As I sat and listened to a recent lunchtime discussion at an eminent meeting at an eminent institution, I could not help thinking how times have indeed changed. And that thought, reminding me of my age, made me sad. The subject of discussion was the future of physics, of funding and of the younger generation, which was concluded to be a lost cause unless we drastically reshape our minds and our lives—a tall order. Perched tensely on my seat in a new, impeccably designed building intended to promote the loftiest of lofty ideals of theoretical physics, I listened to colleagues whom I have admired for over a quarter of a century. I couldn’t help asking myself (with apologies to David Morrison), What’s wrong with this discussion?

I realized later that my thoughts on this matter have not changed over the years. What excites me in physics, alas, is exciting physics, and this was true even when I was a kid in a distant, underdeveloped country with no expectation of finding decent employment in this field. After the meeting I decided to ask around a bit to find out whether other physicists share my enthusiasm for the subject or if it is my background that propels me to such an attitude. I began by asking my dear colleague in the office next door. His answer was the same as mine—but perhaps I had brainwashed him over the years. I then walked down to the nearest graduate student office: a random sample of three, but the response was the same. I have continued to ask around, and the responses have been essentially the same. What’s wrong with these people? Didn’t they ever consider whether or not physics is useful? Don’t they realize that they need jobs?

I would like to tell you what my own understanding of the present situation in physics is. The basic theme deals with the freedom of choice and why as teachers we must foster this notion, why doing so is not a waste and why we should teach by example and not in some harsher manner. I would like to tell you why the constant clutter over funding is contrary to our role as teachers. I would like to tell you why in an environment of academic freedom it does not make sense to adopt “birth control” (in the sense of limiting the number of graduating PhDs).

It is often stated, and increasingly so these days, that graduate education in physics serves no purpose: We are simply producing too many PhDs who have wasted six or seven years of their lives. What we really mean is that most of those graduates do not go on to glorious academic careers. It would be useful to conduct an in-depth study to find out if these recent graduates think their physics education has been helpful or not. We may have to wait another 20 years before we can assess their careers, but the anecdotal accounts I have heard have been very reassuring. They may not be doing physics anymore, but they certainly have learned how to solve problems, one of the most practical and useful arts in any area of life. Over and over again I have met graduates working in areas totally unrelated to physics who have told me how valuable their educations have been. One graduate whom I helped supervise in my early career is now a successful citizen of Wall Street; he believes that physics taught him how to go about solving problems of all sorts and he cherishes his education. In fact he is saving his old textbooks, quantum field theory, critical phenomena and all, for his children.

But couldn’t you say something similar about any field? How about the piano major from the Curtis Institute of Music I know who now spends much of his time designing home audio systems? Does he regret the hard work spent practicing piano for so many years? True, he only made one solo appearance with the New York Philharmonic. But was his education a waste? I don’t think so. Nor does he: He still loves music deeply and performs occasionally, not to mention his interest in designing a modern version of the player piano.

My experience with undergraduate physics is no different. As a teacher of undergraduate quantum mechanics I constantly run into graduating seniors who tell me they have no intention of going to graduate school. Last spring I finally cornered one of them to find out why.

“What are you going to do when you graduate?” I asked.

“Oh, I have this great job with this computer company in the Bay Area. You wouldn’t believe how exciting it is,” he said. Seeing the look of horror on my face, he asked sweetly, “What’s wrong?”

“Why then are you taking quantum mechanics?” I blurted out.

“Because I love it so much,” he said. Changing the subject quickly, he proceeded to give me a long lecture about why I should upgrade my office computer, which was horribly antiquated by all standards, and to ask how I could possibly use such a lousy software program for my class notes. (I must say, I sometimes wonder about that myself.)

As he was walking out of my office, he turned around for a moment with a smile on his face. “By the way, those operators for the harmonic oscillators were just fantastic,” he said. “You really need infinitely big matrices, eh?”

With those words, a big load was lifted off my chest, and I felt very proud of myself. My colleagues had warned me that the operator treatment of harmonic oscillators was too fancy to be taught in an undergraduate physics class. But here was a senior who was not interested in pursuing a career in physics who thought it was fantastic.

Like Aesop, I should not end without warning that we often forget that education is a complex organic process; physics education is no exception. The best we can do is to teach excellent physics with a clear and uncluttered mind and remember that the students are free to choose what they do with it. And they do that quite well.