DiPompeo has made me fall in love with learning for the sake of learning again, and instilled in me what I anticipate to be a lifelong interest in what lies beyond...This [course] made that world accessible to me in a way I never thought it could be.”
The following spring I taught *Astronomy 25: Galaxies and Cosmology*. With only six science majors, it was a vastly different experience. Still, I retained many aspects of the larger introductory course, like using student polling to gauge understanding and generate discussion, humanizing the endeavor of astronomy by connecting research to the diverse people who dedicate their lives to it, and involving current popular news — but with a much deeper technical side. The students were required to learn some basic coding (Matlab or Python) for calculations and creating figures on problem sets. From the second day of class, they were exposed to current research literature, choosing research topics to pursue over the term. This evolved into their final projects, for which they not only summarized a paper and the relevant literature, but used it as the starting point to probe a new question of their choosing (working closely with me). It was exciting to watch the students actually do science.

Beyond the classroom, I have also mentored undergraduate students. In Wyoming, I worked with a freshman astronomy major, who developed a range of fundamental skills that are useful in any research area. English is his second language, and I also worked diligently with him to hone his writing skills. This experience taught me where to place my expectations and how to monitor the work and progress of beginning students. He presented his work at a meeting of the AAS, published a peer-reviewed paper as first author, and has now gone on to study theoretical cosmology in graduate school. I am working with a similar student this fall at Dartmouth, whose interest was piqued in my galaxies and cosmology course.

To broaden my impact further, I have co-developed several NSF-funded professional development workshops for K-12 teachers, helping them effectively bring physics and astronomy into their classrooms. These workshops focused on classroom activities with cross-disciplinary foundations and even guided teachers on their own projects using research-grade observing facilities. My collaborators on these projects work on the forefront of education research, which has broadened my understanding of effective teaching and the role that teachers play in the classroom. The workshops have also resulted in co-authorship on a paper in an education journal, with more to come soon.

Engaging the local community is just as important as working with students and teachers. I invest in outreach efforts wherever I go, which has helped to sharpen my skills as an educator. From visiting or hosting classes from local schools to bringing astronomy to local non-profit organizations that work with kids, such as Vermont’s Farms for City Kids program, I have extended my impact far beyond the bounds of universities. Public outreach (particularly planetarium shows) has also taught me how to engage an audience, a critical skill for teachers. I also draw from experience playing music on stage, which was critical in providing me confidence that enhances my teaching.

Throughout my teaching experiences I have come to truly appreciate the rich and diverse history of astronomy, a diversity reflected in students. I have successfully taught students with an array of backgrounds — from those who grew up in large cities to those who grew up on ranches with only a few hundred residents within miles and from those who grew up across the world to those who have never stepped outside Wyoming — often in the same classroom. I owe this in part to the fact that I regularly work with scientists from different backgrounds. My major research groups have contained fewer than half Caucasian males (the major demographic in physics and astronomy), and I maintain collaborations with astronomers around the world. Diversity of background and experience in scientific collaborations enhances both productivity and impact.

In summary, I believe that science should be accessible to all, no matter a person’s background, knowledge base, or goals in life. I believe that teaching is hard work, not just in constructing material to foster learning, but in inspiring students to find out more about science on their own. It is also rewarding work. Finally, I believe that a single great educator can change the course of a student’s life, turning an uncertain young mind into a passionate scientist. I am a living example of the effect such a teacher can have.