

RAISE THE BAR

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Student Success.

That's our latest holy grail, straw man, whipping boy, bete noir, dead horse, can of worms—pick your favorite metaphor. Heaps and heaps of dollars are available in grants for those worthies who can propose “the” way to ensure, enhance, increase and/or improve student success. Since Failed Students equals We Have Failed equals Budget Cutbacks—and because, curiously enough, funding for research is vanishing before our very eyes—we're out there with expensive hardware, software, firmware, liveware and consultants, hoping to do two things:

Thing 1. Improve Student Success.

Thing 2. Get a big grant to help with Thing 1.

So here is A Modest Proposal—“modest” because it is extremely low-tech and devoid of bells and whistles—hence, unlikely to attract mega [or even kilo] bucks from some Kindly Outside Funding Agency. But I'm convinced it works. It has worked for me. In fact, if you do it right, it doesn't have to cost a dime. Here it is:

- **PREMISE:** Students fail, not because we expect too much of them, but because we expect too little.
- **CONCLUSION:** Raise the bar and they will attain the height you set for them ...
- **CAVEAT:** ... but do it gradually.

The caveat needs a bit of explaining, because “raising the bar” is not equivalent to “being demanding”. It's more subtle than that:

- Find out where your students are, relative to whatever you're hoping they'll learn, and bring them along *from that point*.
- Raise the level of your expectations slowly and steadily throughout the course of a term.
- The more you expect, the more you'll get. Encourage goal—setting, both in your students and in yourself, relative to a class, a curriculum, a career.

All right, Bud; talk's cheap ... where's your proof? Let me give a few examples from the recent past: these qualify as anecdotal evidence, if not actual proof:

A lower-division service course: VTASP Math 1015 (Elementary Calculus with Trigonometry). This class met five days a week for three hours credit; students were mostly athletes and other mathophobes from a variety of backgrounds, with eleven different majors present in a class of 30. For the most part, they had enough mathematical talent to do well in a regular 1015 section, but as Bruce Reed correctly pointed out, they lack confidence. To restore this confidence, I began by confronting their mathophobia and suggesting possible reasons for it. The extra two days a week allowed me to go through the syllabus at a slightly slower pace per day, but still keep up with the rest of the sections. In addition, I slowly raised the bar by expecting clearer explanations and assigning harder problems as the term progressed. Throughout the term, the students gained confidence in their ability to work mathematical problems; the talent was always there. By the end of the term, the majority of these students had both the ability and the confidence to take a regular section of Math 1016.

This class was the occasion for a Magic Moment. On the first test, a young woman named Jennifer made the highest grade in the class—an A. I announced this, and Jennifer's startled response was, “But I've never gotten higher than a B on a math test in my life!” [I wish I'd had a camera.] In her mind, her attitude became: *I'm good at this*. She remained my top student in both 1015 and the followup 1016, and this ex-mathophobe is now in the Honors Program majoring in Accounting with a 3.7 QCA—and she tutors other students in math. Hers was the most extreme case, but there were many others in that class who experienced similar successes.

An upper-division course for majors: Math 4164 (Advanced Discrete Mathematics). These students were Mathematics, Computer Science and Computer Engineering—by and large, excellent students. Again, I began slowly, trying to gauge just what they knew; then I gradually raised the bar, e.g. the standards of what I would accept as good work, the degree of polish of their write-ups, the difficulty of the exercises. By the end of the semester, it was clear that this was an exceptional bunch, so I gave them a really hard final exam, consisting mainly of problems from the final of a similar *graduate course* I'd given several years earlier. They breezed through that final; I was blown away. The level at which they were working by term's end can be judged by the following comment on one student evaluation: “That which does not kill me makes me a better mathematician. This course was real close!”

A beginning graduate course for majors: Math 4124 (Abstract Algebra). This class is required of all graduate students in our Masters Degree program, always includes several of our brightest undergraduates, and is a whole lot of fun to teach—usually. This particular term, however, I was confronted with an additional circumstance. For some reason, several of my students lacked the undergraduate prerequisites for 4124, they were not interested in the subject, and they greatly resented having to take the class in the first place. After a week or so, all of these unhappy students came to my office. During the ensuing conversation about the class, one student said, “I like working with differential equations that describe airflow around a wing. You can touch a wing; you can feel it. *But I can't hold a group in my hand.*”

Talk about *carpe diem*! I said, “Oh, yes you can,” went down the hall, borrowed Monte Boisen's models of crystals having different kinds of symmetry groups and radically changed my approach to the course then and there. I encouraged the students to make these models for themselves, to carry them around and to use them to understand the concepts in the course. I also

went back and found just where these particular students were relative to understanding the prerequisite material. Once they succeeded at the elementary material, I was able to raise the bar slowly for them; the crystal models were a tremendous help. By the end of the term, the students were no longer resentful; in fact, they seemed to have gained an appreciation for the topic. One of them did so well, in fact, that he enrolled in the followup graduate course and was one of my best students in that class. But mainly, they had learned in a way that was accessible to them, and had learned material that was previously mysterious and distasteful. At the same time, the advanced students in the class were not held back because I was able to push them to stretch their capabilities: they were given special projects, and I included more difficult exercises as bonus questions. The net result was a very successful class, from top to bottom. **[Note added in October 2005: Three of the students from that class (total enrollment of 14) now have PhDs in Mathematics and a fourth will receive one in 2006.]**

A reorientation for the University: the revised eligibility policy. In 1995—96, the University Council approved a resolution to change the academic eligibility policy to read that for all students, Satisfactory Progress (i.e. good standing) would now be a QCA of 2.0 or better. One take on this policy is that from the beginning, we are setting the bar just where a student needs to be in order to graduate. The beginning height is a fair height, because it's also the final height. That's it. A lower standard for first and second year students allows students to dig themselves into inextricable holes, from where they have scant hope of ever graduating. Just raising the bar, however, is not the whole story. We review their progress every semester—not every May, as it's currently done. We provide plenty of support for those who don't make the beginning height.

Will this wipe out lots of new students? I doubt it. **[Note added in February 2000: it hasn't. In fact, all signs indicate that graduation rates will be rising, due in part to the change in the eligibility schedule.]** A student will come to Virginia Tech, learn about what it takes to stay eligible, and do it ... they don't know any differently, so they'll live up to our expectations from the outset. Also, they won't have to push as hard to stay eligible. Now, a student with a 1.5 after 36 hours must make a 2.0 over the next 36 hours just to make the 1.75 after 72 hours and stay eligible. The student with a 1.75 after 72 hours must make a 2.375 over the next 48 hours in order to make a 2.0 for 120 hours and graduate in most of our programs. In effect, we've had the new policy all along for students who are just barely eligible after their first year, and a stronger policy all along for students who are just barely eligible after their second year!

In the long term, by raising the bar on eligibility, but providing a strong support system, we make Virginia Tech more attractive to better students—good students are attracted to strong programs—and we can challenge the brighter ones by helping them raise their own bars, with our Honors Program.

- **THE UPSHOT: Raising the Bar Can Be Salutory to the Health of the University.**

All very well and good. But do these ideas transfer to anything besides mathematics? Of course. How do you raise the bar in your field? Hey, you're the expert in that area ... you tell me!