PROFESSIONAL DEVELOPMENT WORKSHOP · SPRING 2006 · ASSIGNMENT 14

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Compare/contrast the students in your current class with those in your fall semester class. Things to consider include, but are not limited to, background skills, academic maturity, attendance, willingness to work.

Twenty to thirty people is a small sample size out of a large and diverse undergrad population. Most of the differences are, I think, attributable to that. One noticeable difference, though, is that somehow there is no one of whom I am suspicious regarding plagiarism. I still keep my eyes open while proctoring exams, but last semester there were several people who I immediately distrusted — this semester, there aren't.

Compared to last semester, what changes did you make in the way you teach? This can include major philosophical shifts, subtle tactical nuances, and anything in between.

A philosophical shift is that I am less uptight about getting the students to understand everything. E.g. last fall, I thought, "They have to understand all about logarithms because there's an exam coming up!" Now, having seen a semester all the way through, I know the students can fail to grasp certain concepts and still survive the exam, the final, the rest of the undergraduate career, and the rest of their lives. If nothing else I want to encourage good calculator skills, along with an appreciation for the limitations of calculators. I still have high hopes for all of them, and for the kinds of students who do ask thoughtful questions, I'm as excited to help as I was at first. But I've learned to "let go". I want to give each of them as much as they want and need, hopefully with something interesting and/or useful they hadn't expected along the way.

The biggest change (as I discussed in assignment 10) is that I'm making the course homework-driven. Selecting the homework is the center; my lectures are designed to tell them how to do the homework; in-class exercises are practice homework; quizzes and exams mimic homework problems. I don't want to give them anything on an exam that isn't similar to something they've done and that I've graded and returned to them.

How have you grown as a teacher this year?

Foremost, I have a lot more growing to do.

When I started teaching, I was deathly afraid of an out-of-control classroom. I've achieved my goal — my classroom is completely under my control. I overdid it, and people don't talk much. I need to find a happy medium and be less intimidating.

Peer observations gave me the feedback that when I ask the students a question, sometimes my body language indicates that I don't look like I really want an answer — that I'm just counting to seven in my head until I can go on with what I wanted to say anyway. Also I've been told after graduate-colloquium talks that I don't do much direct eye contact — either I'm facing away from the people I'm talking to, or I'm facing *toward* them but not really looking anyone squarely in the eye. This is the number-one thing I'm working on.

Casual conversation and peer observations have shown me that some of my fellow first-years have a lot more rapport with their students than I do. I want to imitiate this, but what works for some of my fellow first-years may not for me. I am *not* these students age; I do *not* have much in common with my students, and should not pretend to. Jan Wehr has become my teaching role model: he is professorial and authoritative,

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yet is incredibly respectful with his students. He manages to communicate well with his students, without needing (or trying) to be like them.

I am feeling a lot more comfortable in my own shoes. I feel like a teacher and not just a pretender. This is true both as an instructor and as a graduate student. I don't need lecture notes so much — I like this. I have lots of good examples, anecdotes, mnemonic devices, etc.

I'm trying to make my exams easier. In particular I believe there should be nothing even remotely clever on an exam for 110 students. The students who don't know the material will miss even the straightforward questions; the ones who do know the material will answer them correctly. That's all that needs to happen.

I'm more aware of my students' inability to generalize. In fact I think this is one of the *primary* differences between a 110 student and a 125 student. I realize that although I see only a few simple concepts in 110, for them there is a welter of concepts, definitions, skills, etc. The rule of four is not just nice — it is *necessary.*

I've discovered vertical integration, or rather, vertical translation invariance: 110 is as hard for them as cores are for me. I acknowledge that we all have our strengths and weaknesses, our accumulated wisdom and a much larger sea of unknowns in front of us. This second semester, I put even less emphasis than before on "here's the wisdom; the answer is . . . " and more on "here is how a person could actually know and remember this." Why? Because that's precisely what I want (and often don't receive) from my own professors.

To *do* something, you just need to know the *right* way to do it. To *teach* something, you must to know *wrong* ways to do it — the more wrong ways, the better. Every student mistake I witness gives me more info about how other people think of things, how they remember things, how they solve problems.

I'm making more time to put positive written feedback into my grading (as I discussed in detail on assignment 12). I've believed in positive feedback always, but sometimes last semester I graded very tersely. Two auxiliary facts are that I'm not as panicked as a grad student, so I have more time, and that I have 18 students rather than 30, so I have more time per student.

Last, I'm making some efforts to make my class not just a math course, but a bit of a liberal-ed course as well. Now, this *is* algebra; I need to spend 95% of my time talking about math. This semester I feel like I'm beginning to be competent as an instructor; I don't feel like I'm just barely surviving (although my spring student evaluations will be the judge of that). I want to connect what I'm doing with the rest of the students' education. I do this in four ways:

(1) I talk about units of measurement. This is in part because this is something that pure-math people tend to leave out. The equation $y = 2x + 5$ is wonderfully abstract, and is broadly useful *because* of what's been abstracted out — we can't tell if it involves gallons, miles, light-years, or what. Putting the units in gives us the chance to (1) set up the problem correctly, in terms of getting the units to match on both sides of the equation, and (2) interpret our answers correctly. E.g. if the answer to a problem is $x = 10$, then ten of *what*? This connection is necessary for the students to sanity-check their answers. Also, units are necessary for the students to be able to successfully use algebra in their science courses, where *all* numbers come with units attached.

(2) I make occasional references to trig or calculus — some of my students are currently taking trig, and some soon will. While talking about odd and even functions, there is no harm to most students (and there is a benefit to some) in taking a few seconds to mention that $\cos(-x) = \cos(x)$ and $\sin(-x) = -\sin(x)$. Likewise, when teaching function decomposition, it's worth stating that the (only) reason decomposition is on the 110 syllabus in the first place is because it's a crucial prerequisite skill for the chain rule. I want to make some connection to rest of the curriculum, to the idea that there's a bigger story here, delineating what parts of the story are told in 110 and what parts they'll be seeing elsewhere.

(3) Both semesters I've given 10 minutes or so on the history of logs: in short, logarithms were every bit as important to the Enlightenment as the transistor was to the 20th century. That's worth knowing. Also, the

reasons logs helped facilitate hand computations are the very same log properties that 100 students need to know. So here, I kill two birds with one stone.

(4) I make reference to career issues, e.g. do most people solve formulas, or make eyeball estimates via reading spreadsheet graphs? For most people in most careers, the latter — but we *do* need to know how to create and interpret graphs.