



Finding the Frontier

I am amazed at the efforts that some people take to “push the envelope”— to do something that no one has ever done before. With the elimination of the geographical boundaries in recent time, there is, literally, nowhere on earth to go. All potential record breakers can do is reduce the time, distance, or support needed to accomplish a task. But to what avail? The continued publication of the *Guinness Book of World Records* may be one of the most useless enterprises known to mankind. These days, finding a frontier would seem to be a difficult thing to do.

All of this came to mind because of a class that I have been teaching for the first time this past semester. The course, PSY1000, Adjustments to College Life, is intended to provide freshmen entering Georgia Tech with something beyond the standard two-day orientation. The catalog description is:

Discussion of topics related to academic and professional success including time management, learning skills, career planning, psychological hardiness, teamwork, and leadership.

The course has been offered for several years now. It is intended to increase the retention rate at Tech, where too many students leave after a year or so because they were ill-equipped to deal with the workload. It is not that they are not capable. Their SAT scores are quite good. The idea behind the course was to give the students some information on how to survive at Tech during their first year. It was also intended to introduce them to some of their peers and to meet other incoming freshmen. Unfortunately the course did not live up to expectations. The School of Psychology gave courses that were tailored for the average student. They didn't meet the needs of students from various majors. That's where I came in.

The College of Science at Tech decided that each of its Schools should handle their own PSY1000 course and, for reasons that lie outside of a dedication to teaching odd courses, I offered to give the course. It is a considerably different approach to the conventional exposition of some area of physics or optics. During each weekly class period I have to present an entirely different topic. There are

people on campus that I can draw on for topics such as money management and student “wellness.” The latter topic went into details that I was not aware of until after grad school!

Given this structure, I wanted to give our entering physics students some idea of what physics is all about. Not from a topical viewpoint, (they will get enough of that in their courses) but from a personal viewpoint. What do you do when you do physics? And aside from our innate curiosity about the subject, why do people “do” physics?

After casting about a bit, I decided to ask two of my colleagues here at Tech to talk about how they did their work. I asked one of our younger theorists, Carlos Sa de Melo, and a seasoned experimentalist, Walt DeHeer, to answer some questions, some of which I had dreamed up and others to come from the students. First, I asked my colleagues about how each of them got into physics. Both had interesting stories to tell. In Walt's case, he told of how his early interest in electronics led to being a member of a rock band until the band's instruments were stolen. That ended his musicianship and caused him to enter graduate school at Berkeley.

Most of my questions tended to highlight the factual parts of their physics research. But to my mind, the question that drew the most detailed and thoughtful responses was why do you do physics? The first answer both speakers gave was curiosity. But then as they warmed to the question they both said that the discovery of new knowledge was the most satisfying reason for doing physics. The training that occurs in graduate school and in a post-doctoral position prepared them to understand what is not known. By imagination and effort they are able to make sense of some piece of the world and discover something completely new. Both of my colleagues expressed it in terms of pushing back a frontier.

Although no one is certain that any of their discoveries would be acknowledged by anyone beyond their colleagues, still, for all of us who do research there is the knowledge that for the first time in the history of humankind we have developed a theory or produced an effect. There is no Book of World Records here. Just journals, such as this one. But for many of us it is this sense of accomplishment along with our curiosity that drives us to write the grant proposals, work in the lab, give our conference papers, and write up the manuscript for submission. It is the way we stake our claim on the frontier.

The question is how do we show bright young people the direction and location of this frontier? Students are willing to train themselves to run faster or jump higher, but they need to understand that there are frontiers that they can reach and that there are discoveries out there that they can make. And that instead of amassing hundreds of millions of dollars to perform ever more difficult physical feats, there are frontiers of science and engineering for them to conquer and we need their help.

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