

## Reflections on retirement by Ed Nelson

The physicist Sam Treiman once told a neighbor that the university was about to make him a professor emeritus. The neighbor said, “That’s wonderful! They should have done that *years* ago!”

Teaching freshman calculus is fun, but it poses very different challenges from graduate teaching. A few years ago while grading the final exam, I felt an increasing sense of frustration that I couldn’t articulate. Finally I was able to put it into words: “I’ve been teaching these kids forty years and *still* they don’t understand!”

The high point of calculus teaching occurred on the first day of classes one year. I drew a parabola, found the slope of secant lines close to a point, and took the limit. A student said, “Do you mean that is the *exact* slope of the tangent line? I didn’t know you could do that! Can you do it with other functions too?” I knew that he was not a future mathematician, but I knew he was a future something exceptional. In fact, he was Stanley Jordan (see Wikipedia).

The high point of teaching a graduate course was when I was teaching differential geometry (not my main field). I worked out the formula for the motion generated by the Lie product of two vector fields, involving the limit of following the first flow for a very short time, then the second, then the inverse of the first, then the inverse of the second, and repeating a large number of times. The formula produced a muscular memory in my arms: it was just what you do when parking a car. I went to Woolworth’s, then just across Nassau Street, and bought a toy car to demonstrate to the class, for which I received a sitting ovation. I proved that it is possible to park in any space that is even slightly longer than your car; to learn how, see physical pages 42-46 of [www.math.princeton.edu/~nelson/books/ta.pdf](http://www.math.princeton.edu/~nelson/books/ta.pdf)

The most rewarding kind of teaching is the direction of Ph.D. theses. Among many highly enjoyable such adventures, one sticks out because Greg Lawler and I stumbled onto a strange and highly efficient procedure: I would suggest that he prove such and such and he would find a counter-example; then I would say that so and so could not be true, and he would find a proof. He finished his thesis on loop-erased random walks in jig time by this method.

I was the department’s first webmaster, constructing the protocols, all but the final step of getting an IP address, to connect us to the World Wide Web. But the most rewarding administrative experience I had was one year when I was director of graduate studies. I would interview each graduate student. Michael O’Nan was one of them; this was back in the old Fine Hall. Something in his demeanor prompted me to call him back as he was about to leave. It turned out that he was unhappy with the thesis problem in analysis he had been assigned; what he really wanted to work on was finite groups. There was no one in the department who could advise such a thesis. I made some phone calls (there was no email then) and arranged for him to work with Daniel Gorenstein. Michael’s thesis was an essential step in the classification of finite simple groups.

Retirement means retirement from teaching and administration, not from doing mathematics!