Statement of Teaching Philosophy

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My classroom should never be silent.

I find learning works best in a collaborative manner, whether the instructor is asking the questions or the student is asking the questions. As such, I ask as many questions as I can in an effort to encourage my students to think about the material. These questions come out in the examples at the front of the classroom and in the written problems that the students are asked to do individually or in small groups. I also encourage the students to ask questions. They will interrupt me to ask questions when I am speaking, feeling comfortable with this because they know that all I will do is answer the question. Sometimes, confusion reins in the classroom and I am interrupted with a question halfway through a step, which makes answering the question difficult. Today, I managed to answer such a question simply by finishing the step, which made it clear that I had not been entirely clear about what I was doing prior to beginning the step.

Often, I will begin a topic by running through an example. Depending on the level of the class, this is followed by highlighting of the key concepts in generality or possibly a full-blown process on how to solve a similar problem, including these key concepts. When the example is completed, and several times during the example, I will ask for questions. My recent experience indicates that there are always questions. If it's apparent through questions that most of the class would like another example, I will do another example. If this does not seem to be the case, I have problems for my students to work on individually. There are always more questions as students realize exactly what the problem is asking for, and possibly that they were not understanding the right part of the explanation of the example. Sometimes, when there is only confusion, it is necessary to go over the solution to the problem on the board; the struggle between the problem and the solution seems to help my students learn. Sometimes, it is only necessary to go over the answers. This seems to depend on what day it is rather than any kind of more reliable predictor.

One predictor of how a class will learn is how they have performed in the past with me. I spend the first weeks of the semester getting to know my class and what they want from this class, and what they expect from it. I would like to get all my students to the point where they can approach a novel problem with poor wording and little information, refine the problem to something well stated by making assumptions or asking clarifying questions, apply the mathematical technique they learned in my class with no prior knowledge that this technique would be required, and present the solution in a way that is understandable to the person or group that needs it. This is what I would expect from a graduating math major. Unfortunately, in the core math sequence I do not get very many students who want to reach this point, and I have come to the

conclusion that most of the time I do not have enough time to get my students to this point. As such, I must prioritize the learning that I ask of them. At the very base is the pure mechanical process of solving the problem. My students cannot succeed in my course if they cannot master this. Depending on the pace of the course, the prerequisites, and the aptitude of the students, to name a few of the variables, this may be as far as I'm able to take them.

The process is not the end of the road as far as learning is concerned. By itself, it does little good. A student should also be able to apply the process, so some of my class time is spent on learning where to apply various skills. This is essential if my students hope to use their knowledge once my class is over. I find that often my students only care about this in so much as they can recognize the problems on the exam. This attitude seems to be very common in the core math sequence I have been teaching for the last few years, but fortunately decreases as the courses grow harder and the students taking the courses have more aptitude for the subject.

Being able to use it and apply it is not enough. I also ask that my students be able to communicate the ideas and concepts of the math course. This is done through graded events. At a low level, on every homework, quiz, or exam, a student is being asked to communicate ideas. I have frequently gotten assignments where various steps are jotted haphazardly anywhere on a page, and this does not communicate the ideas. To organize their work on written assignments is the first step in the communication, but only the first step. I also give larger assignments, projects, which require fully articulated phrases, pages of text, asking my students to write as if someone unfamiliar with the concepts is reading their report. These are often a pleasure to read, but I cannot take full credit for the development. At the military academy, the building of these projects takes place over the entire core math sequence, and these students have been trained in the writing of mathematics. Also, we have been experimenting with oral reports, which is much more intense for the students. With the combination of written and oral projects, they are more able to show their understanding, and relay information. I do think this is important, and hope to continue to use similar projects in the future.

Collaboration is key on projects, and often I ask my students to submit a group assignment. However, I think it is also important to have individual submissions, and so I will assign a shorter, written homework. I find that students are more able to judge how much practice they need on a particular topic when the answer, in the form of the instructor or a fellow student, is not readily available. In this way, the homework serves a dual purpose: to allow the student to practice individually, and to show a student whether they need the practice, or not. Neither of these can be accomplished in the short hour I have in the classroom. I find that more practice is better. A good student will be bored doing the same kind of problem again and again, but it will not take much time. A struggling student, however, needs all the practice he or she can get, and

the assignment will take a lot of time, but it is time that he must spend to master the technique. Unfortunately, grading is not my favorite activity so I assign less homework than I probably should.

Many of my students do not like the assignments I do give, because I will frequently ask them to do a problem by hand when they know how to do it much faster with Mathematica. I do think that technology has its place, even in the classroom, but I also find that an over reliance on technology detracts from learning. One of the problems I have is in trying to teach a class how to use Mathematica at the same time as I am trying to teach them a math concept. The conceptual understanding of "What is an integral?" is not portrayed in learning to enter an integral into Mathematica, and in order to use the concept one must have a conceptual understanding. As such, I find technology to be less than ideal, even though it is useful, especially for many of the statistical values that were previously only available on tables. I am still struggling to teach in such a way that technology is a tool which does not become an unnecessary crutch.

The use of Mathematica in the classroom, like in-class exams, is something that is asked of me by my department. I find many of the procedures asked by my department to be valuable, and I find many of them are just procedures that I will follow when they are asked of me, but follow different procedure if I have the power to choose. In following these procedures, I am sometimes surprised at which category they fall into. One procedure that seemed to be less valuable but I have found to be a blessing in disguise is the way that grades are assigned here. The department head must approve all grades on an exam, and he is the only one that can assign final grades (although he usually follows the recommendation of the instructors). I thought this was a boring, time-consuming, and worthless step, but it allows me to interact better with my students. My personality is such that I want to help my students, not punish them. I want to be mom. Low grades are frequently seen as a punishment, and I am able to divorce myself from that aspect of teaching. I tell my students that they must demonstrate to the department head that they know the material, and that I will help them as much as I can, but the blame must lie elsewhere if they get a poor grade. This allows a closer relationship with the students.

The relationship between teacher and student is important, as is the relationship among the students. I always encourage the students to talk to one another outside of class, and answer each other's questions in class, and I am available as much as possible outside of class. I don't like giving in-class quizzes because I feel it takes away from the time the students have dedicated to working, as a class, on learning. With a graded assignment, I feel I am testing the current knowledge so I cannot answer questions, and questions are an important part of learning.

My classroom should never be silent. Silence doesn't help my students learn.