

Is there anything one can do to raise the level of performance of one's students? That is the primary quest of a serious educator. Surprisingly, the answer is *not* "explain the material better." That can be accomplished by simply reducing the portion of the subject that will be considered "the material" (this can be done even within a fixed syllabus), leaving the students with underdeveloped expertise. Students seem to like that approach, for reasons that are shortsighted. The best answer to the initial question would be to change the attitude toward their education that too many students bring to college, but that's beyond our control. These students feel that their education is imposed from the outside, something to score "points" toward, to maneuver around, or to skimp on.

We math professors know that when aspirations are fixed, e.g., when courses involve several instructors and common exams, there is little difference among the mean achievement levels of the students of each instructor. The students may say that one instructor explains things better than another, but that does not show in performance on the exams. Since giving explanations that are perceived to be better is known not to improve learning of itself, we should be looking beyond that.

Many instructors have been following fixed ideas about what we can and cannot do in a basic math course, and much of that involves tolerating student reluctance to overhauling high school notions of learning mathematics. I, for one, do not tolerate that. Not only are you to learn what I present in the lectures; you are expected to pick up some things from written sources, namely the textbook and documents posted on-line. *By declining to insist on that, the instructor confines the students, depriving them of the principal means of developing the skills for grasping the subject.* Here's what I'll be doing:

0. There was a substantive presentation on mathematics and the sciences (combined) during Freshman Orientation on September 1. It addressed the large change in aspirations that typically occurs in these disciplines when the student comes to college. You are expected to be aware of its content. (This and other orientation material has been posted on the course homepage).

1. The course will be run at a level where the vast majority of the students are capable of learning the material well through reasonable exertion. This refers to *you*, and not to students who did not get into Hopkins or its academic peers. It is standard to say that two hours outside of class per hour of class is not unreasonable. I'm aware that students (esp. freshmen) often regard half of that as a heavy workload, but if you are to learn well, you must put in sufficient time. I will be supportive but firm.

2. The professors of science and engineering have told the Math Department that they want their students to be capable of using the calculus in their courses, however it happens to arise. For that, you must learn *flexibly*. I uphold their wishes. And I do not accept as understandable the assertion by students that they don't want to learn the material, that they don't need it. *Why* are these courses required for your major? You will see the material coming up in later courses.

Don't be short-sighted! Even if it were the case that you will not need one shred of it, do you really wish to declare yourself to be untrainable? Who would want to hire such a person?! Just as one doesn't have to know how to solve a problem

in order to move towards a solution, *you don't have to know your career goals in order to move towards a successful career.*

3. We want students to learn methods, not problem types. This again is a change from what most students are accustomed to from high school. For that reason, I refuse to give practice exams (though exams from former years are available to indicate the *level* of the exams). I stress the importance of conceptual learning as well as your working out a large range of problems.

4. A bottom-line point about education in college (as opposed to high school) is that *the student* is responsible for learning the material, and is expected to cooperate in the learning process. I avoid retreating much from this in college courses.

5. You are capable of picking up the easier material of the course largely on their own. *This is of fundamental importance.* In particular, I'm saying that you can learn some things from reading the textbook, even if you never had to do that in high school. Therefore, I will not waste a lot of time in class over the easier material, for that is not where you need my help. If a student is unwilling to cooperate and thereby falters, ... it's the student's business.

6. Many good students recommend looking a little at the material in the book *before* the lecture, so that you don't come to class cold, without having a head start on the subject. Prof. Shearn of Biology talked about this in the Orientation program. I recommend that too. If students don't see the need to cooperate with this, they can get what they can from the lecture and sort things out later.

7. The textbook is to enhance what is done in class. *It is not necessary for the instructor to wait to see the students "getting" the material in the classroom.* You have until the homework is due for that! There is much more to a college course at Hopkins than a teacher feeding the students in class. The students must learn to figure some things out for themselves.

In sum, you don't get something for nothing. I want my students to learn well, so I push them to make a reasonable effort to achieve. It's routine to do that in athletics or musical performance. You will not succeed in learning mathematics well by being mathematical "voyeurs," just as you cannot improve your tennis game much by simply watching matches between professionals.

Your performance is primarily an issue of attitude. The extreme cases—I've met several in the last couple of years—are students who left Hopkins for a year or more after being suspended for poor grades, and came back to become good students. Clearly, their ability did not change; it was that their attitude was more mature.

I will presume that you want to learn the material of this course well. Your admission to Hopkins was, at bottom, based on that. If you want to shoot for less, it will be your responsibility to find the means; but remember, you will be saying that you are unwilling to be trained. Make a serious effort and you can adapt to such a course in plenty of time for the first exam. You may even find it enjoyable. If you are experiencing any difficulty, don't hesitate to see me during my office hours (or by appointment), for I can't help you otherwise.

I think you now have some idea of how I will be running this course. You might read this statement again to get a better idea.