A Classicist's Turn toward Science

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Some things never change. I've never been good at math. Not now, not in high school. I managed to get good grades in math, but largely because my father happened to double as a physics professor who could teach trigonometry to an orangutan. On the contrary, by the 9th grade, although I was interested in astronomy, I was overwhelmed with the humanities. While chemistry and geometry were mere trades, I found gripping joy in Shakespeare, the wives of Henry VIII, the psychosis of Poe, the heroes of various revolutions, the perpetual pillaging of Alsace and Lorraine. A glance at my bookshelf proves that these topics still capture my imagination. Some things never change.

But some things do. I'm not an historian, but an atmospheric scientist. How did this happen?

I suppose that through the 10th grade, I had not realized that something important was missing from my educational experience. I say my enjoyment of the humanities was "gripping," but unfortunately that is not a literal usage of that word. I now understand that while these topics are entertaining to me, they are not tactile. I cannot touch them, open them, perform experiments on them, or marvel at the mere idea, much less the act, of observing something that no one else has ever observed. These experiences are, however, inherent in scientific disciplines, but I did not truly begin to appreciate them until the 11th grade, when I enrolled in the Central Virginia Governor's School (CVGS) for Science and Technology.

When my turn at CVGS began, the Cold War was just over and the Berlin Wall newly crumbled, a very different George Bush was president, we carried neither cell phones nor iPods (heaven forbid!) though many of us still used Walkmans and listened to cassettes of our favorite hair bands from the previous decade. It was long before the days of Facebook, Youtube, and even before simple e-mail and internet were common in schools. The fact that CVGS had, as any good science and technology-focused high school should, put itself at the forefront of such newfangled technological sophistication would become critical in my later academic success in college.

I was unprepared for what awaited me at CVGS. One month before the school year began, we were herded into vans and driven to the Virginia shore for an orientation of sorts – three days of environmental and biological data collection on beaches, and from the sides of various watercraft. This was a "jump in and see if you can swim" situation (literally, in some unfortunate cases) and required immediate use of instruments and techniques I was completely unfamiliar with. I had no idea what a turbidity meter was (or turbidity, for that matter), I did not know what *Spartina patens* was, much less how to identify it, and I did not know how to harness a seine net.

The CVGS teachers, while kind and supportive, were not anxious to hold our hands and give detailed instructions in these matters. "Try it yourselves," they said. And we did. In fact, the standard answers to just about any topical question I asked of a teacher at CVGS were along the lines of, "I don't know, Jeff. What does your Materials and Methods section say about that? What can you find in the search index? Do you think you might discover something if you press some of those buttons?" I say these things not as criticism, but out of appreciation, for two reasons: 1) one is at a decided disadvantage if one carries to college an over-reliance on teachers who spoon-feed answers and teach science purely out of textbooks and 2) while classroom learning is

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important to training young scientists, there is no substitute for hands-on experience.

Who among us has ever been inspired by a physics textbook? How many scientists were first enchanted by their discipline while scrawling equations on a dry-erase board? Moreover, I have had some great science teachers, and they were not great because they could deliver an inspirational and stem-winding lecture on topics like island biogeography or angular momentum. A great science teacher not only has enthusiasm for a subject, but enables hands-on learning with available technology, learning by tactile and visual experimentation. This provokes the mind to new ideas in a way that a typical classroom lecture experience cannot, and can inspire a sense of wonder, independent learning and self-confidence from which a young scientist might someday spring. This started for me at CVGS and carried me through my experience as a teaching assistant in graduate school.

Some of the more fantastical things I experienced for the first, and perhaps only, time at CVGS include using time-lapse exposure to photograph light pollution, programming a robotic arm to pick up random objects, using an electron microscope to view onion cells, separating plant phytoliths from soil samples using a centrifuge, building a bridge out of popsicle sticks and applying stress until it shattered, piecing together a documentary using a video toaster, and using laser technology to produce a hologram.

Some of the less fantastical, but perhaps more important, things I experienced for the first time at CVGS include typing a login name, composing and sending an e-mail, cutting and pasting text on a word processor, joining an on-line discussion group, manipulating a spreadsheet, using desktop publishing software, saving documents to a disk, the heart palpitations and cold sweats that ensue when your computer fails and you realize you have neglected to back up the document you were working on, using a database to search for a specific article and then properly citing it in a research paper. And it must be said that our home high school peers, despite having excellent teachers, did not experience this same level of hands-on, technology-based learning as I did.

My experience at CVGS has been essential to my early career in science, considering it was my introduction to developing research methodologies, collecting and processing data, writing research papers, using spreadsheets and other computer software, learning to appreciate the joy of observing natural systems in something akin to real time, cultivating a healthier sense of skepticism. But it was not simply learning new ways of thinking and the experience with computers and other technology that really placed me at an advantage. We had a faculty that knew what they were doing. The atmosphere, curriculum and general approach to learning at CVGS were fundamentally collegiate.

There was no ringing bell to indicate the start of class, no one was constantly watching us although we were encouraged to make constructive use of our time, we were more likely to be encouraged to touch and use things than be told not to touch them, no one kicked us out of the computer lab if we were there after normal school hours. We were given syllabi which we were expected to follow, and this was our primary means of learning the due dates of assignments and the material we were responsible for. No one reminded us of what we were supposed to read, by when. During my first biology lab session, Dr. Cheryl Lindeman made some introductory remarks before getting to the task at hand, and asked the class what "CHNOPS" was, the answer being Carbon, Hydrogen, Nitrogen, Oxygen, Phosphorus and Sulfur – the six most important elements in biomolecules. We would have known the answer had we done the first reading assignment. But alas, not a single one among us had, because we had no idea what our syllabus was for. Her question was met with solemn silence. One student finally raised a hand and said, in all seriousness, "you mean, like, *peach* Schnapps?" This class of high-caliber 12th graders, many bound to be valedictorian or salutatorian at area high schools, could offer nothing better.

It was embarrassing, but a lesson was learned, and better learned in high school, I think. I was surprised by how far ahead of the game I was when I started college. I knew exactly what to do,

was better prepared than those around me, and was still ahead of the curve by the time I had declared a major (environmental science) and was taking laboratory courses. How sad to see so many pre-med and engineering students having to switch over to the history department because they were left behind during their first semester ("Test? We have a chem test today?" was a refrain heard frequently in my dormitory suite). Without this great, practical benefit provided by a strong science and technology school with a clear intent to prepare students for a more collegiate style, I do not see how I would have been as successful academically in college, or how becoming a professional scientist would have been a natural choice for this amateur historian.