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Statement of Teaching Interests

I believe the best functional maxim for a teacher is a paraphrase of Richard Feynman: Give the best students something to grapple with, and the weakest students a good idea of what is going on. In my experience of teaching and being taught, I have felt the key to successful teaching is respecting and engaging the student. Connecting the material to its relevance in practical life is important to making the experience meaningful. Additionally, providing students with pointers to the state of the art provides connections to research projects that students might be interested in.

I have grown up teaching at various levels. When in college, I spent one summer teaching physics to high-school students, and another designing and teaching a seminar-style course to my peers on computer networking protocols. I taught a short course on development of object-oriented simulation environments at IIT Bombay, which was attended by the members of my then research group including graduate students and professors. I designed and taught a course on how to use computers and internet for laypersons, which was attended by around fifty students. At Northwestern, I involved myself maximally in my teaching assistantship opportunities to learn and teach a wide cross-section of classes: introduction to computer programming, introduction to artificial intelligence, design and analysis of algorithms, design of computer problem solvers, and, knowledge representation. In all of these classes, I got opportunities to lecture, conduct recitations, and work with the instructor in shaping the class.

Last fall, I taught the "Cognitive Science 207: Introduction to Cognitive Modeling" class. This class provides an introduction to artificial intelligence and cognitive science for liberal arts majors, and prepares cognitive science majors for more advanced study. In previous years, the format of class was Socratic discussions on various aspects of cognition anchored around a syllabus consisting of classic papers in the area. Based on past student feedback, I made a few significant changes. As most of the students in this class were exposed to reading research papers for the first time, I introduced them gently to the art of reading and critiquing papers. Students wrote paragraph long critiques focused on aspects of papers they found interesting, and this was used as grist for generating discussion about the paper. I also gave them *modeling assignments*, where they applied the computational metaphor to analyze specific cognitive activities relevant to the discussion. I made the reading and modeling assignment the largest fraction of the evaluation for the final grade. Based on the class participation this generated, I feel these techniques worked. I used a website[1] and an online discussion forum to carry over the discussion outside the classroom. The discussion forum was successful, and there were about two hundred and fifty posts over the quarter. Midway through the course, I conducted an anonymous survey to get feedback from the students. A very important lesson was learning to be sensitive to students' reactions and be flexible based on those.

I would enjoy teaching classes in artificial intelligence and cognitive science. With my background and training, I can also teach classes on algorithms, data structures and software engineering. I would like to teach graduate/advance-undergraduate classes on knowledge representation and design of problem solvers. I would like to create graduate level seminars in knowledge representation, cognitive systems, and design/psychological aspects of information. Besides these, I am interested in designing a new class centered on teaching estimation skills. Studies have shown that engineering undergraduates are surprisingly bad at this. More than 90% of mechanical engineering seniors (100 at MIT, and 250 from five other universities) came up with estimates that were off by more than one order of magnitude for the value of energy stored in a 9-volt "transistor" battery, and responses varied by nine orders of magnitude[2]. My research on back of the envelope reasoning provides a framework to structure the class, and this class will also serve as a laboratory to generate and explore hypotheses about human commonsense reasoning to guide my research.

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[1] Available at http://www.cogsci.northwestern.edu/courses/cg207-2004/

[2] Linder, B. 1999. Understanding Estimation and its relation to engineering education, Ph.D. dissertation, Department of Mechanical Engineering, MIT