
TEACHING STATEMENT - KATHERINE M. KINNAIRD

My teaching philosophy pushes against the belief that statistics is a field set apart, reserved only for the mathematically gifted. Instead, I incorporate statistics into my students' broader educations, and seek to remove barriers of entry currently existing in the field. I believe that every person can have fluency with the statistics, but that each person may not yet realize this. Thus when teaching, I have two equally important goals: to facilitate my students learning of statistics and to dispel the notion that one is innately good or bad at doing statistics. To accomplish these goals, I use teaching techniques that engage students beyond each class meeting and that complement classroom activities.

My teaching style has been influenced and informed by teaching my own courses, being a MAA's Project NExT fellow, participating in teaching focused seminars at Dartmouth College and Macalester College, and by being as a fellow in the NSF GK-12 Project at Dartmouth. While my approach is different from more traditional lecture based teaching styles, I have successfully implemented my teaching methods in a multi-section course with the instructor of the other sections using more traditional teaching methods. For my broad experience and my successful implementation of innovative teaching methods, I was awarded the Dartmouth Graduate Studies Teaching Award in 2013.

Convincing students that statistical skill is a learned process and not a gift is, in my opinion, an indispensable part of teaching statistics. For students who believe that they are "bad at math," I aim to re-engage them with statistics, and restore their confidence in learning both statistics and mathematics. For those who believe they are "good at math," I push them towards deeper understanding of the material, while encouraging their enthusiasm.

To address both of my classroom goals, I first create course learning outcomes that concretely state measurable goals for a student taking the course. I design exams, lectures, collaborative learning activities, and homework assignments with these course learning outcomes in mind and link to these outcomes at the top of the course Canvas site. These stated goals give students a roadmap for where the course is headed and provide students with mechanisms for reflecting on their learning throughout the course. By highlighting those relevant to each activity, I provide students with a larger context for daily material and demonstrate that mastering one statistical idea takes time and work.

To solidify students' understanding of the new material and to continue building their confidence in their statistical skills, most class meetings are spent working in small groups on collaborative learning activities that make use of techniques and concepts from the reading assignments. These activities are designed to guide students through answering challenging questions by breaking the solution into smaller pieces. I carefully design these smaller steps to help students understand not only the procedure, but also why each step of the procedure makes sense. These activities demonstrate that statistics is a reflective process, not simply an answer, and can increase a student's confidence in their own statistical skills. The small group settings provide opportunities for students who are more confident with the

material to deepen their understanding by explaining the relevant concepts to others in their groups. These collaborative activities often expose when a student has simply memorized a procedure without understanding the conceptual underpinnings. Additionally, these in-class collaborative learning activities help me stay in touch with the needs of the whole class as well as the individual needs of each student; I can then tailor our collaborative learning activities to their specific needs.

To further challenge the notion that one's statistical abilities are predetermined, my students play a game called "Statistician of the Week" where students identify a statistician from an image and share a fact about that person. This game has several goals. The first is to show that statistics has a long history and is a living, breathing subject. Second, the students witness that the concepts they are working to master in just one term have taken years to develop and codify. With a chocolate bar as the prize, students can have fun with this game without having it tied to their grades.

My teaching techniques have also proven effective in settings beyond the traditional statistics classroom, and in each new setting, I have learned how to apply, stretch, and reinvent my teaching methods. At Macalester College, I incorporated my teaching methods into an introductory computer science course and into an introductory statistical modeling course. For example, being cognizant that many students take these introductory courses for practical experience and skills that are applicable to their future endeavors, I added writing components to my classes where students immediately applied their course knowledge and developed their technical writing skills. During the 2013-14 academic year, as an NSF GK-12 fellow, I co-founded a new club called "Lady Hack" at a local high school that taught motivated, female students how to program.

In December 2014, inspired by the transition that undergraduate students make from college to work relating to data science, such as being a graduate student, a member of an R&D department, or a new hire at a start-up, I founded the Data Science TRAIIn Lab (dsTRAIIn) that exposing undergraduate students to data science by encouraging them to (T)ry, (R)ead, (A)sk, and (I)ncorporate. During weekly lab meetings, dsTRAIIn discusses a recent data science or machine learning peer-reviewed research paper, and lab members present the current state of their self-directed individual or small group research projects. For their active participation in dsTRAIIn students earned either work-study hours or 1-academic credit. In just one term, dsTRAIIn at Macalester College started six machine learning projects, led paper discussions with two machine learning researchers, and read seminal papers on topics from spectral clustering to topic modeling.

Believing that teaching should not be limited to formal courses, I seek additional opportunities to share both statistics more broadly. I also strive to be a role model and mentor, who happens to be an applied mathematician, by participating in outreach activities such as the Sonia Kovalevsky Math Day and college-wide activities like the VDAY Dartmouth campaign. For my service to the Dartmouth community, I was awarded the Dartmouth Graduate Studies Graduate Community Award in 2011. By actively participating in the broader community, I have additional forums in which to share and accomplish my goals of incorporating statistics holistically into people's lives and challenging stereotypes about statistics and statisticians.