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PSYCHOLOGY OF THE SCIENTIST: XLIX. ON BECOMING A STUDENT—AGAIN[1,2]

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Summary.—The author describes the difficulties he encountered when, as a full professor in the Departments of Psychology and Psychiatry, he wished to enroll as a medical student and obtain an M.D. Forced to take classes in chemistry and zoology to make up his "undergraduate deficiencies," he soon learned first-hand why students complain so bitterly about poor teaching and why they are often forced to cheat in order to "beat the curve." The author concludes that the quality of undergraduate instruction might improve if all professors occasionally took courses as well as giving them.

For the past 25 years, I've taught psychology at The University of Michigan. And like most psychologists (and almost all teachers), I thought I knew a lot about learning. For that's what education is all about, isn't it—helping students learn new ways of thinking, feeling, and behaving?

Alas, I now realize that most professors are more concerned with *teaching* than with *learning*. I discovered this fact in 1963 when, having just been promoted to the rank of full professor, I enrolled as an undergraduate and began taking courses again (for credit, thank you). I will describe my horrible ordeal in some detail in a moment. First, let me tell you the plain, unvarnished truth about a college education.

Professors and Pontiacs

Generally speaking, university professors are pretty decent people. However, since our promotions and pay raises typically come from how good our research is, we don't always pay as much attention to our teaching as we might. As a result, we tend to judge our pedagogy on what we say and do in class rather than on how much our students learn. If the students fail to benefit from the pearls of wisdom we cast before them, well, we've done *our* part, so you can't really blame the teacher, now can you? Why, that would be like blaming the top brass at G.M. for the fact that Pontiacs aren't selling as well as they used to, when everybody knows that the blame should be put on the politicians in Washington, or on the OPEC nations, or on the "nasty Japanese and Europeans" who dare to turn out well-built cars cheaper than we can.

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[1]This paper is adapted from a Presidential Address (Division 2, Teaching of Psychology) delivered at the American Psychological Association meeting in Montreal September 3, 1980. Request reprints from J. V. McConnell, POB 7590, Ann Arbor, MI 48107.

[2]Traditional use of pronouns in this paper is an editorial decision. (a) "He/she," "they," passive construction, etc. seem to be unduly clumsy in this situation. (b) There is little support in our experience for the often cited claim that the use of the generic pronoun *per se* leads to increased thoughts of men. This impression receives some research support in an interesting article: C. M. Cole, F. A. Hill, L. J. Daley. Do masculine pronouns used generically lead to thoughts of men? (*Sex Roles*, 1983). The Editors.

The truth about the automobile industry is, of course, that during the 1970's the times changed—and the automobile industry didn't. Detroit lost touch with its consumers and employees, and we are all paying the price for the industry's failure to keep abreast of the times.

And the unvarnished truth about the educational industry is, of course, that too many of us who teach have also failed to provide our "customers" with the best-possible product. And thus our present methods of teaching may be as obsolete as are the gas-guzzlers that Detroit produced during the 1960's.

I didn't always see the educational process as I do know. Indeed, it has only been in fairly recent years that I have come to realize that the view of the classroom a teacher gets *from in front of the lectern* is entirely different than the view the students get from the seats *in the back row*. Let me share with you the story of how I came to hold this radical view, and why I am presently as worried about our system of education as I am about the frenzied attempts that Detroit is making to recapture its lead in producing automobiles.

1963: It All Begins

1963 was a landmark year for me. To begin with, I was "finally" promoted to the exalted rank of full professor. What I was full of, naturally, was pride. Gaining the tenure associated with a professorship also filled me with a new-found sense of security, for surely I had finally proved to my peers what a well-educated scholar I was.

But with this security and pride came a nagging thought—what did I really know? A strange question for a full professor to ask, admittedly. But perhaps because I had finally achieved status and tenure, I was at last free to inspect my lapses and ignorances as well as my strengths and accomplishments.

And when I looked at the enormous amount of information in the world that I didn't know, I found myself troubled. Under most circumstances, the pressure of work would probably have left me little time for doubts and fears. But it was in 1963 that the people at NIMH were kind enough to give me a Career Development Award. For the next five years, the government would pay my full-time salary, an act of federal generosity that allowed me to do anything in the world that would enhance my development as a scientist and educator.

What a marvelous gift, I told myself. A five-year paid vacation! Of course it didn't turn out that way at all. Since I suffer painful withdrawal symptoms when cut off from my students, I continued to teach half time. And I kept right on running experiments on animal learning in my laboratory. But I also felt free to return to the classroom *as a student*—to do a little learning on my own. And I did learn a great deal—but not quite what either my teachers or I expected.

It was in 1963 too that James G. Miller, then the Director of the Mental Health Research Institute at Michigan, offered me a position at his institute. MHRI is officially the "research arm" of the Department of Psychiatry. Thus when I moved to the Institute, I found myself the proud possessor of a research professorship in the School of Medicine as well as maintaining my teaching professorship in the Department of Psychology.

Now, it soon occurred to me that despite my fancy new professorship in the School of Medicine, I knew precious little about the medical sciences. And since my research on the biochemistry of memory was rapidly moving into areas that were more medical than behavioral, I got the bright idea that I should try to get an M.D. degree to add to my Ph.D.

Jim Miller, knowing the ways of the academic world far better than I, offered to *hire* an M.D. to work with me instead. But since in my daydreams I already saw myself as a world-famous person (or some such), I told Jim that I didn't want to know about medicine "second hand." No, I would go and acquire the knowledge on my own.

What I would like to tell you about next is my rather frantic and often foolish efforts to become a student again. As you will see, my viewpoint on the educational process has never been quite the same since then.

The Associate Dean and I

The first problem I encountered was one that thousands of undergraduates face every year—how in the world do you get *admitted* to medical school? Of course, I had a slight edge over most of those undergraduates, for I already had one doctorate. More than this, I now held the equivalent of a full professorship in the Medical School. So, I said to myself, all I have to do is to go tell the Dean that I want in, and that will be that. Little did I know!

At any rate, I called up the Associate Dean in charge of admissions and made an appointment. Once in his office, I told him my story, and then requested immediate admission to that year's freshman medical class. I expected the man to welcome my request with great enthusiasm. But instead, the Dean gave me what seemed a bemused look and asked me, "Where's your undergraduate transcript?"

Frankly, I was flabbergasted at his question. Rather than patting me on the back for what I saw as a daring course of action, the Dean seemed to be questioning my credentials! So I "lost my cool," I suppose, and responded by giving the man a lecture he certainly didn't need.

"What is the purpose of the admissions process anyhow?" I asked the Associate Dean. "Surely it should serve as a way of screening out the incompetents, the ones who aren't bright enough and motivated enough to succeed as students at the graduate level. And obviously, since I've already obtained the Ph.D., and achieved a full professorship in this very medical school, I

shouldn't have to prove myself further. But if you do have qualms, you might keep in mind the fact that I am now qualified to sit on the Admissions Committee itself. And if I am good enough to pass judgment on other applicants, surely I am qualified to be admitted myself."

The Associate Dean smiled at my tirade. "I have no doubts about your intellectual qualifications," he said. "But part of the admissions process is aimed at making sure that even bright students have the prerequisites necessary for survival in Medical School. We can make you a professor of medicine no matter what your academic record is like. But we are forbidden by state law to enroll you as a student unless you've taken certain biology and chemistry courses. I sympathize with your plight, and I'll do what I can to help, but I simply can't admit you until I've inspected your academic transcript."

Now, I'm not sure how many full professors keep their undergraduate transcript close to hand, but I assure you I wasn't one of them. I looked through my files, with no success whatsoever. Finally, in desperation, I called my Mother to see if, by chance, she had saved the damned thing. Fortunately, Mother was always a bit of a pack rat, and a day or so later she called me back to say that she had located the transcript in a trunk in the attic.

So, armed with the magic piece of paper—and with a certain amount of hubris—I returned to the Dean's office. He looked the transcript over for a very long time, and then shook his head slowly from side to side. "I'm sorry," he told me, "but according to state law, you must have at least three courses in organic chemistry to be admitted to the Medical School. You've had introductory chemistry, but nothing else. So we cannot let you in."

Well, naturally, it does make a certain amount of sense to require incoming medical students to have taken organic chemistry. However, I was not to be deterred by such logical trifles.

"But surely my many years of research on the biochemistry of memory must count for something," I replied. "After all, I'm helping out on a project directed by a man who is professor of organic chemistry at another university. In fact, this man has won the Nobel Prize in chemistry, and he's now trying to replicate some of my work. Surely if I'm good enough to give advice to a Nobel Laureate on the biochemical correlates of behavior, that must count for something."

The Dean smiled rather wanly. "How many credit hours will you earn from this experience and when will they appear on your transcript?" he asked. And before I could give him a snappy response, the man continued: "Furthermore, by law you must have taken a course in introductory biology to be admitted. I see that you have several credits in physiological psychology, but according to this transcript, you've never taken an introductory course in botany or zoology."

I shook my head in bewilderment. "But I'm a fellow of a learned society of neurophysiologists, I'm a consultant to the Biological Sciences Curriculum Committee in Boulder, and I've just turned down a professorship in zoology at another university where I would have been *teaching* the beginning zoo course."

"But that sort of thing doesn't appear on your transcript, now does it?" the Associate Dean responded. "And I'd be violating state law if I overlooked the matter." The Dean then shook his head in genuine dismay. "No, much as I'd like to be of help, and much as I admire your spirit, according to state law you simply don't qualify for admission to the Medical School. The only way we could bring ourselves to consider you would be if you made up your undergraduate deficiencies."

"How do I do that?" I asked, wondering vaguely if in the Medical School the initials "Ph.D." didn't stand for "Phatal Deficiencies."

"You will have to enroll as an undergraduate again and take at least three courses in organic chemistry and one in biology," the Dean told me. Then, after a pause, he added with a grin, "It would help, of course, if you managed to get good grades while doing so."

Well, stubbornness was always one of my cardinal traits, and I immediately decided that I would show the Dean what I was made of. I would use the first year or so of my Career Development Award to play a game of academic "catch-up." And annoyed as I was, I consoled myself by thinking that gaining admission to the undergraduate college at Michigan would be easy, since I had been a teacher there for almost a decade. And if I was bright enough to *teach* introductory science courses, surely the *taking* a few of them would be a snap.

And so, confident that all my troubles were behind me, off I went to see the Director of Admissions at the College of Literature, Science, and the Arts.

The Director of Admissions and I

The Director of Admissions for the Lit College (as we call it at Michigan) was a pleasant fellow who sympathized with my difficulties about getting into medical school. At least he was pleasant until he discovered that I, a full professor, actually wished to enroll as an undergraduate. "But you can't do that," he informed me. "You already have the B.A. degree, not to mention the M.A. and the Ph.D. Thus you are ineligible for admission as an undergraduate since you can't take the same B.A. degree twice."

But now I was on my home turf, so to speak, and I knew something about the rules. "How about registering as a Special Student?" I asked.

"Highly unusual for a full professor to become a Special Student," he stid. "Not exactly illegal, of course, but highly unusual. Couldn't you just sit in the courses informally?"

"Would 'sitting in' appear on my transcript?" I asked politely.

"Of course not," he replied.

"Well . . ." I said.

The man mumbled for a while, but not being able to find a regulation that actually *prohibited* my doing what I wished to do, he eventually gave in. So I filled out the multi-paged admissions forms, wrote a short essay on what my academic goals were, and in the fullness of time received in the mail a notice saying that I had been admitted to the Lit College as a Special Student.

Enclosed with the notice, naturally, was a warning that work taken as a Special Student would in no way qualify me for a degree, and that I was not to come back to them later on pleading for "regular" admission as an undergraduate at The University of Michigan.

Obviously the worst was over, I told myself. Now all I had to do was register, attend class, and pass the exams.

The Registrar and I

Next, I pored through the course catalogue and selected both an organic chemistry lecture and a zoology class that wouldn't conflict with my teaching schedule. Then I filled out my enrollment card and trotted over to the Administration Building to sign up.

Naturally, I cheated a bit. Most undergraduates would have to stand in line for several hours to work their way through the registration process. But rank has its privileges, and I guess I was pretty "rank" at the time, so I made an appointment to see the Registrar himself. I told him my story and found him properly sympathetic. Then I handed him my enrollment card.

The man looked the card over carefully, then suddenly frowned. "But this card hasn't been signed by an academic counselor," he said.

I shrugged my shoulders, took the card, signed it myself, and returned it to the Registrar.

"That's illegal," the Registrar informed me. "No student is permitted to sign his own card. You'll have to go see a counselor and get a proper signature, or I cannot allow you to register."

I argued with the man for several minutes, but to no avail. In those days, the faculty and administration considered students too immature to be able to figure out what was required of them. So each student's course selections had to be "vetted" by a counselor each semester. Nowadays, we have decided that the students *are* mature enough to handle most such matters themselves. And surprise! It turns out that most of them are.

But in 1963, the rule was that no student could sign his own card, and that was that. No exceptions. Finally, I prevailed on the man to call up the Associate Dean who was in charge of academic counselling. The Associate Dean promptly informed the Registrar that, since I had been a counselor myself for many years, and had signed enrollment cards for hundreds of other students, it probably was all right for me to sign my own card.

"Highly unusual," the Registrar mumbled as he put down the phone. But eventually he capitulated, stamped my card, and handed it back to me. "Take this to Window 5, pay your tuition and fees, and you're all set."

"Wait a minute," I said instantly. "I'm a professor here. It's ridiculous to expect me to pay tuition and fees."

"Nonsense," the Registrar replied. "The rules clearly state that no student can be exempted from tuition and fees except in cases of dire financial need. As a full professor, you obviously don't qualify."

Well, given the fact that faculty salaries are always a bit on the low side, I wasn't so sure about not meeting the "dire need" requirement. But my argument took a different tack. I reminded the Registrar that The University of Michigan has always encouraged its faculty members to improve their knowledge and skill. Surely requiring them to *pay* for enrolling in courses wasn't a very astute way of "encouraging" the process of continuing education.

The Registrar shrugged his shoulders. "I sympathize with your point of view," he responded, "But I'm trapped by University regulations. According to the rules, only the Board of Regents can exempt you from paying fees."

"How do I see the Regents?" I asked.

"First, you petition the Dean of the Lit College," the Registrar told me. "If he approves, your petition will go up through the chain of command until it reaches the Regents."

"But classes start next week," I replied.

"Sorry about that," the Registrar said. "Perhaps you should have begun the registration process somewhat sooner."

Oh, well, I had sinned again. What I had done, of course, was to point out a discrepancy between the stated goals of the University and its actual performance. And I assure you, that's no way to make friends and influence people in the academic world. But I did manage to push the matter up through the Regential level and, in the fullness of time, the Regents did waive my tuition and fees. In fact, my case set something of a precedent, and nowadays, if a professor at Michigan wants to enroll in a class for any legitimate reason, the University will almost always assist as best it can.

At any rate, after I had jumped all the hurdles that we place in students' paths to prevent them from entering college and possibly learning something, I was at last officially enrolled as an undergraduate student at Michigan. And I had my student I.D. card and my library card to prove it! All I had to do now was to show up at my organic chemistry lecture and at the course in invertebrate zoology that I had elected to take as a substitute for the introductory biology course.

And pass the exams, of course.

THE ORGANIC CHEMISTRY PROFESSOR AND I

Before the first day of classes, I stopped by the Chemistry Building to chat with Martin Stiles, who was the lecturer in the beginning organic chemistry course. Martin and I soon became good friends, but our first meeting was somewhat stilted. After all, he was but a mere associate professor, so I outranked him. To complicate matters further—as Martin confessed years later—at our first meeting he had assumed that the Dean had asked me to sit in on his class to determine whether or not Martin was any good as a teacher.

In truth, Martin was an excellent lecturer, and I thoroughly enjoyed his classroom presentations. But I enjoyed the first day's class most of all. As it happened, I was helping teach the introductory psychology class that year. And an hour or so after I had given the first lecture to some 1,200 psychology students, I showed up in the chem auditorium and took my seat.

The young man sitting next to me stared at me for some time, then finally asked, "Didn't you just lecture to me in that big psychology class?"

When I allowed as how I probably had, a puzzled look came over the young man's face. "You just sitting in on this chem class?" he asked next.

No, I said, I was enrolled for credit, just as he was.

"What's the matter, don't you have a degree yet?" he asked.

I told him I had several degrees, but was trying to get into medical school to earn the M.D. as well. The response seemed to please him momentarily, but then he frowned. "Gee, I sure hope you don't muck up the grade curve too much."

I laughed, and promised I wouldn't muck up the curve if I could help it—a promise all too easy to keep, as I soon discovered. For, as it turned out, I had tremendous difficulties getting through that first course. Part of the trouble was my own, as you will soon learn. But part was due to the fact that Martin graded on rather a strict curve, so the 200 or so students in the class were sworn enemies from the moment the class got underway. However, the major difficulty I had was with the textbook.

THE ORGANIC CHEMISTRY TEXTBOOK AND I

The textbook Martin Stiles had chosen was one of the best-known in the field, and the first chapters were fairly simple to comprehend. I took extensive notes in class, read the chapters several times over, and spent the entire day prior to the first examination studying. As I recall, I got a grade of 97 on the exam—not the highest score in the class, but a good solid A nonetheless.

But from there on, it was all downhill. As we delved deeper and deeper into the intricacies of molecules and complex organic reactions, the prose in the text got murkier and murkier. Often I found myself reading a given chapter three or four times, and still not able to make heads or tails out of what I had read. There seemed to be no overriding logic to what material was presented,

and in what order. Furthermore, the authors frequently would introduce a topic, discuss it briefly, and then utter those magic words, "From the above, it is obvious that . . ." Of course what followed was, to me, not obviously related to anything at all.

At first, I sought the help of the graduate student who ran the discussion section I was in. But I soon found that, while he knew a lot about chemistry, he knew precious little about teaching. More than this, he didn't care to learn. As evidence of his indifference, let me relate one incident that occurred early in the term. At the end of each chapter in text were a dozen or so "practice questions," the answers to which were printed elsewhere in the book. Because I wanted to test my comprehension of the material in any way I could, I tried to answer all of the questions, but one in particular gave me fits. I worked at least two hours on it, but kept getting an answer different from the one the book gave. Finally, in desperation, I asked the teaching fellow for help.

"Oh," he said, "The book has the wrong answer for that question."

"Why didn't you tell us that in class?" I asked.

"Because it should have been obvious to you the book's answer was wrong," the teaching fellow replied, giving me what seemed a disdainful look.

So I gave up on the teaching fellow and sought Martin's help, for he was always willing to clarify matters for me. But I soon found myself stopping by his office almost daily. So, eventually, I stopped pestering Martin and tried to work through the text on my own. And what a waste of time that turned out to be!

Since I found the text impossible to understand, I tried to memorize it word for word. I studied 20 to 30 hours each week, and just before the next exam, I "pulled an all-nighter," to use a well-known student phrase. Still and all, I managed to score but a low B grade on the second exam.

Naturally, my ego shrank measurably, and I swore I'd do better next time round. So I increased my study time to about 30 hours per week, memorized even harder, and spent almost the entire 48 hours prior to the third exam in complete seclusion, plugging away at my notes and at that impossible textbook.

The result? I got a low C on the test. At this point in the semester, I was no longer concerned with "the thrill of discovery," or "the joy of learning," or even "mastering the field of organic chemistry." No thank you, I was worried sick about flunking out. What would the Associate Dean at the Medical School say about something like that, I ask you? For that matter, what would the Dean of the Lit College say if one of his "full" professors came up "empty" in the grade department?

Fortunately, I did somewhat better on the final examination, and managed —as Martin Stiles so politely put it—to earn a "gentlemanly B." Not a "professorial A," you understand, but a liveable-with B.

The Invertebrate Zoology Professor and I

Just as fortunately, I did rather well in the invertebrate zoology class I took. For the most part, that course consisted of memorizing the species names and the major characteristics of some 287 different single-celled organisms. We didn't learn much about the behavior of the wee beasties, or about their ecological niches, or even much about their medical importance. No, because the professor was a bit of a nut about taxonomy, we just memorized name after name after name. *That* sort of thing I could manage fairly easily, thank you, because I knew all about mnemonics and other memory devices. So I got an A in invertebrate zoology.

But as you might suspect, little of this sort of knowledge is needed either in psychology or in medicine, so I forgot at least 283 of the 287 species names the moment I finished the final exam. In retrospect, the course was a pretty complete waste of my time, and had no real relationship to what one learns about infectious diseases in medical school. But I *had* met the state requirements, and anyhow, where is it written that a college education has to have any practical value?

Some Preliminary Conclusions

As that first dreadful semester ended, however, I began to draw some conclusions about undergraduate teaching. To begin with, I finally realized that many of the complaints about the educational process that my students had raised over the years were quite justified. Many graduate teaching fellows are not good teachers, nor do they wish to be. Their careers rise or fall on the research that they do, and handling a discussion section in an introductory course is merely a necessary evil for many of them.

Don't misunderstand—there are many graduate assistants who are superb teachers, better than the senior staff members in some cases. Unfortunately, I never encountered any of these "supergrads" during the year and a half that I returned to the classroom as a student.

Second, and much more important, I concluded that most textbooks used in undergraduate courses are simply inappropriate to the task of educating their intended audiences. The authors of the organic chemistry text I used certainly were bright and knowledgeable scientists who probably knew their field from A to Z and back again. What they did *not* know was how to communicate this knowledge to their readers in an interesting and memorable way.

Let me state this point more forcefully: If a full professor spends 30 to 40 hours a week trying to comprehend an introductory textbook but cannot make sense out of the material even after 3 or 4 careful readings, then there is something shamefully wrong with that textbook.

Worse than this—at least from a student's point of view—is the following fact. If I couldn't hack it in that course—with all my experience and supposed

wisdom, and having all the study time available that anyone could reasonably ask for—then how in the world is the average undergraduate going to master the material found in that textbook? Perhaps now you can understand why, when I wrote my own introductory psychology text (1), I tried to create a book that even so-called "average" students could comprehend without too much difficulty. And to accomplish that miracle, I had to test the book out again and again and again on hundreds of students in a variety of different academic settings *before* the first edition saw print.

And in the process of making the book readable, I had to revise what I had written again and again and again until the feedback the students gave me convinced me that they not only could *memorize* the material without too much trouble, but that they could *understand* and *utilize* the data in the book as well.

The third conclusion I came to at the end of my first semester as an undergraduate/full professor was this: Grading "on the curve" *causes* a great many more problems than it *solves*. When I asked Martin Stiles why he gave so few A's and B's in his course, he replied that since organic chemistry was required for admission to most medical schools, he was under considerable pressure to "screen out the dummies." When I asked him if he knew whether there was any correlation between getting an A in organic chemistry and later proficiency as a medical practitioner, he said that he presumed there should be some correlation. But he didn't know "for sure."

Well, I know, and so do you. There isn't a very strong correlation at all. There *is* a fairly high correlation between undergraduate grades and those grades that students obtain in medical school. However, neither type of grade predicts very well how the student will do once that student begins medical practice.

Now, please put yourself in the average student's place as the student takes organic chemistry. Faced with a textbook that is often incomprehensible, a teaching fellow who can't (or won't) teach, and a grading system designed to flunk out a significant percentage of the people in the class *no matter how much they learn or how well* they perform, what is the average student to do?

Cheat, that's what! For cheating is the only possible way that a large number of students can survive in this situation.

And, in fact, there was a great deal of cheating in that organic chemistry class. Some of it was blatant and overt; other cheating was subtle and covert.

The blatant cheaters were those who brought notes to exams or who paid someone else to take the tests for them.

The subtle cheating took many forms. First, there were the fraternity and sorority files of past exams, hints on how to "get by" offered by students who had already taken organic chemistry, etc. People like me—who didn't belong to a "Greek" social organization, or who didn't have friends to give them guidance and counsel—were at a distinct disadvantage in that class.

Second, there were the "crib sheets" and "outlines" and "universal guides to organic chemistry" sold openly at the bookstores. These "aids" are not illegal, I suppose, but to my way of thinking, they are distinctly immoral.

(Incidentally, I'm not talking about the sort of "Student Manuals" that accompany many introductory textbooks, for these ancillary materials are designed for a specific text and actually supplement the material found in that text. I'm talking about books that *re-state in the simplest possible language* material found in texts or that merely give students mnemonic devices for memorizing material rather than explaining it in understandable terms.)

The third form of "covert cheating" involves those graduate students who advertised their services as "tutors" in organic chemistry. I detect a real conflict of interest here, since some of the "tutors" were also "teaching assistants." Obviously, the worse the textbook, the poorer the quality of teaching in the discussion sections, and the more difficult the exams, the greater the need for "tutors"—and the more extra money the graduate students would make.

Why do I consider tutors and crib sheets and frat files to be covert forms of cheating? For this reason: If a class is well-taught by concerned instructors who pay attention to their students' needs and abilities, if the textbook explains the material to be learned in clear and memorable language, and if the grading system emphasizes achievement rather than failure, then there would be little or no need for such legal but immoral pedagogical practices. However, if the course isn't well-taught, if the textbook is unreadable, and if the grading practices are patently unfair, then it is the *professor* who is cheating the students, and not the other way round!

The fact that there *are* frat files and crib sheets and tutors in abundance suggests to me that perhaps we should worry more about professorial cheating than about that practiced in self-defense by many students.

The Chemistry Laboratory Assistant and I

Well, so much for the first disastrous semester I spent as an undergraduate, and on to more amusing experiences.

At Michigan, a student cannot take the first laboratory course in organic chemistry until after successfully completing the first lecture course. Having earned a "gentlemanly B" in Martin's lecture class, I was eligible to take the lab, and did so the next semester.

I approached this course with high expectations, at least as far as getting a good grade was concerned. After all, I had run my own laboratory for many years. And because my research dealt with the biochemical correlates of memory, I assumed that I would have little or no difficulty breezing through the organic chemistry lab, right?

Wrong. As it turned out, the lab course was far more difficult—at least during the first few weeks—than the first lecture course had been. Let me explain why.

I reported bright and early to the first meeting of the lab course, was assigned a bench, and tried to get things organized for the first experiment we had to perform. I spent 20 minutes standing in line to use the device that would bore holes in a cork, then stood in line another 20 minutes to use the archaic balance scale that always seemed to lack the very balance-weight that I most needed.

Now, to understand the frustration I felt that first day, you should know that in my own laboratory at the Mental Health Research Institute, we found it quite possible to purchase corks with holes already bored in them, and we had a variety of fairly inexpensive electronic scales that would weigh things extremely accurately in the blink of an eye.

But then, my lab—with its ultra-centrifuge, its spectrophotometer, and other impressive gadgets—was as modern as NIMH research funds could make it. The organic chem lab, however, was straight from the 1890s. We were taught to perform experiments that no "real" scientist in his right mind would dream of performing—or would ever need to perform, for that matter. And we had to use equipment that no "real" scientist was ever likely to encounter in a modern organic chem lab. And to make things worse, some of the street-wise students—knowing the class was graded "on the curve"—usually managed to steal or to break things like the balance scale or the cork borer after using them. This way, you see, the street-smart students put the rest of the class at a distinct disadvantage.

Incidentally, when I complained about the lousy equipment, I was politely informed that the Chemistry Department didn't have the funds to up-date the student labs. Of course, the Chemistry Department *did* have enough money to spend tens of thousands of dollars each year buying things for the professors. But then, the professors (and not the students) make the budget decisions, don't they?

No matter. I got the first experiment done in record time, turned in my lab report, and began work on the second experiment. A few days later, the graduate student who ran the lab returned the first report to me. I got a flat "flunk" for a grade. There were nasty comments scribbled all over the paper, mostly informing me how stupid I obviously was. Needless to say, few of the ill-chosen words offered me any worthwhile suggestions as to what was wrong with the paper, or how to improve my performance in the future.

So I went to see the lab assistant to have a little chat.

As far as I could tell, during the course of the semester, this young man never learned that I was a full professor. Or maybe he did, and simply wasn't all that impressed. Whatever the case, when I asked about my poor grade, he

told me rather sarcastically that I had failed to present the material in the "desired" order, and that I hadn't included such critical information as the ambient temperature in the lab, the barometric pressure, etc. When I pointed out rather defensively that he hadn't told us what he wanted included in the report, the young man became quite angry. "You're supposed to know such things," he said.

"How am I supposed to know them if you don't tell me?" I asked.

"That's not my worry," he replied. "I just know that you're supposed to have learned stuff like that before you get here." Then he shook his head rather sadly. "I'm afraid you just haven't had much experience writing scientific reports, now have you?" he said.

Well, by that time in my career I had authored one book and edited another, and I had published some 50 journal articles, review papers, and scientific monographs. And that darned grad student hadn't yet published a single thing. But what could I do, since he gave out the grades, and I didn't? What I did, naturally, was to rewrite the report "his way," which I would have done anyway had he bothered to let me know what he wanted ahead of time.

What I learned from this "close encounter of the worst kind" was that teachers ought to give out *models* of the kinds of reports they expect from their students. Since that time, I've made it a point to provide my own students with several examples of what I consider to be first-rate term papers and lab reports whenever I could. As I will mention in a moment, dredging up good models isn't always an easy thing to do, and remembering to use them is even more difficult. This experience taught me a very valuable lesson, however: The more clear-cut I make my instructions, and the more good models I give, the better my students perform.

THE CHEM LAB STUDENTS AND I

But onward and upward in our search for pedagogical wisdom. I had no more than made my peace with the lab assistant when I ran afoul of a worse problem. No matter how carefully I followed the instructions in the lab manual, I simply couldn't obtain the results the manual said I ought to be getting. Oh, I could usually get the "final product" of the chemical reaction to come out right, but my "yields" were considerably less than the manual said they should be

In desperation, I asked for help from some of the other students in the class. And oh, what insights they gave me into the real world. I might mention that the most of the other students apparently didn't know that I was a professor. At least, they seemed to like me, they called me "pops" (I was in my late 30's at the time), and they tried to be helpful since it was obvious I hadn't the faintest clue as to what was really going on in the lab. So when I

complained about not getting the right yields, the other students laughed and explained what I should do.

As one young man put it, "Nobody, but nobody could get the 'yields' the manual says you're supposed to get. So you should start out with three or four times as much of everything as the book says to use. That way you mostly end up with enough of the final yield to satisfy the lab assistant."

"Yeah," said another friendly student, "And the manual leaves out stuff sometimes, and doesn't tell you easier ways to do the experiment, and short cuts you can take. But our friends who took the course last year tell us what to do."

"Yeah," said still another. "And if you can't get the final products you're supposed to get, don't worry. You can buy some of the simple products like menthol at the drug store on your way to class. The more complicated stuff we can get for you from friends of ours who run a little black market on the side."

Cheating? Of course it was. But be honest. If you were an undergraduate desperate to get into medical school, and if you had to pass the organic lab to achieve your dream, and if the lab assistant was sarcastic and unhelpful, and if the lab manual was often inaccurate, and if the equipment you had to use was at best inadequate, what would you do? Wouldn't you at least be tempted to cheat a little yourself?

THE BIOCHEMISTRY COURSE AND I

By now you may be weary of my account of the sins we commit on our students in the name of "good teaching." But let me recount the final episode in my quest for the medical degree.

More by good luck than anything else, I finally managed to complete the requirements that the Medical School imposed on entering students. You understand that nothing I learned in those chemistry and zoology courses would have helped me much in the medical field. Not to worry. I had done what they told me to do, and by God they would now have to admit me as a medical student.

Which they would have done, I suppose. But by this time I had heard some dreadful tales about the quality of the teaching in the Medical School, so I decided to sit in on a class or two before committing myself to four years of worse torture than I already had gone through. So I "audited" the first course in biochemistry at the Med School. And that turned out to be the straw that broke the professor's back.

The biochemistry class was taught in a large auditorium. We had several different lecturers. Some were surprisingly good, but most of them were at best indifferent as instructors. Class attendance dropped dramatically after the first day or so, mostly because the regular med students had banded together

and hired people to attend class to take extensive notes and to tape-record the lectures. I do hope those "hired attendees" were well-paid; they surely deserved to be.

The first six weeks of the class dragged by slowly. Since I wasn't officially enrolled, I couldn't take the first exam with the rest of the class. But I got a copy afterwards and answered the questions to the best of my ability. I barely passed, but there were many reasons for my performance other than my own innate stupidity. By then my motivation to do well was almost zero. I had already discovered that we wouldn't cover anything in class that would help me much in my own real-life research, and I found it extremely difficult to wade through yet another dull textbook and memorize yet another batch of disorganized material.

I found it difficult as well to listen to all those dreary lectures in that huge auditorium, but I continued to attend class until that fateful day when I simply gave up on "being a student." I don't recall who the lecturer was that day. Probably I'm repressing the chap's name. But I do remember quite clearly that the man walked into class, hung the microphone around his neck, and started mumbling about this and that. No one could hear him at all, and for a very simple reason. He had neglected to turn on the power for the microphone.

After we had endured his mumbles for about five minutes, one of the students stuck up his hand and got the professor's attention. "I'm terribly sorry, sir," the student said, "But we simply can't hear you. You didn't turn on the P.A. system."

The lecturer stared at the student for a moment, then replied, "That's your problem, not mine." And with a wan smile on his face, the man continued to mumble—without, of course, ever bothering to turn on the P.A. system.

I sat there in shock for a moment or two. And then I closed by notebook and walked out. And I've not been back in the classroom on the "wrong" side of the lectern since that fateful day.

What We Really Teach Our Students

As I look back on my experiences, I realize that I was lucky. For I could march out of that biochemistry class in righteous disgust without paying any real penalty. I already had one doctoral degree, I had my tenure and my professorships and my Career Development Award. But pity the poor students! They can't just get up and walk out of a badly-taught class, because we professors hold the keys to the kingdoms they want to enter—to medical school, and graduate school, and law school. We have a captive and mostly passive audience, and we know it. We create an artificial scarcity of a very valuable commodity—grades—which we ration out only to those students who meet whatever arbitrary performance standards that we choose to set. And we call this process "teaching."

What we too often teach our students, however, is to hate us, to hate books, and to hate literature, science and the arts. By setting up conditions in which cheating is often the only way to survive, we also teach our students that cheating must somehow be okay—at least as long as you don't get caught. Worse than this, we often create in our students a strong avoidance reaction to the whole educational process. That is, we make learning so painful and so ego-deflating that many students fall by the wayside, while others can't wait to be rid of everything associated with a college classroom.

And then we wonder why teachers are underpaid, and why the public doesn't support education as generously as we think it should! Perhaps it would help if we remembered that "the public" is, in large part, made up of students whom we ourselves have taught to hate or de-value everything associated with the educational process.

Now, don't misunderstand. I'm not suggesting that we could solve all of our pedagogical problems by requiring every full professor to become a student again—although I dare say the quality of undergraduate teaching would improve rather dramatically if we did. But I do urge all teachers to remember that the lectern has two sides to it, and that teaching isn't really *teaching* unless the students *learn as much as possible* in each class that they take.

Practicing What We Profess

As I noted earlier, I learned a great deal from my rather harrowing experience of returning to class as an undergraduate, but it wasn't what I had expected to learn. For when the worst was over, and I had time to sit and think about my experiences, my first blinding flash of insight left me squirming in my seat.

You see, all the time I was suffering through those classes, trying my best to survive, I had blamed my problems on such things as "bad teaching," or "the system." But I suddenly realized that, in the immortal words of Pogo, "I had met the enemy, and he was me."

For wasn't I a teacher too? Hadn't I committed every pedagogical sin against my own students that I was now accusing other professors of committing against me?

Hadn't I selected textbooks that I thought would impress my colleagues, or that seemed interesting to me for some obscure reason or another, rather than picking books that my students would find readable and memorable?

Hadn't I failed to solicit feedback from my students to determine how clear my lectures actually were? And when I had occasionally gotten dark hints from the students that all wasn't going well in a class, hadn't I all too often swept the problem under a mental rug rather than taking the trouble to set things right?

And what about my own teaching assistants? Had I bothered to make sure that they continually demonstrated concern and affection for the students

they supervised? Did I reward my assistants when they strove to be good teachers, or was I more likely to applaud them when they stole time from teaching in order to finish up a research project (particularly a project I was vitally interested in)?

Finally, I asked myself what I meant by the term "good teaching?" Did I measure my own success as a teacher in terms of what students actually learned, and how emotionally involved they became with the material covered in class? Did I ask myself whether the material the students learned in class would be of value to them a dozen years later? And did I have any assurance that they'd remember what I had taught them even if the material was relevant to their lives?

Well, you can guess how I answered most of those questions back in 1968 when I was mulling all this over. What I had learned, you see, was not merely that classroom teaching is often very bad indeed. No, more than that, I finally saw how bad a pedagogue I had been myself up to that time.

But why? Why don't we teachers perform as well as we should—and could? At first I excused myself by saying that we just don't know enough about the learning process, etc., etc. But I soon saw that was mere rationalization on my part. Psychology texts are full of information on how to enhance both learning and memory, and (God help us!) we're very good at lecturing on the facts and at making our students memorize those facts.

The trouble is, we just don't practice what we profess.

Why don't we "use psychology" in the classroom? Even as I determined to change the way I personally taught, I asked myself this question. Why hadn't I bothered to put learning and teaching into perspective before? Why was I so blind to the pedagogical facts?

I suspect there are at least two good answers. The first is that, like most other teachers, I had followed the wrong educational models. I simply taught the way that I myself had been taught. And I never questioned what I was doing because, after all, I had survived my undergraduate and graduate years, and had gone on to become a full professor. Surely if my students were worth a damn, they'd survive the academic jungle as successfully as I had.

Of course, some students always do survive. And they become teachers to the next generation, and promptly repeat all the mistakes their own teachers made.

And so it goes, and will continue to go, until enough of us break out of this vicious circle and begin looking objectively at what we're really doing to our students in class.

The second reason I had been so blind is that "insight just isn't enough." Even when we know that what we're doing isn't as good as it might be, the costs of personal change are often pretty steep. For example, once I had suffered

through that organic chemistry lab, I decided that I would *always* give my students good models of what I required of them. But, in retrospect, it took three to four years of constant effort before I actually turned my good intentions into everyday practice.

At first I simply gave my students a detailed explanation of what I expected from them, thinking that was enough. But it wasn't. No matter how clear-cut my explanations were, some students simply couudn't perform as I had assumed they should. At first, I blamed the students. Finally, I realized that some of them simply didn't have the cognitive skills they needed to translate my verbal instructions into the written word.

So I had to sit down and develop "good models" of term papers and examination answers. And I had to do that for every class I taught. Frankly, I resented having to do all that work—and to tell the truth, I still do. And yet, I have discovered again and again that when I use models instead of explanations, almost all my students can produce what I want them to produce.

And that's the purpose of teaching, isn't it—to do whatever's necessary to help the students acquire the cognitive skills they need to perform at the highest level possible? Even if we, as teachers, have to make rather drastic changes in the way that we've traditionally taught our classes in order to achieve this goal?

Hope for the Future

Is there no hope that we will ever break out of the pedagogical rut so many of us seem to be in? Well, yes, there is some hope. To begin with, I've become a much better teacher myself from having endured the re-entry process as an undergraduate. And so have a great many other educators who have become more concerned about enhancing *learning* rather than merely learning to lecture better.

Many deans and administrators are beginning to question some of our more archaic pedagogical practices, such as "grading on the curve." Perhaps it has finally occurred to us that the professor who takes pride in having taught a course that was "so intellectually demanding that half the students flunked" is rather like the mythical surgeon who bragged that "the operation was a great success, but the patient died." For surely our main task as teachers is that of encouraging (and rewarding) learning, and not that of punishing failure.

Another sign of hope comes from the fact that many teachers are starting to see the introductory course as a chance to entice students *into* a field rather than perceiving it as "the last chance to screen out the dummies."

Additionally, we now have Learning Centers for teachers as well as for students, we have journals such as this one, and a growing number of awards for distinguished performance in the classroom.

Why, there are even changes in the way that classes are taught in many

medical schools. At Michigan, for instance, the faculty has started soliciting feedback from the medical students in most courses. And the Dean has recently hired a few instructors who specialize more in teaching than in research. Naturally, these instructors don't get promoted very rapidly—that would perhaps be asking too much change in too short a time—but at least these "good teachers" are now present in the Medical School in small numbers.

But perhaps the most helpful sign of all comes from the way that the two-year colleges are responding to our present economic shambles. Back in 1963, we couldn't begin to take care of all the students who wanted a college education. Now we have a surplus of campuses, and the students are beginning to "vote with their feet." They go where the good teaching is, and where the material they learn in class has some relevance to their real-world lives. And that often means they attend a community college rather than a state university. Indeed, even at such "prestige" schools as The University of Michigan, as tuition costs climb ever skyward, the students are beginning to demand that they get their money's worth.

So perhaps there is almost as much hope for the teaching profession as there is for the Detroit automakers. And I'm very hopeful about the direction that Detroit is presently going in. In the spring of 1980, a G.M. executive was quoted as saying that things had come to a pretty pass when the public thought it had a right to tell G.M. what kinds of cars G.M. ought to manufacture. By the summer of that year, G.M.'s advertisements sang quite a different tune. In these troubled times, the consumer is king.

And perhaps if the economic crunch hits the universities hard enough, we might begin perceiving the students as kings too.

We won't change as rapidly as GM has, of course—professors are a bit more protected economically than even the United Auto Workers are. But we're asking a few more questions about our professional competence than once we did. You might even say that we're finally beginning to "learn what good teaching is all about."

A Happy Ending

I've told you how I learned my own lesson from bitter experience. The real question is, what about other teachers? Must they too register as an undergraduate and repeat all the mistakes I made? I sincerely hope such drastic measures aren't necessary. All any professor really has to do to improve his performance is this: First, read the journals! They offer marvelous advice on how to teach better. Second, it would help if more teachers started soliciting feedback from their students, and then reshaped their lectures to meet their students' needs. Professors might even start insisting in faculty meetings that good teaching is just as important—and as worthy of financial support—as is good research.

But most important of all, it would help if all of us who are teachers tried to love and value our students more than we presently do. For the next generation of teachers will come from their ranks. And if we love our own students—and try our best to help them become what we always wanted to become—they just might model their own pedagogical behavior after ours.

For what more could any teacher ask?

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