

## Teaching Statement – V.N. Vimal Rao

आचार्यात् पादमादत्ते पादं शिष्यः स्वमेधया। स ब्रह्मचारिभ्यः पादं पादं कालक्रमेण च॥ Mahabharata 5:44:9

This saying states that a students' learning is derived from four sources: their teacher, themselves, their peers, and time. In the short time students are in my classroom, I can impact the content and pedagogy, as well as the learning environment. However, my goal is to also support students' own inquiry and prepare them for future learning experiences. To lay this foundation, I utilize autonomy-supportive teaching practices (Reeve & Cheon, 2021). These values and practices uniquely manifest in three ways: (1) my interactions with individual students, (2) my classroom presence, and (3) my instructional content.

**(1) Student Interactions** In adopting a student-centered approach, I focus on meeting each student at the limit of their current understanding (i.e., their zone of proximal development; Vygotsky, 1978). For some, this involves extra scaffolding, while others require an extra challenge. In Spring 2021, within the same four-person discussion group, I had one student of each type during an activity on bootstrap resampling. To provide extra scaffolding to one student, I re-explained bootstrapping in a way that emphasized the software representation of a statistical explanation (see Garfield & Ben-Zvi, 2008, Chapter 13, for typical roadblocks in students' learning of statistical inference) and provided a live worked example, before having them complete the first half of the activity in my presence. To provide an extra challenge to the other student, I suggested they try to re-explain what bootstrapping is and what it achieves in their own 5 minute mock lecture, and practice explaining the key points to their group mates (see Clark & Rossiter, 2008, for the benefits of narrative explication). This helped me keep both students engaged, supported and challenged relative to their current understanding, moving through the course content at the same pace, and supporting each other's learning through their interactions.

**(2) Classroom Presence** To foster an environment that supports individuals' inquiry and prepares students to approach statistical problems beyond the classroom, I focus on teaching students how to 'see' like a statistician through a cognitive apprenticeship (Collins et al., 1987). For example, to develop students' critical statistical literacy, I start each class with the five minute "What's not here?" activity. During the first few weeks of the term, I model how to critically consume graphs by talking aloud when viewing new graphs for the first time. This helps teach students the features that they should pay attention to and the questions they should ask, such as the sample

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size, the study design, potential sampling bias, potential covariates, etc. Soon, we transition to students sharing visuals with the class, and I coach them and provide feedback. Before long, I provide students an opportunity to reflect on their skills by comparing their reasoning with mine. By the end of the course, students explore and search for visuals in their own day-to-day lives, and apply the “What’s not here?” lens. By devoting class time to developing students’ professional vision as a statistician (Goodwin, 1994), I hope that even beyond my class they are able to orient themselves to statistical information and can notice important features in data. Even if students don’t remember or possess the statistical tools to solve a particular problem they face, they will at least be able to think like a statistician, and can embark on further training.

**(3) Instructional Content** My research in statistics education sometimes leads to new classroom activities. For example, while studying graduate students’ perceptions of  $p$ -values, I found evidence that their mental representations of the  $p$ -value continuum were distorted around the socially significant .05 boundary for ‘statistical significance’ (Rao et al., 2021). Borrowing from research on categorical learning, I have developed (am and currently testing) a series of activities to (1) maximize the learning benefits of categories for novices, (2) ensure students do not leave my course with a warped mental representation of the  $p$ -value continuum, and (3) hopefully protect students from any future warping of their mental representation. In this way, I want to ensure that my students do not fall into deleterious category- or rule-based approaches that affect their underlying cognition.

By balancing my role as a teacher with a desire to support students’ autonomy, I hope my students leave my class with the foundation to continue developing as thoughtful statisticians. This is exemplified by one former student telling me a year after completing my course that “You taught me that there is so much more to statistics, it’s not just ‘black and white’. You have to be very mindful when it comes to analysis,  $p$ -values, and interpretations.”

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### ***Selected excerpts from student feedback aligned with my approach to student interactions***

“I really appreciated Vimal’s flexibility in his teaching and feedback. He was always ready to adjust or re-explain things when we were having trouble with a concept. I appreciated how much effort he put into presenting topics in different ways.” from *UMN EPSY 5261 Fall 2020*

“Vimal was very helpful during EPSY 5261. I was nervous to take a math class online, but decided to give it a shot. Vimal responded very quickly to electronic questions and didn’t just provide an answer, but was willing to dialogue back and forth to help me truly understand the answer to my question. He is a great teacher and I learned a lot in the course. Thank you, Vimal, for really engaging with students despite the course being online.” from a *Thank a Teacher Note*

“Professor Rao while commenting on discussion board posts wouldn’t just give you the answer out right. He would give you the necessary information to figure it out for yourself and actually think about what the correct answer is.” from *GWU HSCI 2117 Summer 2019*

### ***Selected excerpts from student feedback aligned with my approach to classroom presence***

“He made this class extremely personal and created an environment where discussion and collaboration are encouraged. Being able to ask questions and discuss with breakout rooms has made this class incredibly attainable for me.” from *UMN EPSY 5261 Fall 2020*

## ***References***

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