

The crest of the hill

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I am writing a book based on the material I have been teaching for nearly twenty years in a one-semester course at Vanderbilt. Here the title and contents of the book do not matter so much as the thoughts that emerge during the effort. This essay has two parts. The first part consists of two paragraphs that will land in the Acknowledgments of the book. These paragraphs provide an ideal set up for what I really want to say in the second part of this essay.

In writing a book of this sort near retirement, I find myself reflecting on nearly forty years as an academic. Without doubt, I have been quite fortunate to be a university professor. Nonetheless, my adventure followed a path that twisted and turned in many unexpected directions. It seemed always to be going uphill, perhaps exacerbated by an unshakable demon — my personal version of impostor syndrome. I have not reached the crest of my hill. Yet the vista is clear. I can claim two immeasurably satisfying scholarly achievements: a deep understanding of certain topics that I studied and wrote about; and an eventual self-awareness that I had cultivated a strong, unwavering commitment to being a good teacher for our students.

Amidst the twists and turns, one element remained steady: the delightfully refreshing perspectives of students. I thrived on this. I thoroughly enjoyed their cheekiness and willingness to banter intellectually, whether in the classroom or in one-on-one discussions. Sometimes these conversations consisted of a give-and-take of ideas bent toward my encouraging the students to think about things more clearly and precisely, occasionally helping them unlearn misconceptions from their earlier work. But sometimes these conversations bent toward me realizing that I needed to think more deeply about my own understanding of things. It is therefore with sincere gratitude that I say “Thank you!” to innumerable students who made me happy — students who made me anxious before each class because I wanted to do a good job.

Here is the part that will not land in the book.

The course material is centered on developing a style of thinking for using physics and mathematics to describe how Earth and environmental systems work. By standards of courses in this area of study in Earth science programs, the physics and mathematics are intimidating for most of the students. For many the course is their first experience in actually using physics and mathematics to formally describe real stuff. But by standards of physics and applied mathematics, the material is not difficult. It’s calculus stuff — differential and integral things, a solid initial immersion in the language of differential and partial differential equations centered on principles of conservation, and a wee bit of probabilistic methods — all presented in a physically based manner such that the students do not necessarily fully appreciate the extent to which they are doing real calculus stuff until it’s over.

But here’s the thing. It’s one thing to performatively coach students through the physical meaning of the mathematics of a problem using a classroom chalkboard. It’s quite another to write

it out in a textbook sitting alone in front of a computer. This is stuff I have for one reason or another done hundreds of times. Certainly there is satisfaction in practicing the art of writing in an informative manner, confronting the challenge of developing clear themes in a way that at least in part replicates the classroom experience. And I never tire of the profound beauty of the mathematics, particularly when I view it in the context of an emerging philosophy — first suggested by Eugene Wigner and Freeman Dyson among others — that physics and mathematics are in fact the same thing. But there is a real element of tedious slog in writing the book — the umpteenth repetition of the physics and mathematics presented in the course, despite fully appreciating the importance of illustrating to the students the value of embracing this foundational material as a solid launching point for their further studies. This, then, is in contrast to the thrill of teaching the material and experiencing the deep satisfaction of watching student light bulbs flash on in real time during classroom lectures or in one-on-one conversations, or having my own flashes inspired by such conversations. The delight of engaging students in sidebar discussions regarding the history and philosophical basis of key physical and mathematical concepts, and their relevance across a great number of seemingly unrelated fields and topics. The sense that magic is occurring as the material invariably becomes as fresh as ever in this setting. This experience cannot be duplicated in any other form. It cannot be elicited from writing. It ends when I put down my piece of chalk.

I now see the crest of my hill. And when I glance back at the adventure, I see my path inextricably interwoven with those of students.