TEACHING STATEMENT

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Regarding his ideas for self–improvement and how to influence others, Dale Carnegie once said "the ideas I stand for are not mine. I borrowed them from Socrates. I swiped them from Chesterfield. I stole them from Jesus." Like Carnegie, my teaching principles were originally borrowed from others who have applied them successfully. What many great teachers have already discovered about learning mathematics I have only recently learned for myself: students who learn the most mathematics are often the ones who practice the most. Thus I try to encourage problem solving as much as possible. Upon each new teaching assignment, I ask myself: just how *does* a teacher motivate his students to *do* mathematics? I believe the answer lies within mathematics itself. Just as math problems often have more than one solution, my challenge and goal as a teacher is to find different ways to get students to actively do mathematics, and thereby learn mathematics.

Well–known mathematician and expositor Paul Halmos once wrote that "the only way to learn mathematics is to do mathematics." In *I Want to Be a Mathematician: An Automathography*, Halmos quotes a Chinese proverb: "I hear, I forget. I see, I remember. I do, I understand." At the University of Illinois, my first teaching experience was as a teaching assistant, and my assignment was to lead several discussion sections for the business calculus course. Adhering to Halmos' teaching philosphy worked well. Quizzes aside, class generally consisted of students asking questions about homework, and me requesting the students to come to the chalkboard, one at a time, and just try any ideas they had. This technique was based off of Robert Moore's teaching method. If one reached a stumbling point, another student would try to pick up from there. Every question was resolved in this manner. Only if it was clear that they were on the wrong track would I interject. This method not only allowed students to discover the solutions on their own, it also helped them retain what they learned.

Doing mathematics does not necessarily equate with using the chalkboard or pencil and paper. Discussions can be just as effective in facilliating learning. The following semester I was asked to teach a regular, stand–alone calculus course, and was responsible for the lectures. Within each lecture, I left "pause points" during which I asked students questions, or had them think about the current concepts and extrapolate new ideas from lecture. At first, students were somewhat surprised when I paused for even as little as ten seconds. (Some were genuinely unnerved by the "long" moment of silence!) However, as the semester progressed, students well understood that the questions and pauses were cues for quick discussions. During the quick discussions, I tried to take on the role of an advisor, leading the discussions in the direction of the lecture. I gave lectures only every other day. Off days were for problem solving and homework discussion, again so that students could "learn by doing." At the start of such a day, volunteers would present their solutions

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to selected problems. The remainder of the class was handled in a style similar to that of my first teaching experience. Students responded very postively to this style. Those who did well were enthused about presenting what they learned. Even the more shy students were able to engage in the discussion, as I generally reserved the easier problems for students who normally would not volunteer, and thereby minimized their chances of mistakes.

During my third year as a graduate student, and several semesters thereafter, I was asked to teach large–lecture courses. Though I still wanted students actively do the math I was presenting, the small classroom techniques were no longer applicable. Moreover, there were seemingly more topics to cover than a typical semester allowed. A colleague suggested the use of overheads for problem statements as a timesaver. I took this one step further and made two versions of my lecture notes: one was a complete lecture with example problems, the other was an outline, with black space after the problem statements. The outline version was placed online. I felt that this provided the best balance between lecture and problem solving.

In class, the outline was placed on an overhead, and my students and I filled in the blank spaces together. This technique worked well on many levels. Whereas a complete set of notes posted online might have encouraged unexcused absences, an outline only provided students with questions and problem statements, with blank space where the answers would be written. Students who were truly unable to attend class could still get an idea of what was covered or considered important. The outline also kept me organized and allowed me to designate how much time to spend on each topic. Most importantly, though, was that students who printed the outline no longer fervently "xeroxed" notes and could concentrate doing the mathematics along with their instructor, and writing down answers to questions about the theory. Even short discussions with a lecture hall of about 200 students became possible.

As a teacher, I have learned a great deal about adapting teaching styles to various class formats: discussion sections, regular stand-alone lecture courses, large lectures—all by actually teaching under these formats. I am currently teaching a Merit pre–calculus course (very similar to a problem solving session). This is yet another new format for me, and as always, I look forward to learning new ways to motivate "learning by doing."