My teaching of mathematics

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At Spring Arbor, I have taught calculus, differential equations, linear algebra, real analysis, remedial mathematics courses, discrete mathematics, and modern geometry (to prospective teachers).

As a post-doc, I taught abstract algebra and the honors linear algebra course and a sophomore level course in linear algebra and differential equations.

As a graduate student, I had a wide variety of teaching experiences. I taught discussion sections for large lectures, taught courses to groups of about thirty students during the summers, was the graduate student instructor for two graduate courses, tutored upperdivision students from underrepresented communities in small groups for Berkeley's emerging scholars program, taught undergraduates from underrepresented communities from all over the country in the Berkeley Summer Mathematics Institute, provided math enrichment at an elementary school, helped organize the workshop for the preliminary exams given to entering graduate students, and taught intensive calculus sections in the emerging scholars program. In the latter I wrote worksheets for five hours of in class group work per week.

My teaching philosophy is quite simple: For most students, the approach taken in Berkeley's emerging scholars program is better than the traditional approach. We need to get our students to solve challenging problems and we need to get them to collaborate. Doing mathematics is a process like playing a sport or playing a musical instrument, that is, it is best learned through practice. This includes practicing collaboration. Therefore, I challenge students to work hard. I also encourage students to work in groups and to write. There is no better way to sharpen one's understanding of material than to try to explain one's ideas to others, both orally and in writing. When teaching mathematics, I prefer to proceed in four steps:

- I introduce a new technique or idea on familiar ground. The first step is an explanation of the material with simple examples that illustrate the typical behavior of the mathematical objects in question and are as familiar as possible.

- I have the students use the new technique or idea on safe ground. The second step is to have the students explain the material while listening carefully for misunderstandings and oversights. My favorite way to do this is to have students do a worksheet in small groups while visiting the

groups and asking followup questions to individual students in the groups. Of course, the worksheet must include challenging problems in order for this to work.

- I correct the usage of the new technique or idea through practice. The third step is to present students with examples to work through that illuminate common misconceptions, their particular misconceptions, and their oversights. I like to present examples designed to illustrate the common misconceptions in the later problems on a worksheet and address individual students with followup questions. At this time, I try to convey enthusiasm for mathematics.

- After this, I like to force the students to apply the new technique or idea outside the controlled setting. The fourth step is to present students with applied problems and ask them to present detailed written solutions. This is often in the form of a group homework assignment. Here students need to see how the techniques they have just learned might be applied to the real world and when they might apply.