Teaching Statement for E. Jason Riedy

CV: http://lovesgoodfood.com/jason/cv/

My teaching experience is not vast but it is varied. This statement is more free-form and autobiographical than philosophical. Different classes have needed different approaches. If there is any guiding philosphy, it is to empower the students.

Unfortunately my graduate school experience is in the far-ish past but may be amusing. I was the teaching instructor for UC Berkeley's CS267 (introduction to parallel computing) twice. The first time I assisted Bob Lucas and David Bailey. The second I assisted Kathy Yelick, and Bill Kramer was a student. If you know these names, you will be amused and realize that these were not *typical* experiences. Neither are the rest.

1 First Experience

Once I left UC Berkeley, I was in coal country for family reasons. The place where Virginia, West Virginia, Tennessee, and North Carolina meet was, for me, eye-opening. Coal and tobacco and health care country. The two educational concerns were trying to make do and trying to get out.

I was adjunct faculty in mathematics at Virginia Intermont College. I was hired because one of the two mathematics faculty passed away suddenly. I had to construct two courses given only the textbooks. The other faculty member in mathematics was saving up enough for their next through-hike (Appalachian trail). After we left, Virginia Intermont lost accreditation and went bankrupt. Some pieces were bought by King College, and others still are for sale. The general geographic area is more complex than it appears in headlines. That became clear from my students as many things do.

I taught two classes. The larger was the only required mathematics class in most areas. The students almost all were seniors expecting to graduate. The textbook I had included such topics as adding fractions. The students could not translate "on sale for $X\%$" into algebra or even arithmetic. This was and hopefully will be my most difficult teaching position. I kept this class in fully tradition lecture format; anything else would have terrified the students. Two of the three days in the week covered the textbook in a somewhat accelerated manner. On Fridays I went into more detail. I explained the history of what we covered trying as well as I could to emulate Eli Maor's light but thorough style. Supplying context seemed to help, and the students were comforted learning that hundreds to thousands of years came before the few sentences in their textbook. Textbooks relay history in the shortest possible way. History itself meanders as people meander. Seeing that history, particularly in their region, made the facts easier to remember. Not all students progressed well. The class's grades did fall along a perfect bell curve. And I received the best compliment from a student that I consider possible: "I'm no longer as afraid of math." (Class materials still are available at http://sonic.net/~jriedy/VI/math131-f08/.)

My other class was mathematics for future elementary school teachers, required for their certification. I had two students. Neither went on to teach. There were few to no children of elementary school age where they lived at the time (decently outside Bristol). With two people and knowing their situation, we could wander a bit. I explained that "elementary" is not an insult; "elementary" means built from known elements. If I recall correctly, that was during our third class. The tone changed immediately. I admit that I used these two students to discover approaches for the larger class. I explained the Pólya's problem solving principles. I explained the Peano postulates, first with stacking rocks and then with bags. I also remember going on a tangent during the logic portion and explaining how half- and full-adders function. Neither student is in a position where this knowledge has immediate impact (according to our social network connections), but the look in their eyes had immediate impact on me. (These materials are at http://sonic.net/~jriedy/VI/math202-f08/.)

People want to understand. Sometimes they sublimate this desire for immediate needs.

My personal lessons from this experience:

- Lectures can be comforting in their structure. Throwing young students into "flipped" classrooms could make them tune out. But introducing those ideas (a.k.a. "come to the board and show your work" in a more friendly manner) hopefully could build their confidence if managed well. Much of this is playing the audience.
- History provides perspective. Ideas are not magic. They come from effort, much more effort than a homework assignment. Understanding may require centuries the first time. Having a few days' confusion is perfectly fine.
- Alas, in the larger required course, I had to partition students into those who listened and those who did not.

- Explaining that mathematics (and computing) are inventions of **people**, and showing *how* they were invented changes students' views of the world.

2 Second Experience

Since Virginia Intermont, I've filled in as a guest lecturer in classes. That counts even less than does being a teaching assistant. But I also started two undergraduate research classes. One involves honey bees (since 2015) and the other involves novel computing architectures (since 2019). My research statement goes into more detail on the research / application side.

For background I funded myself through my undergraduate years at the University of Florida with a 50% appointment as a system administrator (long before Windows and "dev ops" were concerns) and two 25% research appointments. One was with Dr. Timothy Davis on sparse direct methods, and the other was with Dr. Joseph Wilson on parallel computer vision and programming languages. I do not consider research separate from education even for undergraduates.

The structure provided by the Vertically Integrated Projects (VIP) system at Georgia Tech is quite interesting. These are multi-year and multi-disciplinary teams providing undergraduates with research experience while also accomplishing research goals. That does not happen immediately. But over time students stay with a project. Those students guide newer students. The team builds institutional memory. And the students learn that research is not an instant process.

For the honey bee project, BeeSnap, exposing computing students to biologists' field work is eye-opening in both directions. Computing students often only see data sets and not the process needed to obtain them. The biologists see computing as application and not as development. And then add in the other majors who have been involved (civil engineering, environmental engineering, public policy, chemical engineering), and everyone learns about much more than honey bees. Projects include citizen-science phone apps, IoT instrumentation of bee hives, 3-D printing for native bee habitats, GIS analysis of pollinator-friendly trees, field work to sample bee interactions, and more.

This particular class demonstrates the importance of not being *typical* computing for STEM outreach. We have had semesters with only women students. We always have underrepresented minorities. Students are invited to participate in local maker fairs and science events.

My other research class began recently, in Spring 2019. The class's focus is building around the CRNCH Rogues Gallery (see my research statement). This is a very *typical* computing research class. The contrast in involvement already is stunning. However, this class has attracted funding from Sandia National Lab and interest from many in industry. We have *undergraduates* excited about quantum computing, analog devices, and hardware migratory thread architectures.

My personal lessons from this experience:

- Be patient. Students have their own goals. Unpaid undergraduates in particular likely have no reason to obey your needs. And you can learn much from their directions and interests.
- Students know more than you about the current tools. Roll with it. They feel more invested when they can choose their own tools, particularly when they bring other students up to speed.
- *Applying* computing to the world appears more interesting to underrepresented groups. This may have grown from many reasons, but we can use the observation to *learn* those reasons and address them.
- One outstanding issue with the VIP structure: How do you give credit in published results? Not all students will check their "forever" e-mail addresses, so we may not be able to contact them for publishing permission. I do not have a good answer.

3 The Next Experience?

For large classes, lectures are a good base format. But the students still need some sense of ownership. Team projects and presentations *to the other students* help build that personal investment. People with inter-personal issues (like myself) may feel extra pressure. Be aware and willing to assist. Often students will not voluntarily show up to office hours, so set up a fixed and required schedule if possible.

Small classes allow much more rapid interaction. The "instructor" must read the people and their backgrounds. Some students will feel out of their depth even when the technical knowledge is relatively easy for them. Providing support is as important as providing a venue for being individual. Not everyone reacts well to invitations to group dinners for example. Be cognizant and adaptable. Sometimes a "group" trip to a book store (if one still exists) would be more welcome. Or a performance / concert / movie.

Medium-scale classes are tricky. They could be treated as lecture plus small groups, or as an over-arching lecture with larger project groups. At some point, let the students decide. Then they are in charge of themselves.

As I was told by Prof. Kahan at Berkeley, "[a] student's job is to teach the teacher." I'm still learning and do not want to stop. I look forward to what I learn and can impart from my next experience.

I'm going to end this with a question. And I want to know the answer for my own future plans. Who is reading this? I know who reads the statements where I am, and the count is far too low. Setting down these words proved important to *me*, so this ultimately serves its purpose.