

Introduction

As a teacher of statistics, I see a priority in three goals while supporting my students. I expect my students to be able to 1) adopt the most appropriate statistical method; 2) have modern computational skills to apply the method; 3) communicate their findings effectively in written, visual, and oral formats. To help my students achieve these goals, I use multiple strategies which I have developed over the years and continue to develop. Overall my teaching involves three main decisions: content, tools, and pedagogy.

Content

In planning the content of my courses, the first aspect I consider is the mathematical background of the students. Even if I am teaching the same topic, depending on learners' background I tailor the content. For instance, I teach linear regression in three different ways, using matrix algebra and calculus, using only linear functions, and without any mathematical formulae depending on who the target audience is. In addition to the prior courses that students have taken, I also consider the subsequent courses that students are likely to take in the department. Lastly, with the emergence of data science, when planning the topics, I consider how I can incorporate more modern computational topics into the curriculum.

In statistics and data science numbers are not just merely numbers, they have context. I encourage my students to always understand the context before looking at patterns, calculating statistics, or making predictions. Without having a profound understanding of the context, students can be misled into number crunching or focusing only on certain statistics while missing the bigger picture. Thinking of the context also gives students an opportunity to think of the social impact of their work. One way I support my students to think about context and maintain their attention in class is to use datasets, research articles, and newspaper articles relevant to their life and interests. When the topics covered in statistics class are relevant to students, I have found that they become more passionate about statistics.

Tools

Languages. I use and teach R with the RStudio GUI in all my courses, including more theoretical courses such as probability and Bayesian analysis. In the past, I used local machine installations and local servers to teach R in the introductory courses. Starting this semester, I adopted RStudio Cloud which is currently in alpha version. RStudio Cloud allows users to access RStudio GUI through a web browser. For each class, I set up projects that students can access and work on their own Cloud. As an instructor, I get access to the code students write. The cloud gives me an opportunity to have students start coding right away without having them worry about installation of packages. They can make visualizations on day one and are drawn to learning R. In a way, I first teach my students how to drive, then I teach them how the engine works.

Even though I have used R for the last ten years, I learned and am still learning multiple languages. In the past, I have given workshops in SAS. Currently, I am self-teaching Python. It is hard to predict what the lingua franca of data science will be, but I am aware that during my career I will have to teach more than just R. That is why I try to learn more languages and think deeper about the learning process of computational skills. I strive to gather pedagogical knowledge that is language agnostic and can be applicable in my future classrooms as well.

Version Control. Depending on the level of the course, I utilize version control using GitHub in my classroom either using RStudio or command line. Version control finds its place in my classroom not only because it is a tool to track projects and collaborate, but it is also a great way to introduce students to the open source community. In addition, it helps students build their data science portfolio early on.

Community tools. I use and encourage my students to use community tools often in my courses. Depending on the course, I expect active participation either on a collaboration tool like Slack or the learning management system. These tools help me manage students' questions, give students an additional space to voice their enthusiasm, fascination, concerns, and difficulties, and help form a sense of community where different pairs respond to each other.

Pedagogy

Scaffolding. Although I use different components of different learning theories, my teaching is heavily rooted in constructivism. I mostly have a flipped classroom. Students complete reading questions online that are graded for completion before coming to class. For each topic I teach in class, I first think of the big idea that I want my students to grasp. I try to create challenging problems or scenarios through which the students will experience this big idea. As they solve problems and navigate through scenarios, my students construct their own knowledge. These problems give me an opportunity to diagnose any misconceptions students may have. Once students grasp the big idea and correct their misconceptions, I rely more on traditional methods such as repeating procedures, drill and practice exercises.

Learning community. I try to create a positive learning environment where each of my students feel safe and valued. The community building strategies have both academic and social components. For the social component, I want to make sure that students feel comfortable. First, I make every effort to learn my students' names on the first day of class. This develops the students' sense of belonging in the classroom and promotes a safe place for students to ask questions and contribute ideas. I use my own background to build a sense of social belonging. I openly share the fact that I was a first generation and an international student in college. I ask my students their preferred gender pronoun. For the academic component, I emphasize that mistakes are always welcome in the classroom and put my students in charge of each other's learning by encouraging them to ask questions to a neighbor before they can ask me. If I answer a question for anyone in class, that student is then in charge of explaining the solution to others in class. This approach means that early in the semester, collaboration among my students flourishes and the positive relationships built in my classroom continue even after the semester is over. As a teacher, I never doubt my students' social or academic capabilities and I do not let them doubt themselves.

Room for growth. As the tools we use change fast and our understanding of learning changes, I feel obligated to change what I teach and how I teach. Every semester, I try to make at least one profound change to my teaching. This usually takes me out of my comfort zone which can be quite unpleasant in the classroom. For instance, this semester I have started using RStudio Cloud and I ran into multiple issues that I had to solve during class time. Towards the end of the semester, I will teach how to build web apps using Shiny for the first time. Getting out of my teaching comfort zone is what makes me grow the most in my teaching. It is my utmost goal to learn more and teach better. To achieve this goal, I attend pedagogical and computational workshops, join and serve in supportive networks, and seek help from more senior colleagues when needed.