Teaching Statement

Steven Kay Butler

Teaching requires a balancing between giving students enough knowledge and interest so that they have the abilities and interest to learn the material but not losing them in minutiae by trying to explain too much or stretch too far. A good teacher is thus as much a guide as a good instructor.

Over the last ten years I have enjoyed various roles of instructing and I have found it both stimulating, exhausting, awarding and frustrating. In the end, I have found that the style of teaching that works best is when the students are most involved in the process. This requires some patience as the pace of instruction will be slowed, but it is better that a student understand basic principles well than that they don't understand advanced principles at all. Once a student has become invested in their own learning than the end result will be improved.

Teaching background

My first experience with teaching came as an undergraduate where I worked in the "Math Lab" at Brigham Young University (BYU). This was a large lab where students from any math class could come for assistance in their math classes from the math lab TA's. I started working there as a TA my sophomore year and continued through to graduation often working 20-30 hours a week answering questions ranging from basic algebra to calculus to linear algebra and advanced classes.

The more I worked with students the more I came to realize two basic principles. The first is that students who seemed to struggle in calculus did not have major problems with the calculus part but had a hard time doing the basic algebra. The second is that if a student understands the basic principles behind a rule they are better able to apply the rule. This molded the way I worked with students. First, I started emphasizing being careful with the algebra and the basic rules of algebra. Secondly, I did not just give a solution I gave an explanation of the rule, why it works, how it works, and where to use it, then we would work through the solution together. After adopting this process the students responded positively and improved in their coursework.

After earning my undergraduate degree I immediately started work on my Master's degree at BYU. During those two years I taught trigonometry three times, and differential calculus and integral calculus each once. The trigonometry class was exciting because I was *the* trigonometry instructor at BYU for a year and a half. I got to completely design the class and the curriculum. One of my first decisions was to supplement away from the textbook, while the textbook had wonderful pictures and many great problems and examples it often lacked in motivation. From my TA experience as an undergraduate I found that if a student understood a rule then they were more likely to use it correctly. So I developed a set of supplementary notes to the course that over the year and a half grew into the length of a small book.

The other major decision was to minimize the amount of repetition in the homework. Many problems seemed to be rote and I discovered that there is a quickly diminishing rate of return on multiple problems that apply the same technique. Instead I chose to focus on assigning a few problems that focused on the basic techniques but often would require some small marginal additional thought. I employed similar techniques when it came to writing the tests for the course. I found that a well written test problem is one that is based on the principles taught in the course but still is new enough that the students have to give some

thought on how to proceed. I strived to maintain many of these same principles on tests and homework for the calculus courses I taught at BYU. It seemed to work to good effect and my teacher evaluations were consistently some of the highest in the department. (This, even though I gave the most challenging tests, though it might be a reflection in the occasional donuts I brought to the class.)

After BYU I did my doctoral work at the University of California at San Diego (UCSD). During that time most of my teaching responsibilities involved running sections which supplemented the professor's lectures by giving chances for students to ask questions regarding concepts and homework. I did section for several levels of calculus, differential equations and dynamical systems. One of the things I discovered is how to tailor the message to the audience. For instance, a low level calculus student does not need to know the precise definitions and details of limits that a higher level calculus student does (of course both should have an intuitive understanding).

Beyond trying to answer questions I wanted students to understand the principles that were being taught and how to apply them. Thus as we would work through problems as a class I would frequently emphasize important points, places where students commonly ran into problems, and would ask for the input of students of how to proceed.

Occasionally at UCSD advanced graduate students are given the opportunity to instruct a college algebra or beginning calculus course. During the winter quarter of 2007 I had the opportunity to teach a beginning calculus course at UCSD. I was able to take the tools that I had developed through my background and was able to construct and lead the course. The students responded favorably, very few dropped out and at the end of the quarter I again got positive reviews from the students.

Future plans for teaching

Some of the most enjoyable time I have spent is working with students. I have found that most students are looking to truly understand the material and it is a matter of giving them the right direction which leads to insight and understanding, grades then become of secondary importance to learning. As I continue in my career I want to stay involved with students. I believe that a good teacher is one who can be clear in the ideas that they espouse, and these are also some of the indications of a good researcher.

As I teach I will continue to focus on getting the student to participate, and do my part in presenting the material in a way that can be understood by the particular student. As the student begins to understand their own excitement will help further them in the process of learning.

I look forward to my future opportunities to teach.