

Teaching Philosophy

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I've spent all but two terms during my career as a graduate student working as a teaching assistant (TA) and during that time I've done a lot of thinking about the methods and goals of mathematical pedagogy. The philosophy I've come to embrace is a pragmatic, student centered attitude toward education. Ultimately, the standard against which any teacher should be measured is their contribution to overall student welfare and academic progress. This may seem uncontroversial, even clichéd but I think taking the responsibility to serve student needs seriously leads to conclusions that are orthogonal to, or even in tension with, conventional mathematical pedagogy.

One obvious, and uncontroversial, application of this principle is to avoid assuming that non-majors need to learn the same things that a math major would. Those TAs and professors who insist on approaching freshman calculus as if it was the first couple weeks of a real analysis course are doing their students a disservice. However, it's actually the other direction that I feel is the greater danger in practice. While it's hard not to notice your going way beyond the classes comprehension level, it's easy to unthinkingly pass along the same material you learned as a student. Emphasizing rote techniques of little to no use your students creates the illusion of education and may even improve your recommendations but, it is just as much a waste of student time and energy as inappropriate insistence on rigor. It doesn't matter how great your pedagogic technique is if you are using it to teach the use of sliderules.

Of course since teaching is a pragmatic discipline it is rarely appropriate to make a sharp, dramatic break with the standard material. Instead of eliminating things like the more arcane techniques of integration an instructor can instead place less emphasis on them and more on things like computer algebra systems that will be of greater practical use to these students. More generally an instructor can minimize the cost in student time and effort spent learning applied techniques by allowing students access to books and notes during exams and using time pressure to ensure they can solve similar problems quickly in the future.

Besides encouraging careful choice of material, a focus on student needs argues against shortsighted focus on test performance. Ultimately students are better off if they gain the ability to learn on their own and manage their own time by the time they graduate college. Thus, while students in first year courses should be incentivized to work and study with grade boosts from homework and quizzes by the time they are seniors they should be managing their studies without grade based incentives. However, the integrity of the grading system requires that students demonstrating sufficient understanding be given good grades. Thus homework and other 'effort' based grades should only be able to help, never (directly) hurt a student's grades.

This brings us finally to the subject of interaction with students. Since this is ultimately a pragmatic question it is difficult to make many general statements about it. My experience as a TA has been that different classes responded best to different approaches with some classes working well when split into small groups and others preferring a more traditional approach. One constant factor is that the primary barrier for most students in mathematics is the belief that they won't be able to solve the problem on their own. Thus, as an instructor it is as important to convince students they are smart enough to solve the problems as it is to teach in any particular fashion.