Teaching Statement

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I first felt a real excitement for teaching statistics when, as an undergraduate TA for an introductory statistics course, I found myself explaining Simpson's Paradox with the classic Berkeley admissions example. The students attending my office hours were surprised that there wasn't a single "right" way to analyze data. *How great!* I thought to myself. *I'm not just teaching formulas or how to get a correct answer, I'm teaching critical thinking!* Since then, I've sought opportunities to lead students to appreciate both the creativity and intellectual discipline required for data analysis as well as the elegance of foundational statistical principles. In a field that demands technical proficiency be paired with a deep consideration of the problem at hand, I have developed an approach to teaching that combines passion and rigor with effective pedagogy to train both statisticians and scientific professionals alike.

My teaching philosophy has evolved as I've gone from an undergraduate TA at Duke to a discussion section instructor for both introductory and advanced graduate methods courses at the University of Washington and, now, to a co-instructor for the Johns Hopkins Department of Biostatistics' new Advanced Data Science course. I've learned how to incorporate more engaging examples into my teaching, how to encourage active engagement in class and gauge students' understanding, and how to provide feedback in a way that motivates (rather than discourages) students. Most recently, I've been awarded a grant from Johns Hopkins University's Center for Educational Resources to develop and teach an undergraduate course on data visualization and interactive app development for precision medicine. I'm excited for the opportunity to design a course that reflects my teaching philosophy and has the potential to inspire a new generation of statisticians.

When teaching, I motivate statistical instruction with compelling examples. Not only does the use of real-world problems motivate students to struggle with the technical details that may otherwise seem dry, it serves as a vehicle for a deeper conceptual understanding than is attained by rote memorization. This approach also applies to learning the computational skills needed to produce plots and graphs that communicate the result of statistical inquiry [1]. In the course I am developing, data visualization and app development will concentrate on problems of precision medicine. After working through a few case studies, small groups of students will collaborate with clinicians at Johns Hopkins Hospital to design decision-support apps that communicate predictions of likely treatment effects and longterm prognoses to individual patients. By introducing my class to the types of problems statisticians work on, I also hope to encourage more students to consider the field.

While many statistics classes consist primarily of lectures and homework assignments to be completed individually, I plan to also use in-class activities and group projects to maximize student learning. In-class exercises enable students to actively engage with course material during class time and facilitate *formative assessment*, that is, evaluating to how well students are learning the material and recalibrating the lesson in response while learning is occurring (rather than waiting until grading homework to begin providing feedback) [2]. Partner and group activities– both in and out of class– also provide a space for students to receive feedback from one another and, as a complement, the opportunity to teach. By having the opportunity to informally instruct their classmates, students will attain a deeper understanding of the course material and experience an added sense of mastery. While I plan to use these approaches in a seminar course on data visualization, they can also be effectively combined with lectures and individual assignments in more traditional statistics courses.

Finally, I have found that providing thorough assessments of students' work is necessary to solidify comprehension and build confidence. As a co-instructor for Jeff Leek in his inaugural data science course, my primary responsibility is giving detailed feedback on data analysis projects. For each student, I recognize the strengths of her report and applaud clear and creative thinking, even when the final product falls short. When pointing out mistakes, I make sure to provide context so that the student is not left wondering where she went wrong. And, even when an idea or the writing is not wrong but could be refined or strengthened, I suggest strategies to do so. This approach neither discourages nor coddles students; on the contrary, such attention demonstrates an investment in students' success and encourages them to elevate their thinking and writing to the high standard set.

I look forward to future opportunities to teach statistics at a range of levels and to a variety of audiences. Teaching never fails to make be a better statistician and remind me why I love the field.

References

[1] Deborah Nolan and Jamis Perrett. Teaching and learning data visualization: Ideas and assignments. *arXiv preprint arXiv:1503.00781*, 2015.

[2] Dylan Wiliam. What does research say the benefits of formative assessment are. *Reston, VA: National Council of Teachers of Mathematics. Retrieved March*, 10:2010, 2007.