Teaching Statement

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I look forward to the responsibility and privilege of teaching and mentoring students. I believe that a teacher has two primary responsibilities:

1. Exciting students about problems and helping them discover their interests;
2. Providing students with the necessary resources to succeed in pursuing those interests.

A good teacher uses a course not only to impart knowledge, but also to instill excitement about the material and help students discover new interests. As a teaching assistant for MIT's graduate networking course, I prepared lectures, recitations, and new questions for problem sets and quizzes. Lectures and recitations provide a unique opportunity to present new problems to students and challenge them to think in new ways. A good lecture or recitation should engage students by relating topics that they are not familiar with to those that they know well or some topic that they can be excited about (*e.g.*, motivating video transcoding with a wireless digital television application, rather than speaking exclusively in the abstract). It should also challenge students to think on the fly. Finally, I believe that a lecture should leave students with a clear intuition for the fundamental high-level problems and intellectual ideas in some area (which they could hopefully carry with them for years) but still allow a student who is interested in delving into the topic further with enough information to pursue his or her interests.

A good advisor helps students discover their interests by recognizing their specific strengths and guiding them towards interesting open problems that capitalize on those strengths. I have found that an effective way to excite students about a problem is to pique their interest with a concrete problem, a couple of (sometimes small) interesting results, and a handful of open questions to think about. To this end, I spend time thinking about interesting questions (*e.g.*, Do spammers steal addresses from other Internet service providers to untraceably send spam?) and performing some initial exploration of these problems so that I can pose problems to students in terms of concrete examples, rather than simply describing a problem in the abstract. I have found this approach to be successful in helping guide the research of Winston Wang, a Master's student who addressed some open problems I posed in the Infranet project and ultimately received an award for his thesis on the topic; and, more recently, of Mythili Vutukuru, a first-year Ph.D. student who is working on open issues related to the Routing Control Platform, based on the design that we previously proposed.

An advisor should also develop his or her students' research tastes, encouraging creativity while ensuring that students do not waste time on irrelevant or uninteresting problems (*e.g.*, problems that are too short-sighted, emphasize implementation without a research goal, etc.). One of the most valuable things that my advisor, Hari Balakrishnan, did for my research was to help steer it clear of these types of problems in a constructive way that encouraged me to refine my ideas; I intend to do the same for my students.

Teaching also requires providing students with the necessary resources to succeed once they have discovered their passions. Perhaps the most important resource an advisor can provide is the ability to draw connections between different research areas that do not initially appear to be related. For example, my advisor recognized that information theory could help me design the covert channels in the Infranet project. This type of insight requires familiarity with many fields; I believe that my background in other fields, including game theory and signal processing, will help me provide the same support to my students.

One of the most important aspects of teaching undergraduates is conveying excitement about the material. I believe that one good way to do this is to pose a problem in terms of a concrete example or application that provides solid intuition. My discrete math professor explained merge sort with a Tower of Hanoi-style set of rings and combinatorics with card tricks. I believe that using concrete examples—whether they involve using cards to explain combinatorics or video streams to explain the effects of packet loss on streaming video quality—not only excites students about material, but also provides them with intuition that they will remember long after their memories of details have faded. Coursework should involve problems and projects that encourage students to both "get their hands dirty" and to develop creative problem solving skills based on their newfound knowledge.

Given my experience in Internet routing, Internet measurement and modeling, and network security, I would also be excited to hold graduate seminars on any of these topics. Finally, I am very interested in designing and teaching courses at both the undergraduate and graduate levels that could be applied to interdisciplinary research that I intend to pursue (*e.g.*, applying game theory and signal processing to networks).