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TCS Contributor

Confessions of an Engineering Washout

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I am an engineering washout. I left a chemical engineering major in shame and disgust to pursue the softer pleasures of a liberal arts education. No, do not pity me, gentle reader; do not assuage your horror and dismay at my degradation by flinging a filthy quarter into my shiny tin cup. Instead, hear my story, and learn why the United States lacks engineers.

Not long ago, I showed up for my first year at Smartypants U., fresh from a high school career full of awards and honors and gold stars. My accomplishments all pointed towards a more verbal course of study, but I was determined to spend my college days learning something useful. With my strong science grades and excellent standardized test scores, I felt certain that I could handle whatever engineering challenges Smartypants U. had to offer. Remember: Kern = real good at math and science. You will have cause to forget that fact very soon.

I had three options for a chemistry class: the intro course, the accelerated course, and the genius course. My high school chemistry background made me a good fit for the accelerated course, but my academic advisor warned me not to take it. The course instructor was a legendarily incompetent teacher, even by the dubious standards of Smartypants U's engineering department. He was so incoherent and capricious that academic advisors were warned to steer students away from his courses. So why was he kept on staff? His research was outstanding. My tuition dollars at work.

Being too arrogant to waste my gifts in some kiddie intro course, I enrolled in the genius course. Memo to freshmen, wherever you are: unless you are a certified, card-carrying prodigy with a four-digit IQ, do not EVER EVER EVER sign up for a chemistry class whose informal nickname contains the word "Turbo." "What happened?" said the comment on my second test. I wish I knew.

In high school I had grown accustomed to math classes that featured clear, helpful instruction from teachers who liked to teach and excelled at teaching. At Smartypants U, the jewel in the crown of American academia, my math instructor was a twenty-something teaching assistant whose classroom style never

deviated from the following pattern:

1) Greet class.
2) Ask if there were any questions about the previous evening's problem set.
3) If so, work out the problem in question on the chalkboard, without further explanation.
4) Repeat step 3) as needed.
5) Announce the pages in the textbook from which the next problem set would be derived.
6) Perform a sample problem from the new problem set.
7) Ask if anyone has any questions.
8) Give the problem set assignment.
9) Dismiss the class.

Total elapsed time: never more than 25 minutes.

Clutching the shredded tatters of my pride and dignity, I trudged to the office hours of my math instructor every week, seeking an explanation for the increasingly mysterious problems in the textbook. My instructor welcomed my presence as she would welcome the Angel of Death. Irritated? She was terrified. Explain…the problems? Articulate…the steps? Relate…the concepts? I would ask questions, and she would respond by completing yet another sample problem as fast as she possibly could, blushing nervously. I felt like I was on a *Star Trek* episode. "Captain, I think I understand…the creature communicates through multivariable calculus problems!"

I know what you're thinking, and you're wrong. She was as American as I am. Spoke perfect colloquial English.

Engineering physics was only marginally better. The harried teaching assistant could actually explain the occasional physics concept. But he made sure you understood that a poor grade on any assignment reflected upon your merit in the eyes of God. "If you get a 60% below on ANY quiz," he wrote on the chalkboard on day one, "YOU ARE NOT STUDYING HARD ENOUGH." I wondered what would happen if you got a 30% on a quiz. Were you branded? Expelled? Excommunicated?

The social-life-killing workload was the stuff of gallows humor among the three or four upper-class engineers who could still laugh. "Sleep is for the weak!" they bellowed, when gathering at the listless engineering parties. "Your underwear has two sides," they whispered, pressing their furry acne-ridden faces into the ears of bewildered freshmen. "*Use them.*"

Reader, let us not dwell upon the endless problem sets, the wretched grades, and the weary nights spent screaming at my inscrutable textbooks. Compose in your mind a montage of quizzes covered in red ink, classes wasted in the stupor of incomprehension, and frowning instructors muttering strange incantations in their eerie scientific argot. And of the hands-on

laboratory portion of the chemistry class, I will say only that I still hold the record at Smartypants U. for most failed attempts at that hateful titration experiment. ("No - not *dark* pink! You filthy godless soul-eating beaker! Damn you to hell!") They assigned grad students to watch me after failure number six. And I still screwed it up.

Meanwhile, my friends majoring in the liberal arts pulled dandy grades while studying little. "You just wait," I thought, gazing upon them like the ant regarding the grasshopper in the summer. "You party and blow off homework now, but in ten years, you'll be making merely wonderful money as investment bankers and consultants, while I'll be getting laid off from a great job at General Electric."

My first-semester GPA was the engineering major average: 2.7. But to a former academic superstar, a 2.7 GPA was akin to a public flogging.

I nearly fainted when I learned that I received a 43% on the Physics final. I nearly fainted again when I learned that the class average was 38%. A sub-50% grade on a science test is a curious creature, as much the product of grader whim as academic achievement. "Hmmm…looks like he understood a tiny bit of this question. I'll give three points out of ten. Or should I give four? Whoops…tummy rumbling…better make it three." Having allegedly mastered 43% of the course material, I was now deemed fit to take even harder Physics classes. I wondered: at the highest levels of physics, could you get a passing grade with a 5% score on a test? A 3% score? A zero? Could drinking from a fire hose actually slake your thirst?

Exhausted and demoralized, I stumbled into my next semester of engineering. My new math T.A. had all of my old T.A.'s inability to teach, but half of her mastery of English. One day in class I heard myself saying: "If I understood what I didn't understand about the problem, I would understand the problem, and therefore I wouldn't be asking a question." The T.A. stared at me across a void that seemed increasingly unbridgeable.

The course was called "Discrete Mathematics." Many people thought that the course was called "Discreet Mathematics." Wrong. To clarify: "Discrete Mathematics" is "the mathematics in which Kern was getting a D at midterm." "Discreet Mathematics" is "how Kern dropped that class along with the rest of his engineering course load and signed into liberal arts classes, all on the last day he was eligible to do so, because he couldn't stand the stress, abuse, and lack of comprehension anymore." No one waved goodbye to me at the engineering door.

The United States contains a finite number of smart people, most of whom have options in life besides engineering. You will not produce thronging bevies of pocket-protector-wearing number-jockeys simply by handing out spiffy Space Shuttle

patches at the local Science Fair. If you want more engineers in the United States, you must find a way for America's engineering programs to retain students like, well, me: people smart enough to do the math and motivated enough to at least take a bite at the engineering apple, but turned off by the overwhelming coursework, low grades, and abysmal teaching. Find a way to teach engineering to verbally oriented students who can't learn math by sense of smell. Demand from (and give to) students an actual mastery of the material, rather than relying on bogus on-the-curve pseudo-grades that hinge upon the amount of partial credit that bored T.A.s choose to dole out. Write textbooks that are more than just glorified problem set manuals. Give grades that will make engineering majors competitive in a grade-inflated environment. Don't let T.A.s teach unless they can actually *teach*.

None of these things will happen, of course. Engineering professors are perfectly happy weeding out undesirables with absurd boot-camp courses that conceal the inability of said professors to communicate with words. Fewer students will pursue science and engineering majors, and the United States will grow ever more reliant upon foreign brainpower to design its scientific and manufacturing endeavors. I did my part to fight this problem, and for my trouble I got four months of humiliation and a semester's worth of shabby grades that I had to explain to law schools and employers for years. Thousands of college students will have a similar experience this fall.

So engineering is suffering in this country? It deserves no better.