Teaching Philosophy Statement

As a Scientist, I Observe:

In my career as an immunologist and microbiologist, it is my observation that the best scientific practice is simultaneously independent and cooperative. Each member of a small group comes to a common problem with their individual hypothesis and experimental approach, but then all involved come together for collaborative analysis and decision-making. Contrary to this best practice, it seems the traditional and didactic method of biology education, where largely abstract lectures significantly precede the practicum of laboratory classes, all too often selects for students who excel on their own, working in a vacuum. Through my own experiences as a student, mentor to undergraduate researchers, and scientist, it seems clear to me that the typical educational methods often fail to prepare future scientists for the realities of a career in the lab or field. Even more disparaging, this classic mode of life sciences education usually offers non-majors little more than trivia, when the rigorous scientific processes of thought, application and analysis can be of use to practitioners of many fields.

From Observation, I Hypothesize:

In my time as a student, I have served as a teaching assistant and worked as a peer tutor. In my professional career I have taken the role of trainer and mentor to both new employees and undergraduate students. In review sessions, tutorial meetings, and chalk talks, my students have often asked what I now consider a most revealing question: "How?" *How* was some core principle pieced out, *how* is some particular classroom example considered relevant, *how* do I know which concept drives the model at hand? When I provided the answers, my students responded best to a combination of historical fact, technical process, and parallel example. But when I applied an active learning technique and turned the question back on the students to solicit *their* thoughts, I helped generate a longer-lasting, deeper grasp of the material. This leads to my hypothesis: I can provide a more useable, and more enduring, biology education. I can create an educational experience where broad concepts are applied to concrete examples, one that allows students of any stripe to investigate and to learn. I propose that I can guide my students, both as individual students and in small groups, to learn to apply the methods and mind-set of science to almost any problem at hand.

And Hypothesis Drives Approach:

Admittedly, the settings of tutorials and reviews are significantly less formal than the classroom, where the sometimes stiff and often hesitant instructor-student dialog can hamper someone from publicly owning his or her lack of comprehension. And promoting a cooperative group work ethic and practice is by far easier in an advanced upper level course than in a large introductory section, even with the aid of teaching assistants. Hopefully, by fostering a more comfortable and exploratory atmosphere, with questions asked and answered from both ends of the classroom, I can help develop my students' thoughtfulness and desire to learn. Additionally, by my establishing small groups for both discussions of class material and collaborations on assigned projects, my

students can learn the lessons of social construction of knowledge at a markedly earlier stage in their academic careers.

For both better and worse, the classroom is not the same as the laboratory, and benchmarks of success are by necessity different. But, lecture and practice can be better integrated, so that working on one set of lessons more effectively strengthens the students' grasp of the other material. Discussions in both spaces can be shaped directly by student suggestions, so that together we can explore the principles and limits of their current understanding of biology. Examinations and assignments can be structured to measure the students' ability to apply their hard-earned knowledge to novel problems, rather than to simply demonstrate their factual recall. And classroom group exercises can be designed so that students' individual reports are weighed as meaningfully as their collective end result. In these ways, changing the methods of class assessment is as critical an element, and as useful a tool, as altering the structure of the instructor-student relationship.

Given a supportive atmosphere, and interactive and passionate instruction, I believe that any student can walk away from the study of biology with lessons that will serve them well, whatever their future endeavors.