

A Curriculum for the Twenty-First Century

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Note to readers: I submitted this document for inclusion in a book a colleague is compiling about the history of the Department of Pharmacology at Michigan. As such, it is one of several chapters I wrote on my reflections about coming here, and being part of the faculty and the medical school. A draft of this chapter was then submitted by my colleague for peer review. The recommendation was that this chapter should be deleted, largely because it is too provocative and parochial. It's here, unedited, for your reading nonetheless.

During Dean Giles Bole's tenure there had been much discussion, followed by a badly botched attempt, to come up with a new curriculum for the medical students. The failure was largely because Bole put the wrong leader in charge of the redesign, and the faculty never got to give advice or feel ownership of things. Giles knew change was needed, and knew it had to come from the faculty. Many faculty were still skeptical, if not down-right opposed to, any significant change; they had been soured by the prior attempt. But Giles described the curriculum as an old train that had gone down the same track too long, and something was going to be done.

As the 80s faded, Bole charged Wayne Davis, his new Associate Dean for Medical Education, with the task of putting the new curriculum together. Arguably, the dean couldn't have found a better person to lead the way for curricular reform than Wayne — whether locally or nationally — unless, of course, you wanted to find someone who actually taught medical students: Wayne didn't. Wayne had years of experience in the study of medical education. But his methodical approach to creating what later would be called MD2000 succeeded for several reasons, not just from his education or management background. He involved the teaching faculty and sought their advice and participation from the get-go; set finite time-tables to accomplish specific organizational tasks, and by God expected them to be done on time; he kept the faculty at-large frequently informed of goals, objectives, and progress, and listened to concerns. He masterfully picked his allies, and did the same to neutralize his adversaries. Wayne was, in essence, an administrator par excellence.

The framework for the new curriculum wasn't dictated by an administrator (neither Bole nor Davis), but shaped under Wayne's superb leadership and Giles' blessing, and built to beliefs and needs by educators and students at and for Michigan. Bole didn't micromanage: he trusted Davis and the faculty educators Davis brought into the process, put in his two cents, and then helped get the faculty's plans approved through the necessary channels.

The process to get us a new curriculum took several years, thousands of faculty and student rep hours, many hundreds of committee meetings. (Davis' staff kept meticulous notes and prepared the minutes and agendas, putting the meeting number for each committee at the top of the packet. For some committees that continued after the curriculum was long under way, it reached well into the hundreds.) I started serving on

several committees for the New Curriculum planning (since first-person sharing of ideas and concerns between groups, was essential), initially as one of our departmental representatives who wanted to ensure that the “basics” of pharmacology didn’t get omitted or short-shrifted, and that we were the ones responsible for the teaching at least the bulk of pharm material. Ben Lucchesi, Ron Holz, Peggy Gnegy, Donna Shewach, and several others added significant pharmacology input.

Soon my colleagues and I would discover that only one portion of what our department had taught to medical students for years would come out of the exhaustive revision process unscathed. That was the Senior Pharmacology and Therapeutics elective run (depending on which years you look at) by Ben Lucchesi, Ed Domino, and Hank Swain. On a positive note, the new M4 year was to include for all students a mandatory “Science in Clinics Experience” — the purpose of which was to “revisit” basic science issues with a more clinical and more advanced thrust and connection. The Senior Therapeutics course was held out (rightly) as the exemplar of how to structure such a learning experience.

A goal of MD2000 was to encourage students to become more “independent learners” from day one. They needed to build the fundamentals of clinical skills, including interviewing skills and risk assessment, earlier than before. Fostering “self-directed life-long learning skills” (as it was repetitively described) by students would be accomplished in one surgically precise way: limit formal lectures to no more than 15 hours a week, total; and cut back on the voluminous handouts and substitute more of a framework, with the rest of the information to be gleaned by reading.

Major cutbacks of lecture time loomed, and the faculty started getting nervous, if not angry, as this message filtered down concurrent with the dean’s pledge of greater rewards for teaching. Was the administration screwing us again, or at least messing with our minds? Every basic science department (with the exception of one, perhaps) faced a cut. Every basic science chair (and most rank-and-file faculty) became extraordinarily and almost instantly protective and territorial. Researchers who disdained teaching (at best) were reborn as education advocates. Like it or not, they knew that if their teaching assignments disappeared or got cut radically, they and their departments might too. I remember distinctly how so many teaching faculty who before would “just as soon not teach” (and some who, for various reasons, shouldn’t be allowed even near a classroom) suddenly became possessive of their teaching time and worried that their lectures (and, hence, their compensation) would be cut and “their students” wouldn’t learn. Ah, when money gets figured into the balance sheet, teaching suddenly takes on a heightened importance. Very pragmatic, not at all surprising, and not the kind of educational motivation I’d like my kids to receive, especially if I’m writing the checks.

The new M1 year (now officially dubbed “Component I;” who knows why we needed such a highfalutin term for what everyone else recognized simply as M1) was to be a “basic sciences fundamentals” year. A new multidisciplinary (multi-departmental) cell and molecular biology course would be the flagship, spanning both semesters. Still other

new courses, including one entitled Host Defenses, were assembled. Several other more or less traditional department-based courses (anatomy, histology, pathology, genetics) were kept.

Component I would be graded Pass-Fail. That was touted as fostering a focus on learning for learning's sake, lessening (if not eliminating) competitiveness between students for grades, and thereby encouraging collegial cooperative learning; and eliminating the point-grubbing that otherwise could make a difference between Pass, High Pass, or any of the other subcategories of grades we'd used to differentiate one student from another. (In essence, we'd give the gunners one more year to hibernate before they crawled out of the cracks.)

There would be weekly quizzes, almost every Monday morning, to help acclimate students to the need for keeping up with their studies, to provide both the students and us with "frequent and early feedback" on their progress, and to trigger help sooner than later. Each quiz had about 8 questions from each discipline holding a course at the time, and so some quizzes might have a total of 40 or so questions. Some students felt the weekly quizzes helped keep them on task; others felt it was too much too often.

There were final exams, of course, plus a mid-term if a course was sufficiently long. The term "concurrent exam" — perceived as a horrific ancient ritual by students, was dropped from our vocabulary. Just get a minimum 75% cumulative end-of-course average for quizzes and exams (or get 100%) and you pass. Get 74.99% and you Fail. Many of our students were as good at math as they were at medicine. They knew that if they had a very high quiz average going into the final, they could basically blow-off studying for the final — not learn the end of term material well, if at all.

Monitoring student progress affected me, especially, since one of my jobs as an associate dean was to track student progress and offer the help to students in difficulty — and do what I had to do to get them dismissed if they and we couldn't rectify the problems. Riding hard on students' progress and problems (academic and personal), delivering reprimands or warnings, ushering dismissal or other actions through administrative channels, and even notifying students that they had been dismissed, became the duties of my office. Usually I did the necessary but unpleasant dirty work myself. It was just too unpleasant to dump on a colleague.

I had instantaneously gone from being held up by students as a great teacher and nice guy to the bad cop and executioner. It happens to virtually every faculty member who takes an administrative position where lines have to be drawn, policies that affect individuals followed, measures perceived as punitive taken. It was a hell of a position to be in, worse so when you consider that I was supposed to be, simultaneously, the medical student's fountain of help. And no one from any other med school office would step in when I had to do the onerous tasks, even if only to say Shlafer is just doing nothing more than what the faculty proscribed. As Giles told me directly, many times, I had the toughest job in the medical school. Although I thought his was far worse, often I stopped, thought, and had to agree.

The new M2 year would be more basic sciences, at a more advanced and integrated level, with considerably more clinical connections. Eleven multidisciplinary M2 sequences (courses) were identified. Each would focus on some body system or process and cover things from pathologic, physiologic, pharmacologic, and other basic perspectives in an integrated way.

Besides other changes that affected medical education in a broad sense, one of several affected our department's teaching. There was no longer a discrete pharmacology course that covered the major groups of drugs. And even if we didn't know precisely how or where that material would be presented to anyone, we knew for sure that what there was would be spattered throughout a year, on no regularly recurring day of the week or time of the day. So, what were we going to do with the pharmacy students, and our second year grad students? Get out the schedule for the briefly dead 404-405 sequence, fix it up, and create a "new" pharmacology course sequence, 659 and 660.

The new M2 year would be graded by the old Fail, Pass, High Pass, Honors scheme (marginal pass was dropped), grades based on a somewhat smaller number of weekly quizzes and on a final exam. The minimum to pass was 70%. One unpublicized reason for retaining the old system was that if we used Pass-Fail grading in both the M1 and M2 years, nearly everyone would have the same GPA at the end of the M2 year (because most of them pass all their courses).

There would be no way to rank students to determine who got into Alpha Omega Alpha, the very prestigious medical honor society. Other things changed too, by fiat as much as by consensus. Voluminous faculty notes were "strongly discouraged." In their place we were told to make short, succinct handouts, "being sure to include complicated graphics, tables [and the like] to minimize the tedium of note taking (although the good old Phi Chi note system survived). A good idea, but hard to accept when it's mandated, when students appreciate long but well done handouts and complain when they go away, and when the phrase "academic freedom" blows through your mind. (I get around the rule, sort of, by posting all my notes and slides on my personal web site. For the actual handouts, I "follow orders.")

The challenge system was disbanded...sort of, briefly. The abolition of the practice was to be complete for the M1s. Given the pass-fail nature of that year, and all its erudite philosophic and educational underpinnings, we assumed M1s would just learn for learning sake, or learn from their mistakes (or instructors' mistakes, in the form of lousy questions). No need to bicker about an extra point here or there. Just about everyone would pass. No need to challenge. But being a creative and perhaps obsessive lot the M1s simply send e-mail and take the "...I just want to understand why it's answer A... I picked B for these (dozen) reasons... shouldn't B be right too? ...shouldn't we get points too?" approach. And, "...by the way, the instructor's question was vague and confusing." The M2s could "query," not challenge, quiz or exam questions. Of course, like everything else this all lasted and worked until the unavoidable process of "history repeats itself" became operative again. Today's M2s challenge just as much as in days of

yore; it's still anonymous; and we've computerized the challenge system, which obviously made it easier for students to query us.

Many committees sketched the overall frameworks of the various years, passing down the plans to a fewer number of committees as tasks were done and we were ready to go to the next steps. The day-to-day details had to be filled in — who lectures on what, on what day, even at what hour. The new M1 year would be launched first, naturally; the folks working on the rest of the years had a break, since it would obviously take a year for the first crop of new students to move on to become M2s. And, of course, since the only element of the new curriculum at the outset was the M1 year, all eyes were on it and the folks who put it together and ran it. What a managerial and political nightmare. I pitied the poor slob who'd be the first one get that job. As it turns out, the job landed in my lap. I had been appointed as the first director of the new Component I; I had to sweat the details. Fortunately I got Joe Fantone, from pathology, to come aboard as assistant director.

Putting the M1 year together was a difficult task, help or not, time commitments aside. One of our main roles was mediating and settling turf battles and other skirmishes — many ugly ones of all sorts. The MCB course — clearly the biggest part of Component I — was to be multidisciplinary. But it was obviously to be controlled largely by one department, and since there were faculty in many other departments who had previously given content that would now go into the new course, there were spats over who would do what. Often this clearly wasn't an "I want to teach because I want to educate" motive. Faculty in various departments, and their chairs, didn't want to relinquish their time in the sunshine — their contact hours — because it would lessen their "credit" from the dean for teaching. Department chairs wanted, in particular, to know where the remuneration would go for teaching in an ostensibly multidisciplinary and unquestionably large and visible course. Naturally, too, Joe and I were arbiters of the "we can't teach this in so little time" complaints. We had to mediate, cajole, shuffle, and play the heavies. Thank heaven for weekends and six-packs.

Of a more pressing educational nature, we had to get away from a long history of temporal mismatches in the sequence of presenting content. No longer would, say, physiology be doing cardiovascular while anatomy or histology did the reproductive system and biochemistry focused on something completely different. Everything had to be "in synch" as much as possible so students could learn and see, from different perspectives, the same general things at the same time. For some courses, some topics, there was no "good fit" place to put them. It was a logistic nightmare — move even just one lecture around and everything else has to be reshuffled — and all this was complicated by folks not wanting to change when, or how, or how much time they had, to "do their thing." I had experience juggling things with my own pharmacology course, and it was often problematic but always doable. Doing the same with nearly a dozen courses and more dozens of faculty, a whole year of medical student education, was more than a challenge. The deans and chairs were watching, and more than a handful faculty were hoping all this would be a crash-and-burn escapade to prove that the old way was the right way all along.

Turf battles and logistics aside, I faced an immediate personal conflict because it was clear that pharmacology teaching as we knew it and believed it should be would be relegated to a small spur on Bole's new railroad. Initially there was no planned time anywhere in the M1 or M2 year for pharmacology to teach general principles of the discipline: pharmacokinetics, drug metabolism and other aspects of pharmacodynamics; or any autonomic pharmacology (which, we know, is critical to understanding many areas of pharmacology and therapeutics). To make matters worse, our physiology colleagues never really had, in the then recent past, much opportunity to teach "autonomic physiology" and its control of structures and systems. They provided a great overview but left many nuances to us. We had less opportunity to do that.

We succeeded eventually, albeit not in an ideal way. We got a short basic principles and introduction to autonomics course. It would be presented in about 20 hours at the very end of a long, tiring M1 year — just in time for students to start thinking ahead to their last free summer for years; just in time to forget content over that summer so that, when they needed to recall their knowledge of pharmacokinetics or autonomics as M2s, they could say "gee, I don't think we ever got that stuff". Ron Holz headed up the new course, cognizant of the challenges.

And what about the rest of our old but successful two-term M2 course? For sure it would be fragmented, but no one knew which pieces would ever fall in place, or where or when. Our chance (or anyone's) to teach some content could be eliminated or overlooked altogether (as happened with histamine antagonists — not really a problem-free or seldom-used group of meds); placed in awkward sequences (in the temporal, not academic course, sense); or be otherwise altered or cut. And we wouldn't know precisely what would happen for a long time, because the M2 year wouldn't be planned, because it wouldn't start for another full year after the new M1 year came on line.

More unfortunate, most people outside our department seemed not to understand much of this, or even care. We didn't have impartial sympathetic ears to listen to us, even though pleas were coming from such folks as Ben Lucchesi, Ron Holz, Peggy Gnegy, and me.

As it turned out, M2 pharmacology teaching (who, when, how, and how much) was largely out of our department's control. We could lobby, remind, and prod, but in essence there was little we could do to force things to come out our way. In some cases clinical faculty who became co-directors for the M2 sequences (and generally had more clout than their basic science counterparts) assigned the lectures to their clinical colleagues (often junior faculty), who presented things from their perspective, overlooking or being plain ignorant (in many ways) of the basic pharmacology. From our department, only Ben Lucchesi and Donna Shewach became sequence co-directors, Ben naturally in cardiovascular (I assumed that role in 2000), Donna in the infectious diseases block. (To this day, to me, a look at many of the M2 sequences reveals a definite clinical superspecialty bias in content and contact time, at the expense of solid basic science material. Alas, there was plenty of basic science superspecialist material too.)

As many students (and I) would lament after the new curriculum got rolling in 1992, the demise of our cohesive and comprehensive pharmacology course took away something else with which students developed a love-hate relationship: the comprehensive, integrated final exam on all of pharmacology at year's end. To be sure, it was an onerous exam for some (many?) students, but coming right before Part 1 of the NBME (now Step I of the USMLE), it was a dandy way to kill two birds at once, by preparing for the pharmacology part of boards, just a couple of months away, at the same time. There were other potential learning difficulties for the medical students in pharmacology — and probably for every other basic science discipline — arising from the makeup of the new M2 year: it wasn't just that we and several other departments no longer had comprehensive discipline-specific exams; we didn't have the courses, in which the material is taught, either.

In our great institution, where at least the astute educators stress the importance of holistic medicine and learning, and acknowledge obvious reality that, for example, “your patient with hypertension doesn't necessarily have *only* hypertension, or *only* cardiovascular disease,” we had compartmentalized testing (and learning, de facto) too much. Now, for example, students are very unlikely to find on any medical school quiz or exam a question addressing content in which they are expected to be “responsible for;” for example, the potential adverse effects of NSAIDs (musculoskeletal sequence) for a patient with asthma (pulmonary), or a patient on warfarin (cardiovascular).

Relevant content is obviously presented in different M2 sequences, separated by sometimes months and taught by different people, sometimes one a clinician, the other a basic scientist. (The degree of separation is irrelevant: even if topic A were presented only a week before topic B, but they were in different sequences, the unwritten “no testing old stuff” rule applies.) I allay this problem somewhat by personally giving the M2s about 14 hours of integrated — and optional — pharmacology review on a host of subjects at the end of the M2 year as they prepare for the USMLE. It's supplemented with hundreds of focused, keyed, and annotated cross-discipline self-study questions I wrote and posted on the Internet. For every year this quasi-helpful measure has been done, Donna Shewach pitched in with a couple of hours of voluntary antibiotics review too. It isn't perfect, but it's something, and the students appreciate it.

The reasons for this often ill-suited testing and learning? Part of the answer is obvious. It's communication, or the lack thereof. Many M2 sequences, and some M1 courses too, are still taught by what medical students refer to as a cast of thousands: a large number of instructors who walk into the lecture hall, give an hour's cameo appearance lecture on their “thing” in blissful ignorance of what others have taught, and then leave. Often there's little continuity that could be gained by a few people doing most of the teaching. A lecturer may skip mention of key concepts that had been skipped before, or do the flip-side and repeat major portions of material, sometimes in a way that conflicts with what students learned the first time. Regardless of omission or repetition, the instructors write questions based (usually) on what they teach. This communications problem was to be

remedied, in part, in the new curriculum, when there was much talk about making a computer database of key words or concepts and, eventually, linkage to on-line notes or syllabi.

Presenting lecture material that integrates content presented in another sequence — no matter how relevant it may be — is rarely done. There are other reasons for this in addition to just not knowing what was presented, or what's relevant. They include the fact (as I have said) that medical students tend to go ballistic if they're presented with or (re)tested on "old material." Even if a teacher writes such integrated, cross-topic questions for his or her lecture, faculty in charge of putting together quizzes and exams for the course or sequence are loathe to put such questions on their tests — probably rightfully. They fear student uproar and repercussions, allegations of unfair testing, and believe that "the administration" won't go to bat for the faculty and support what we believe to be realistic and sound integrative testing and the old-fashioned notion that there are some things you're not supposed to forget.

I admit that this testing philosophy gets me down at times, yet I used to play the game because course directors will pull questions that don't follow the rules. For the medical students and nursing students (and now others I teach in guest lecturer capacity) I deal with it by posting on my website integrative questions of a sort I think are useful. Students who wish to test themselves on those questions, and integrate the material (the M2s better do it for the Boards!), can do so. If not, it's their problem.

However, lately I've addressed the matter with the M2s, facilitated by the fact that I've assumed a directorship role in their cardiovascular sequence. I've told them that in "cardio" they're "responsible" on their M2 quiz and final exam for at least the autonomies portion of their M1 course; and the same goes when I get back in front of them and teach in the renal and respiratory sequences: they'd better not forget the related or relevant material from the cardio sequence, because, by damned, I've already spoken with the directors of those other sequences and gotten the OK to put such "you'd better remember" questions on their tests.

The success of the new curriculum was "validated." It is perpetually and inexorably being tweaked, which is good. On the other hand, radical revisions are coming to the table again, served up administratively in a somewhat "eat this" fashion. Student (and faculty) "satisfaction" with the curriculum and other aspects of med school life went up.

Satisfaction is measured, in quantitative and qualitative terms, by a host of well constructed and frequent (and required) formal evaluations given to the students by a burgeoning operation known as the Office for Educational Research and Resources — OER² — run out of the Medical Education side of the administrative shop.) Lecture

attendance went up — at least for a while. Students liked the opportunity to do more doctorly things (H&Ps, interviews, rectal and pelvic exams, etc.) earlier. Clinical faculty liked that too, since “the basic science guys never prepared students to come to us.” Again, all these validations of efficacy of the new curriculum were comforting, but they masked one secret angst. We in medical administration were waiting for, if not fearing, what some felt would be the real measure of the new curriculum’s success: how the students performed on the USMLE. Performance didn’t change a bit, any more than they changed from year to year, or phase of the moon, in years past. (What some of us knew is that our students are, generally, exceedingly bright and motivated learners. We could substitute the phone book for our course texts, and our students would do just as well, on average, on the boards.)

My main outlet to implement my integrative teaching and testing preferences, and feel I’m doing a “good” job, is my nursing pharmacology class, 210. There I’m teaching largely 19- and 20-year-old undergraduate students who allegedly are not as “bright” as their college grad medical school counterparts. They haven’t developed the study skills or gunner mentality of most medical students. And they haven’t developed the air of entitlement or thinking they know how or what to teach better than the faculty.

I can, and usually do, do what I want: I teach, and test, in an integrative way. Material covered in Exam 1 is not “off limits” for the subsequent exams, nor for the very comprehensive final. My nursing students can’t separate or segregate or forget (until the course is over). I don’t let them. In February, for Exam 2, they’d better know how to use data about the temporal fall of blood levels of digoxin, in a hypothetical case of dig toxicity, by applying what they learned about half-lives (Exam 1). In late March, when I’m teaching about antipsychotics or antidepressants (for example) I can “refresh their memories” about such things as mechanisms and consequences for certain patients, of drugs blocking muscarinic receptors, or neural monoamine reuptake, or MAO inhibition, or whatever — things we covered in January.

The nursing course offered another “advantage” to me and, I hope, to my students — one I could get away with in no other course I taught, either because I didn’t direct the courses or because I was dealing with medical students, who had to have things done in a certain way to avoid angst and unrest. I could write a question in scenario format, laden with both relevant and irrelevant (distracting) data (physical findings, vital signs, etc.), and take up most of a page in doing it. Lots of reading, lots of thinking, all for a lousy two points. Moreover, whether a question stem was long or short, I had the liberty to give eight or 10 (or more) possible answer choices (although I seldom did). Try giving a medical student (or any other student) a question with anything but a two or three line stem, and four or five short answer choices, and you get creamed — that is, if the course director has the courage to allow such a question on the exam to begin with.

One reason why my nursing students don't rebel at my teaching and testing approach and learn to integrate is that I teach roughly 80% of the course, write all the questions for what I teach (naturally) as I want, and prepare the entire final exam so the questions can be as narrow or as cross-disciplinary as I think they should be. Of course, the nursing students haven't been acculturated to respond like the medical students do; they don't know anything but my teaching and testing style, at least as far as pharmacology goes. Yes, it's more work for me, and more work and consternation for the students, but in the long run doing what I can for the nursing students and can't with the med students seems to pay off. Our medical schools teaching environment and philosophy just aren't there yet. And as long as teachers and administrators kow-tow to the whines and protests of students, fail to demand that instructors integrate more, and continue with a parade of lecturers, things will never change.

Most people outside my 210 classroom don't know that my lowly, young, "I wasn't a bio major in undergrad" students do amazingly well, with the majority of the class earning A and B grades on some very difficult, no holds barred, exams. Moreover, the majority of those young students realize, based on their course evaluations, that no matter how difficult the learning process may be, the teaching and testing reflect what they know they'll need to put into clinical use. I like running my ship my way.

Broad knowledge helps in other venues, of course. Whether it's nursing, medical, pharmacy, or dental students, I feel I'm better prepared to link some nuance of the topic I'm presenting to other areas of the discipline, even bridging out into some connection with physiology, pathology, or an area of clinical medicine if I think it helps them or if — God forbid — one of the inevitably bright students should ask a "how does it relate" question originating with a prior lecture or their own personal interest or experience. I don't know it all, of course, but the broader-based interest and knowledge not only helps me help students learn, but also helps keep me from looking clueless when a student floats a very important but basic question in front of the class. The answer may have been from a prior lecture and 99% of the class knew the answer, but if the professor says "I don't know" too often, he or she looks like an ignoramus.

Another approach I have used for years is teaching by what's called the prototype approach. For just about any group of drugs to be discussed, I focus on what I (and, usually, most others) would consider the most representative example, and have the students learn it inside and out. I tell my students that, for the most part, most "related agents" are just spin-offs (whether in terms of biologic fate or some other pharmacokinetic aspect, fewer or slightly different side effects, fewer drug interactions, and so on). If a related drug is importantly different from the prototype, then I will spend some time discussing the differences and how they're important.

I don't discuss drugs that are no longer on the market unless it's to compare or contrast some concept (e.g., certain toxicities not caused by newer drugs) or to set the stage of history (in which case I don't test on the historic material). I don't include drugs under development just for that sake; if they seem to provide some major therapeutic advantage, and if my reading of the literature suggests that they'll ever see the light of FDA approval, then I may include them. Countless times I've heard a lecturer admonish students that "this drug is really neat for reasons X, Y, and Z; you need to know about it". With some lecturers, some drugs, I've heard that admonition for a half-dozen or more years in a row, but the drug will never see the light of day in the US market! More inexcusable, in my opinion: lecturers talking about drugs no longer or not yet on the market, but never mentioning that fact, leaving students to believe "I'm going to be prescribing this stuff like candy; I'd better 'know it'."

My medical student teaching expanded, particularly once I took the helm of the introductory M1 course, 525, in 1998. This was to be a one-year fill-in, last minute, role as director: Ron Holz, the original head honcho, had gotten seriously injured in a skiing accident over the Christmas break, and Paul Hollenberg asked if I'd sub. I did so gladly, but didn't do any teaching in the course that year, as Ron had set the schedule. A year later Ron was to go on sabbatical. Again I was asked to run the course. Again I gladly agreed, but with the caveat that I do at least the "adrenergics side" of autonomics, and add a new lecture on age-related considerations in drug therapy. I didn't realize at the time, but in my 20 prior years of teaching at the med school, I had never lectured to the M1s.

I got a little uppity with my first lectures in 525. I wanted to "do unto them" what I'd done for years to the nursing students. During my brief introductory and welcoming comments on the first day of the class I announced what was to be a new and radical plan for how I would test med students. "On your exams you'll see questions from me about drugs we never discussed, never mentioned in class; ones that may not be in your text book or my notes for you. And you'd damned better be able to know the right answers."

Silence, shock, or indignant anger or disbelief. Who was this jerk? After all, the rule handed down from one generation to another of medical students (especially) and other students of pharmacology (except, of course, my nursing students) stipulated "if the teacher didn't mention or discuss something in class, it isn't testable; we can't be held 'responsible' for it." And it would be several weeks from the time of my proclamation till my first actual lecture, where I'd put the plan in effect. They had plenty of time to stew.

When I returned several weeks later to give my first lecture I explained my prior comments and my rationales for them. I told them I'm dramatically cutting down on the number of drugs I will explicitly talk about (and, implicitly, they'll have to learn about). I said that when time comes to look up a drug (in the PDR for example), they'll be reading

many elements that “sound like” a prototype they were taught about, and certain words and phrases should “click” and sound a familiar chord from what they do learn in class or in a text about a most representative med. I told them that in clinical practice they must know things themselves, but they also need to use more knowledgeable drug pros, like PharmDs — the clinical pharmacists — who have the real expertise on drug-related matters. I convince them that no matter how long a pharmacology course could be, they could never learn about all the drugs they’ll encounter, prescription or OTC, because there are just too many; and that physicians pick and choose as they see fit.

But sure enough, when exam time rolls around many of my questions center around some aspect of a never-before “taught” or read-about drug, and perhaps a hypothetical or real patient. They’d have to identify the prototype or drug class, and be able to extrapolate such things as the likely-to-apply side effects, contraindications, and more, not having studied the named drug at all. In short, I wrote questions describing some aspect of the drug (or the patient) in which they ought to be able to say with reasonable certainty “oh, that sounds just like a β -blocker, or a lot like propranolol.” I “taught” a relatively small number of drugs and, by God, they learned meaningful things about lots more, and learned how to synthesize and apply their information. Once the initial anticipation of what I’d do passed, and they found they could easily handle thought processes that seemed a closer reflection of real world drug therapy, they liked it. As Rush Limbaugh entitled one of his famous (or infamous, if you wish) books, “See, I told you so!” And after the students had gotten by my first block of questions, answering them without problem, I told them just that.

To strike a raw nerve, I’ll weigh-in with an unpopular opinion about why coming to a more integrative approach to testing and teaching, and shunning the tendency to view and teach about every drug as substantively different from others, have a dismal future. We, in the basic sciences, aren’t educating enough graduate students with either a broad-based knowledge of or appreciation for the integrative nature of the discipline. They are not likely to know or care about the eventual (or even current) physiologic implications of their focused work, whether that physiology is at the level of a tissue, organ, or integrated whole organism. God forbid, they might have even a basic understanding of the clinical relevance of or beyond their work. Our grad students take one “survey” course in pharmacology, where they’re exposed to some clinical connections (or at least cross-discipline content, depending on the lecturer) and get some view of the big picture. And remember, the grad students of not long ago are our junior faculty, who eventually will assume the major roles in a department’s teaching. Whether it’s pharmacology or physiology, or probably any of the other basic science disciplines, our grad students spend so much time focusing on increasingly narrow research projects that they never see or learn (let alone appreciate the importance and beauty of) broader areas of knowledge within or outside of the narrow confines of their own work. Speaking proverbially, they can’t see the forest for the trees.

On a somewhat related matter, Bob Gussin and Ron Shebuski have recently commented (if not lamented), in print, about an essential question and problem the discipline, if not health care in general, faces. To paraphrase and add my own spin, they point out that we in pharmacology are training many superb molecular biologists, and others with a forté in matters biochemical or subcellular. (Others say that much of the research now done in a department with “pharmacology” hanging on the door could be done just as well in any of several other named departments, or no specific home name at all.) So who are we training who will be prepared to take the knowledge and assess the effects of new drugs in the intact animal — still a necessary prelude to evaluating and using drugs to help humans? There are few training opportunities of this ilk, and the numbers are diminishing such that all of us may face a crisis. Molecular medicine may be sexy and erudite and fundable; it may unlock the mysteries of many diseases and other medical conditions, and pave the way for their eradication or treatment. But we’re not there yet, and I personally hope that no new drug will go straight into me before its safety and efficacy have been studied in some dog or chimp first.

There’s another matter dealing with the nature of our research that is important. In fact, I’ll go so far as to state it has a major bearing on the future of our departments, if not the basic science discipline as a whole. The concept was articulated by some external reviewer who was invited here, I believe I recall correctly, for one of our periodic departmental evaluations.

To paraphrase, “Look at the lab notebooks and publications coming from most pharmacology department research labs nowadays, and if someone didn’t tell you in which department the work was you’d be hard-pressed to figure it out on your own.” In essence, similar work could be done just as easily with the PI residing in a department of physiology, biophysics, cell biology, biochemistry, genetics.... well, you catch on. Indeed, the work doesn’t even need a department to be done. Like the two faces of Janus, that diversity of research interests and talents is both an asset and a liability. Among other things, medical school deans (or their bean-counting henchmen) are looking for places to streamline or just downsize to cut costs. Looking at each department, they try to identify the unique thing or things that are contributed to the institution, and those that could be reallocated and done somewhere else, presumably done just as well.

With few exceptions, one has to ask whether many of the basic science departments contribute much in the way of research that is unique and could only be done under a certain department’s titular framework. Teaching, I believe, is a different matter, and I believe I will counter sufficiently the notion that pharmacology teaching to medical or other health professions students could be done “just as well” by basic science or clinical people who are not trained and dedicated pharmacologists.

Regardless of the nature of one's research, here, overall, we do an outstanding job preparing our students to be scientists. They have excellent role models all around them, they go off with a Ph.D. and do well (five-year post-doc positions notwithstanding). But are we doing even an adequate job of preparing at least some of those students to be educators, should they choose a career in academia and have to teach medical, nursing, dental, or pharmacy students?

I concur with many colleagues who argue that a Ph.D. in pharmacology isn't necessary to be a "good" teacher of pharmacology. But I think it helps, or at least makes it easier, more efficient, and ultimately more on target, content-wise, for both the instructor and the students. Both teachers and learners need what I have described above as a perspective that goes (or at least can go) beyond the confines of the precise topic area as defined by the lecture or textbook title.

An increasingly common approach for faculty, whether they've graduated with a Ph.D. in pharmacology or not, is simply to pick up Goodman and Gilman, read the material that relates to their assigned lecture topic, and go for it. They're bright; the book is comprehensive; and so, between the two, things should work out well. Maybe.

Goodman and Gilman, perhaps more so than any pharmacology text, is too comprehensive in some ways. It is encyclopedic, but learning a discipline from an encyclopedia isn't the best way to go, especially if you then have to teach. Aside from "reading the big print" it still takes time and other forms of prior and acquired knowledge to figure out what is "important" to teach when you're limited to an hour in front of a class on a focused subject. You have to focus on what's important when teaching (we don't have limitless lecture time), and first you yourself must know what's important.

Then, and regardless of which text book you choose, to do what I think is an adequate preparatory and teaching job, you need to look at and understand other chapters that address other topics or concepts that may be more or less peripherally related — those other groups of drugs, or disorders for which they're used — that good or bad affect the drugs you're teaching about.

You also need (I maintain) some basic understanding of the underlying physiology and pathophysiology, and perhaps some anatomy too, whether to provide the more complete and lucid explanations or simply to prepare for that "good question" from a student. Not easy to do if you haven't had physiology or pathology, or any of the sister disciplines. Going beyond, when the audience is health professions students I think you need a reasonable grasp of clinical medicine, which is changing just as rapidly as pharmacology and therapeutics themselves are changing.

You need to pull out a copy of Cecil's, or Harrison's for example (and have the where-with-all to understand it). You need to read New England Journal of Medicine, Annals of Internal Medicine, and other general or specialty journals or texts for even just a little, current, clinical perspective. (It even helps to go back several years and learn about the "old days" — if for no other reason than to have some appreciation of how therapeutics has evolved to what it is now.) Just reading Nature, Science, JBC, and the like, won't cut it. And publishing in one of those journals won't get you a damned thing either if your task is teaching health professionals. Teaching about local or general anesthetics, for example, requires a bit more than having studied the ins and outs of sodium channels. Giving an on-target presentation about drugs for managing hypertension takes a bit more than intensive knowledge on genetic factors that predispose some patients to having high blood pressure.

How and why did we get here? I believe that although there's a common core of pharmacologic knowledge all health professions students need to know from an introductory pharmacology course, they learn better (and are more interested) if some of the material is "oriented" to how they will be using it, whether they will be a physician, nurse, dentist, or clinical pharmacist. More journals to read. Then, of course, there are valuable learning lessons that can be brought in from newspapers, TV, and other mass media — news stories and even advertisements for "new, wonderful, better" drugs that, as we all know, are either overrepresented in terms of their medical worth, or simply me-too versions of old stuff.

So, you need to be up-to-date, not just broad-based or "well read." You need to develop more literacy about several different cultures — scientific and professional, basic science and clinical. Teaching well is not the cakewalk that some say it is — at least not for me. A perfect example is my teaching of antibiotics, anticancer agents, and some endocrine drugs — more precisely, my not teaching those areas, even after 20-odd years "in the business." No matter what I do or read or listen to in class, the stuff doesn't sink in well enough for me to teach it well. It's all a jumble; too many drugs (even just counting prototypes) for me to prioritize so I can separate the big guns from the BBs and teach in a focused, knowledgeable way that would allow me to emphasize the big stuff and not get the irrelevant or the "me-too's" confused in my mind and in my students'.

Doing the optimal teaching job, then, takes time, effort, knowledge, and desire to get at least some broad knowledge in the context appropriate to the students. Reading G & G or any other pharmacology text won't cut it: it's necessary, not at all sufficient. You can't give less attention, spend less time, give mere lip service, to teaching (or other basic science or clinical knowledge) — no matter how good or what your research program is.

I'll add another potential problem: as stellar as our faculty mentors are with research, the "younger generation" (in particular) is too devoid of pharmacologic and therapeutic

cultural literacy to serve as optimum role models for future teachers of health professions students. This is partly an experiential matter: fewer and fewer young faculty received broad-based graduate educations, whether it's in pharmacology or other basic biomedical disciplines, and so it's difficult at best to pass such an appreciation on to one's students. It is also, perhaps more so, a matter of conscious or unconscious choice and necessity: research productivity and funding helps most with professional stature, promotion, and salary.

Regardless of the root causes of a failure to instill a broad appreciation of the discipline, the emphasis is on research. Teaching is a dreaded nuisance that takes time from the "important stuff" — teaching is to be avoided (unless, of course, the dean declares himself to be the "education dean" and teaching suddenly counts).

Our students (even I) rightly see the immediate and long-term necessity for and benefits of research; likewise, I think many of them see faculty disdain for teaching (at least to students other than graduate students, for whom the Socratic method, and pontificating, work), and assimilate it in their attitudes, behaviors, goals and objectives, and even fears. And they may have heard the message "If you lose your grant you have to teach more." That, to me, instantly lessens the institutional value of teaching, and puts it more in the light of punishment than a worthwhile activity for which, I believe, we're here in the first place. No wonder students (and faculty too) would rather do research than teach. Whatever the causes, I wonder what we're doing in a substantive way to remedy it. Some say there is no problem to fix anyway.

Some say we can just let the clinicians do all the teaching. (I've often encountered "real docs" who would gladly teach more, believe they could do a better job than we, but when push comes to shove find they're too busy in the clinics, or on the wards, and teaching becomes oh such an annoyance that also hurts the revenue stream. Clinicians, especially the superdocs we find here in abundance, aren't the ideal solution either.

Clinician-teachers of basic pharmacology have their own "issues." After many "successful" years of teaching about drug therapy of asthma and COPD to the M2s, the new clinical-side coordinator for the sequence approached me to plan for the upcoming year. First, my lecture would have to be cut to a lousy 50 minutes, in large part to free-up time for such M2 "fundamentals" as Extracorporeal Membrane Oxygenation, superspecialized diagnostics this, superspecialized therapy that. Great. Put in all the high-tech stuff that's soooo Michigan, whack time off the #1 pulmonary disease in kids (and many adults); one that, despite advances in drug development has been undergoing a rise in mortality and morbidity rates; the one for which only recently we've identified the true underlying pathophysiology, and target of rational and effective drug therapy should be aimed; the disorder that just about every specialist, generalist, or mom or dad is likely to encounter.

As if that weren't enough, I was advised to cut out basically all discussions of theophylline and methylxanthines, whack back on talk about β -agonists, and just leave in the rest (steroids, leukotriene modifiers). Why? Because β -agonists don't work in the long run. "No one uses them anymore." And the theophyllines were outmoded, problematic drugs: dosage adjustments had been made to fine-tune things; the narrow margin of safety; the multiple side effects and the many significant drug-drug interactions. No one uses them anymore either. Just leave in all the new stuff and (in the gracious 50 minutes you have) focus on what we're using here: that's all that counts. Sorry, buddy. I may be a dumb Ph.D. but I do my homework.

Despite all the problems we "all" know about, lots of docs are still using (misusing) β -agonists as primary therapy for asthma, patients are overusing them (and don't know what other meds to take when), and many of them are dropping dead. Lots of docs are still using theophylline, too — in fact, according to a recent NHLBI data (scarcely a year old at the time), and even according to one of your own colleagues, about 40% — 50% of patients throughout the nation had docs who were prescribing theophylline as the mainstay — far more than were using the preferred anti-inflammatory drugs. In fact, "it's only because so many docs are still using these bad, passé drugs that you guys in the great ICU in the sky (I love to use that term, or simply call the hospital Mecca; drives the specialists bonkers), and the students you train, are getting these messed-up referral patients to begin with. Damned straight I'm gonna discuss them," even if it's only to identify what's really going on in the rest of the world, even if it's only to show the students why these older therapies are bad ones, to show them what they'd better know when they have their own patients or inherit one of the problem cases. Of course I have to discuss the newer stuff too, in that lousy 50 minutes. Makes it real hard to get in a joke, too!

This lack of global focus, and the apparent disinterest in it, isn't unique to the current crop of students or to basic science or clinical faculty. I think, from my own experiences, it's been around for a while. When I was in grad school, I did get a sense that a more global knowledge and appreciation of pharmacology was valued. It was certainly tested, too: my oral and written exam committees had faculty covering every major area of pharmacology, plus faculty from biochemistry, physiology, and anatomy. Everything was fair game. We were even "responsible" for knowing about the then-current "movers and shakers" in pharmacology, and the founding fathers too. Could we have been more coerced (by the faculty!) into getting the global picture than genuinely interested? I honestly don't think so. But in pharmacology today, names like Ahlquist, Clark, Sollman, and Schmiedeberg mean little to the typical grad student or older "pharmacologist." If it didn't occur in their lifetimes, it's probably unknown or almost certainly lacking importance or relevance.

Here I must mention a widely uttered faculty belief (more like a fantasy) that if someone is a good scientist and he or she gives a good research seminar, he or she will

[automatically, they imply] be a good teacher. Bull. The approach, the goals and objectives, and other aspects of a good scientific seminar are in many important ways different from those needed for a good [educationally useful, understandable, and professionally applicable] lecture to medical, nursing, dental, or pharmacy students. Those health professions students do not need to be bombarded with an abundance of data and a litany of hypotheses. They want to be good doctors, nurses, dentists, and pharmacists. People who teach them need to know in depth and breadth, and they need to be able to teach at their students' level, cognizant of what information their students need to know and how they are likely to apply that information. A solid research background helps teachers and students, but it is not the end-all-be-all for good teaching, it doesn't guarantee or even predict good health professions student teaching; and, I'll opine, stellar research achievements can to some extent insulate teachers from (or render them less concerned about) the consequences and criticisms of poor classroom teaching. Someone once said, according to Gerry Abrams (a stellar teacher), that 80% of good teaching is showmanship. I do that, sometimes to the extreme, once described as like a Baptist preacher warning the congregation of hell, fire, and brimstone, but always with the goal of making what has often and widely been called a dull, dry, boring, and overwhelming discipline to teach and to learn into something that comes alive, is exciting, and relevant. Impact makes, well... an impact.

I try to balance students' positive comments that I motivate them to learn (and to faithfully show up for my lectures, even if it's at the god-forbidden 8 AM hour), help them learn, and enjoy things along the way, with negative comments. Thankfully, student-generated negatives are relatively few and generally focus on their not liking my format for notes, or that I told an "aside" that was a little too irrelevant, or that a comment "pushed the envelope" a bit too much. On the other hand, colleagues have simply said that say my good teaching evaluations and teaching awards are based on putting on a show, telling jokes, or entertaining; little, if anything, more. A few forthright ones have said this to my face; the rest, naturally, do so in my absence, yet the opinions filter back to me through one of the many grapevines.

None of these approaches are mere "filler" of empty time that otherwise could be used to present important facts, concepts, and pearls of wisdom, but aren't because I don't know my stuff. With some unabashed arrogance I'll put up for comparison the demands on what my students are expected to learn (and do learn) with the academic demands placed by anyone else in our medical school, or any other medical school for that matter. My humor, my anecdotes, and my meant-to-shock true stories of all-too-frequent drug-related medical blunders by simply ignorant or unthinking health care providers, are all meant to supplement sound pharmacologic knowledge. I've continued with the humor and entertainment approach — toned-down dramatically in this all-too-politically correct environment, where everyone gets not just offended, but "grievously offended," by something; and where every class has at least a handful of cranks, complainers, and others who think they know how to teach and what to teach better than the faculty, and

love to take pot-shots at the most visible (and, in some ways, most vulnerable) person in the room: the teacher.

I think it's important to discuss faculty perceptions of students evaluating us, if for no other reason that it has affected me personally year after year. I've mentioned the all-too-common notion that getting "good" teaching evaluations stems from showmanship, not content or organization or clarity. They are, in essence, ribbons for winning a popularity contest. Conversely, not-so-good teaching evaluations are thought to emanate from the malcontent, angry, or eternally unhappy people with, for whatever reason, chips on their shoulders. Another reason to dismiss the criticisms? Nearly all the evaluations, good or bad, are anonymous.

What puzzles me is that in our roles as scientists we gladly heed, if not tacitly accept and kow-tow to, often scathing and otherwise inappropriate and anonymous criticisms of our grants and research manuscripts. It's a part of life that we don't like, but accept. We often acquiesce to critiques (rather than wage battle after battle to win an unwinnable war and prove we're right for now), even the most cutting or off-target ones, especially if money or a key publication hangs in the balance. Not so with teaching, and especially student-based evaluations. Despite the fact that students are our customers (to use a noun applied so often now to people expecting and seeking a service... patients included), and that they know whether teaching is effective for them, their opinions are often ignored, denigrated, or perceived and brushed-off as baseless because they are expressions of subjectivity from people who are much younger than we, and certainly are not our peers. How often do we read the comments, analyze them to see if there are common themes, tally them up, and really assess ourselves and change our behaviors. That we tend not to that with teaching, but do with science all the time, is an odd phenomenon to me. One final but important development in the evolution of teaching was, of course, the use of computers, some neat software, and the Internet, as substantive aids to (or in some cases substitutes for) the formal lecture. We can trace the roots here mainly to Giles Bole and Wayne Davis because of their support not so much for the technology per se as for the educational benefits and the institutional infrastructure to make it accessible to students in and out of class.

In the context of traditional lecture-based education probably the most important developments for teachers were PowerPoint and later the internet browser. Ben Lucchesi, who had for years dazzled audiences with his colorful 2x2 slides (at a time when most everyone else was using ugly and often sloppy overheads; Ben was always rolling in extra grant money), eventually converted all his lecture slides into PowerPoint. He was light years ahead of the rest of our department's faculty — if not faculty throughout the medical school. In this department I was probably next to do the same, although not nearly on par with Ben in terms of the number of colors, fonts, italics and bold faces I could cram onto one slide. Gradually, more of our faculty caught on, but the numbers are small, the transition slow and by no means complete.

I was very late getting into the World Wide Web, whether as a seeker of research/teaching information or as a personal “surfer.” The medical school talked about increasing emphasis on the web (for information and to foster “self-directed learning”), at first and mainly in the form of posting admissions, Student Programs, and curricular information. The first two categories came out of my shop when I was associate dean. The curricular and teaching information, Med Ed’s bailiwick, was, at first, limited mainly to component calendars (M1, M2, etc.) and syllabi for all four years of med school, and some course descriptions. The academic calendars were great, especially for my teaching in the M2 year. If I ever forgot when I was to lecture, or wanted to see who lectured on what before or after I did, I could look it up. Or so I thought. It was good in theory, but the school quickly fell behind with keeping things up to date.

I had toyed with the idea of putting up “something” on the web. I thought of my nursing course and how there, and everywhere else, I largely despised having to get handouts or an entire coursepack ready months before the actual date of a lecture, and didn’t like the fact (nor did students) that if I wanted to “fine-tune” my notes (adding new drugs, deleting ones that were pulled from the market; addressing new therapeutic recommendations) I’d either have to redo (and recopy) the notes, or let students grumble about the month old notes being out of date. I never had the heart to dump much of my mundane tasks off on busy office staff, so I tried to do things myself. Being somewhat of a procrastinator, each teaching day usually began, then, with my making a hundred sets of 5-page notes to hand out at lecture. I got caught more than once with a copier breakdown. I’d had it with hard copy.

I finally decided to put my nursing pharmacology notes on the Web, learning to do the pages myself. I wouldn’t have to depend on any one else’s priorities, whether to make the pages or post them. I could have more time to revise and update; I could avoid the copying hassles and huge expense of copying; and I could bolster the old-fashioned concept that students need to be accountable for getting their own information, rather than having handouts automatically plopped in their laps. In fact, I did the “full Monty”: On my nursing site I posted not only notes, “finalized” a guaranteed 48 hours before the lecture, but also the course syllabus; old exams (previously they were on reserve in the library, which of course wasn’t open 24 hours every day, as the web is); grades (which previously were posted outside lecture halls); and a growing list of links to other web sites of both pharmacologic and other nature. More helpful to the students: I converted all my PowerPoint lecture slides to Acrobat and posted them too. Doomsayers predicted that “nobody will come to class anymore if all the notes and slides are on the web.” Not my class. As I said, I make coming to lecture worthwhile. There was no decline in attendance.

There were nay-sayers, 99% of whom were the faculty. I was bluntly told I couldn't just post notes on the web for students to get on their own; I had to provide handouts. Wanna bet? Show me that in my contract! I was told, correctly, that not every student had a personal computer. Right, but the Learning Resource Center in Taubman Library has about 50 of them, all free to use by any registered student, and it was rare to find more than a dozen or so already in use. As other courses developed their own pages, I wanted to keep my notes files on my own site, putting just a link to the file on that other course's page. Nope, I was told. Reason? That would force the students to click another link. Just one more goddamned click was, apparently, just too much work.

But the most amazing comment from a colleague was that I couldn't drop handouts and post notes on the web "because the students weren't trained to use the web." Excuse me, but who trained me? Is there any "training course," whether in the medical, nursing, pharmacy, or dental school curriculum, on using the web?? This generation of students is far more web-savvy than an old technophobe like me. If they didn't know how to use it they'd better learn somehow, and soon, because that's where the whole damned information world's going. That's where I was going with teaching them.

Using web-based notes in courses where I "guest lectured" wasn't easy, especially early on when I was the only faculty member doing things that way. I wouldn't like guest lecturers in my course saying they were going to do things their way, especially if I viewed their way as a somewhat radical departure from the old way. But I was ready to say just that, or they could find someone else to teach. Now, all the service courses our department teaches, and nearly all the faculty who teach in them, use the web for their notes and such other things as practice questions and the like. Now, a few years after I got the ball rolling in that direction, it's at once funny and highly annoying to hear other course directors praise the benefits of web-based notes and course pages, talking as if they did it first, as if they weren't the ones who told me either I couldn't do it, or it just wouldn't work.

My web pages for all my teaching have been up now for four years. They've grown from nursing pharmacology only to all the courses in which I teach: notes, slides, even practice questions. Now, during the academic year, August through April, my site averages about 2,000 visits a month, and from students and faculty all over the world. They're constantly updated as each lecture approaches, and if at any time I discover a new resource (e.g., a link), I post it and let the students know by e-mail.

I use e-mail to students a lot, and not just for the usual purpose of trying to defend the grading of exam questions. I watch for drug updates, including recent warnings about adverse effects, new practice guidelines, drugs withdrawn from the market, and pass the information on to the entire class — even if I'd given my last lecture to them months before. Students are generally comfortable enough e-mailing me with a question (it may be about class material, or their mom's illness and her meds) that they do it, knowing they'll get a thoughtful and complete response (sometimes with an additional pharmacologic or therapeutic lesson or explanation), usually that same day or night. Too

much free time on my hands? Brown-nosing for another popularity award? Or is it just doing what I think is my job to educate?

Postscript — Another Death Knell for Pharmacology?

There's another medical school curricular revision afoot here, another one in which basic science teaching time is likely to get cut (again) radically; another one where, I fear, solid basic science education is going to be cut, to the detriment of students and faculty alike. There's also talk of disbanding all the basic science departments as we know them, and putting them under some new general title and administrative layer. How pharmacology, and pharmacology teaching in particular, will be affected is a mystery, but it is worrisome to me.

The health system's latest strategic plan calls for getting students on the wards and in their clerkships by the middle of a to-be-shortened M2 year. I predict an educational and emotional strain on the students (self-directed learning will become even more important and more time-compressed, and they'll still have to pass the USMLE before they start rotations). There will be more expectations on faculty to help the students and less opportunity and time to do it. Student angst and unhappiness is likely to rise (and for good reason), the blame will be put on the administration, and that will trickle down to the faculty. Were the mandate for this change to come from the faculty, any negative consequences should appropriately rest on their shoulders.

Now, however, the ideas and impetus are not yet coming from a Giles Bole-like participatory process in which the teaching faculty was involved, or even consulted. Sitting in curriculum meetings with all the basic science course directors, many of whom are superb and dedicated teachers with years of experience, I've learned that literally none of those educators have been involved in any decision-making or opinion-rendering on a serious matter that is now codified in a strategic plan. Barring a major revolt and knowing that history repeats itself, it's damned likely to occur because the administration wants it so. Communication of a desire or need (let alone a rationale) for such a change was never done formally (and never having any communication other than a done-deal dictum is the likely type of message) in a way that involved the teaching faculty at-large, or even the students.

And so the rumor mill is cranking with speculation (and some degree of credibility) that money matters are the key factor; that we need to give students more time to "explore" career choices before picking a residency, and that means more clinical training (at the expense of basic science); that Michigan (again) wants and needs to be an educational innovator (although a few other schools have gone to an abridged preclinical curriculum, and apparently students don't like it); and more non-educational or quasi-educational matters are the motive forces.

Time will tell how this impacts teaching and learning. New curriculum or not, no one left or prepared to teach it be damned, we'll survive. After all, we're Michigan.

Whither Pharmacology

Where pharmacology (as a discipline) goes, what it will become or how it will look, depends to a great degree on how we “define” pharmacology — not simply as the title on a building directory or journal, but as a discipline that is unique in both the scientific and educational sense. I think most of us will agree that one of the beauties of the discipline is that it encompasses and even enriches the other basic science disciplines. There are interrelations with biochemistry, physiology, and cell biology (as examples); there is room for (and we rightly embrace) all sorts of methodological approaches or “orientations,” whether they are the more traditional systems-oriented approaches (translational research) or those of an immunologic, molecular, or genetic nature; they can be oriented towards neural, cardiovascular, behavioral; and so on.

Where we go, what we look like — indeed, even if we survive — is up to us. If we just look at academic institutions like ours, a necessary blend of both educational and investigative missions, and ignore the future needs of drug companies, you may see that there aren't many people besides ourselves who are advocating and rooting for our future. Some don't even know what it is we do — at least do differently, when it comes to research. Others may have a better sense of our missions, but feel that we don't “own” the roles and responsibilities, and we're not the only or best ones to take on those tasks. The support needs to come from on top: the deans. However, I believe most medical school deans would just as soon do with one less department, one less administrative layer (although they will, no doubt, add more administrative layers of their own), and “ad hoc” the educational mission.

We all agree that we want to see pharmacology survive as a discipline that is at once unique yet simultaneously integrated discipline. We talk that way. We complain. But what are we really doing, in substantive and likely to be effective ways, to bring that about? I believe that longevity depends those unique things we can bring to an institution, and provide better than others. In my way of thinking, it's not the research, it's our teaching to medical and other health professions students.

Frankly, I think we're screwed. Dead. No one gives a damn anymore.