

# Random Thoughts . . .

## THE WAY TO BET

*The race is not always to the swift, nor the battle to the strong, but that's the way to bet.*

—Damon Runyon

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There is no such thing as certainty in science: everything we believe ultimately rests on unprovable assumptions and imprecise observations. Our current theory may seem to work beautifully, but if we really understand science we know that new data can overthrow it at any time. Nevertheless, if there's enough evidence to back it up, we can base predictions on it and sleep peacefully without worrying that we might be wrong. If I pick up a heavy object and drop it, I feel comfortable predicting that it will fall down. I can't prove Newton's theory of gravitational attraction and I'm clueless about *why* gravity works the way it does (as was Newton), but I'm confident that down is the way to bet.

As much uncertainty as there may be in science (and by extension, engineering), there is far more in education. Students are infinitely more complex and unpredictable than cantilever beams and airborne projectiles and fruit flies. Even in education, however, there are some propositions that give you a great chance of coming out ahead if you bet on them often enough. I've got a few like that to offer you.

### STUDENTS

- ▶ *If a student who fails a test claims afterwards that he/she really understood the material, then either he/she really didn't understand it or the test was unfair (too long, too tricky, . . . ). The first one happens far more often than most students believe and the second far more than most professors believe.*
- ▶ *Students who argue vehemently for additional points on every test will have difficult lives as both students and professionals. I also worry about their marriages.*
- ▶ *Students who routinely come up with bizarre but valid ways of approaching problems may struggle in school but will do very well as researchers and engineers (if they survive school).*

- ▶ *Students who drop out of engineering are on average no worse academically than students who stay in. We like to believe that our absurdly high dropout rates in engineering mean we are eliminating weak students and retaining good ones, but that's not how it goes. Lots of students who leave have fine academic records but just don't like what they see in our classes. (Don't bet against this one—I've got the data to back it up.)*

### GOOD AND BAD TEACHERS

*An engineering faculty member is a **good** teacher (i.e., a teacher who motivates his/her students to learn and facilitates their learning) or a **bad** teacher (i.e., a teacher who does not motivate or facilitate learning and may even interfere with it) if he or she:*

- ▶ *(good) gets all of his/her students actively involved in class and knows all of their names (or at least most of them in large classes).*
- ▶ *(bad) makes classes PowerPoint shows, or spends most of every period deriving equations, or puts high-level problems on exams that are qualitatively different from anything students have seen in class or on homework "to see if they can think for themselves."*



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- ▶ **(good)** *always has students waiting in the hall during office hours and coming with questions before and after class.*
  - ▶ **(bad)** *uses words like “spoonfeeding” and “coddling” when talking about student-centered teaching methods (e.g., problem-based learning) and colleagues who use those methods, and dismisses all educational research as nonrigorous. I’m also betting that individuals who do this have never read an educational research study and could not name a journal that publishes them.*
  - ▶ **(good)** *gets consistently excellent student ratings. It’s possible that the ratings are high because of easy grading or whatever other spin colleagues with lousy ratings put on it, but I’m betting (again with a lot of research backup) that a highly rated engineering instructor would also show up as a good teacher in peer ratings and assessments of learning outcomes.*
  - ▶ **(bad)** *gets consistently poor student ratings. Someone who is regularly shredded by most students may claim it is because he is “rigorous” or “unwilling to lower standards,” or because she “refuses to be an entertainer,” and “the students don’t appreciate me now, but after they graduate they’ll see how good I was.” Maybe, but if I always bet that those instructors are simply poor teachers I say I’ll come out way ahead in the long run.*
  - ▶ **(good)** *has students coming back years later saying what an outstanding teacher he or she was. I’d bet my life savings on this one—and I’d do so even if that individual has never gotten a grant or published a research paper.*
- ▶ *meaningful orientation and formal mentorship.*
  - ▶ *Departments that decide to give tenure and promotion to qualified faculty members who focus on teaching and educational scholarship will have stronger teaching programs than they had before, and their research productivity and quality will not suffer.*
  - ▶ *A high school senior contemplating engineering will get a better education by avoiding schools where much of the administration and faculty think ABET is the enemy.*
  - ▶ *Textbooks with CD supplements will soon be replaced by interactive DVDs that may or may not have text supplements, which will lead to improved learning. The present generation of faculty and students may find the adjustment difficult, but the next generation will have no trouble with it at all.*
  - ▶ *Traditional campus-based departments will find it increasingly hard to compete with excellent distance programs for good applicants. An online course that includes user-friendly interactive tutorials, electronic interactions between students and instructors and among students, and individual conferencing with the professor and tutors, provides a better educational experience than a campus-based course that is mostly chalk and talk—and distance programs are getting better at those things all the time.*
  - ▶ *More and more traditional engineering jobs will be handled by computers, technicians, and engineers in India and China (and Malaysia and Croatia and . . . ). Graduates of schools that continue to focus on traditional content will have a harder and harder time finding and keeping jobs. Graduates of schools that focus more on entrepreneurship, critical and creative thinking, multidisciplinary project management, and global economics will do fine.*

I have undoubtedly tipped over some sacred cows here. Some of you will tell me that “Professor X dumbed his tests down and started to get great student evaluations,” or “Professor Y’s students burn her in effigy every year but as alumni they create multimillion-dollar endowments in her name,” or “I can *so* name an educational research journal!!!” You don’t have to send me an angry e-mail message about it—I’ll cheerfully concede right now that if I bet against Professor X or Y or against you I’ll lose. In Vegas the casinos lose thousands of gambles every hour. They make *many* thousands of gambles, though, and the odds are with them. In the long run, they always win. □

## MISCELLANY

- ▶ *Little or nothing meaningful will be accomplished at a faculty committee meeting. The more frequently the committee has regularly scheduled meetings, the more I would be willing to bet on this one. Furthermore, the larger the committee, the less it will accomplish.*
- ▶ *New faculty members who get some formal training and/or mentorship will be better teachers and more successful researchers after two years than their counterparts who get the traditional amount of training and mentorship (none). More and more schools are choosing to bet my way by giving their new hires*

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