Lecture 15: Who Grades the Graders?

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LAST LECTURE

Who Grades the Graders?
by
Dr. Lawrence O. Cannon

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Who Grades the Graders?

The idea of a Last Lecture has intrigued me since the inception of the program—fifteen years ago. I’ve respected and admired all of my predecessors in this position, just as I respect and admire the many of my colleagues who could just as easily have responded to such an invitation. I’m deeply honored to have been asked. I must admit that I’ve wondered from time to time how I would approach a “last lecture.” Then when Eric and Johanna came by my office last December and asked me to deliver this year’s Last Lecture, I was excited, but I was forced to begin wrestling with the prospect of writing a lecture. I realized with some surprise that this may really be my First Lecture as well as my last one. In my teaching, I discovered, I don’t “do” lectures.

That’s not to say that I don’t hold forth from time to time, certainly more than my students want to hear occasionally, but almost never for an entire class period. I want to talk with my students, not to them. I suppose that a lecture is normally designed for the primary purpose of conveying information. That’s obviously one of my primary goals in teaching also, but I’m almost always more concerned with working with my students to help them develop skills or understanding. I want them to be actively involved in the learning process.

They tell the story of the faculty member who had become so famous, so much in demand, that he was off-campus much more frequently than he was on. He was asked only to teach a small seminar, but in order not to deprive students of the benefit of his wisdom, he wrote out his quarter’s lectures and carefully recorded them. He then arranged to have his teaching assistant set up the tape recorder in the seminar room for each class session and play the lecture for the benefit of the students who signed up for the course. Sometime during the middle of the term, through some scheduling problem, he happened to be on campus at the time his seminar was meeting, so he decided to drop in and observe his students absorbing the information he had so carefully packaged for them. When he looked into the classroom, he observed no people, just a dozen recorders dutifully taping his lecture.
I hope that my role as a teacher is not one that can be filled by a tape recorder or a video presentation spewing forth facts and relationships, no matter how attractively packaged. I consider myself a failure to the extent that I fail to engage my students with ideas, with concepts that have the power to change their lives, even when teaching a so-called "skills" course.

What I would like to do, then, for my Last Lecture is to consider just how well I may have done, as an individual teacher and as a representative of this educational system. What kind of report card have I earned for my years of teaching, and who should give me a report card? Who grades the one who is forced by our system to be a grader? Who can grade my life's teaching activity—who except those I've tried to teach? And on what basis? I want to examine with you your rights as students, the rights to which I think that students are entitled. If we can decide what you should have a right to expect as students in a state university, then perhaps we can decide what I—and my colleagues in the university—should have given you, and you can judge me, and them.

The Right of Engagement. If I were to try to characterize my approach to teaching, I think I would have to conclude that my primary concern is the involvement of the learner. I consider learning to be active, not passive.

I must recognize at the outset that my attitudes are colored by my professional discipline. It is truly said that mathematics is not a spectator sport. You cannot learn mathematics by reading about it; to gain any mathematical skills, you simply must spend time doing mathematics. But since I want to consider student rights more generally, I cannot limit my concern tonight to things that are only, or primarily, true of mathematics. I believe that students in every course have the right to be engaged, to participate actively in the learning process.

Walker Percy, probably best known as a novelist, wrote an essay entitled "The Loss of the Creature" that explores ideas similar to mine. Percy suggests that too often our educational system deprives students of genuine encounters with the objects of education, not just in formal instructional systems, but in a great many of the experiences of daily living. He even claims that the way we package our national parks interferes in the quality of our experience. He compares the discovery of the Grand
Canyon by the explorer García López de Cárdenas with the experience most of us may have had in seeing that incredible gash in the earth's surface. Cárdenas traveled through miles of desert, on foot, with no idea of the yawning gulf that would suddenly open beneath his feet. In contrast, we drive through one of the park entrances and follow well-paved roads to parking lots adjacent to carefully chosen viewing points that may or may not reveal vistas that look like dozens or hundreds of photographs we have seen. And then what is the most common activity that follows immediately upon arrival? For most tourists, I suspect it is to take more photographs, most of which don't do anything more than provide an excuse to tell the people to whom they show the photos, “Oh, the pictures don't do it justice. You should have been there!”

Some of us can, of course, experience more of the Grand Canyon or related natural phenomena. Some choose to hike or ride mules and thus experience more of the interior of the canyon than is possible by looking from the rim. Anything we do to reduce the commercial, developed aspects of the canyon can get us closer to the experience of the Spanish explorers, but there is no longer any chance of reproducing their lack of expectation, which surely colored their reaction in ways we can't know.

It can also be argued that not all close involvement in such experience is desirable. Some years ago, park rangers caught a motorcyclist down at the bottom, in the heart of the canyon. The rangers left the motorcycle there while they hauled the offender to court, where the judge sentenced him to remove the motorcycle—on foot. It took three trips, and I suspect that he has no desire to experience the Grand Canyon any more closely. I have had some related experiences of my own. I recall meeting some snowmobiles in a couple of remote wilderness areas where over-the-snow machines are not legally supposed to be. I confess that I would dearly like to have had the power to get those snowmobilers to experience the wilderness on foot, having to drag their machines back to the areas where they belong. I have no objection to snowmobiles except when they escape their legal bounds and intrude on the quality of experience earned by those who go in silence into some of the winter back-country.

What has this to do with student rights and teachers' obligations? How much genuine, unfiltered experience should we be expected to provide our students? Compare a couple of different laboratory
experiences of the sort suggested by Percy in his essay.

The first is all too common. A frog, properly labeled as a specimen of a particular species, is laid out on the dissecting table, together with scalpel and a list of mimeographed questions to be answered about what the list calls “1 specimen of Ranidae horrendous.”

The second doesn’t happen often enough. A student, with some guidance from a teacher, finds and identifies, not a “specimen” of someone else’s named species, but her own frog. After observation of habitat and behavior, she decides to find out something more about the physiological structure of her frog and proceeds, by dissection, to try to determine why one particular valve opens in the way it does, rather than the way one might normally expect.

There are lots of problems with this approach. For one thing, it is terribly wasteful of time and resources—a cardinal sin in an institution supported with state funds. And besides, the student might never think to ask the “right questions” about her frog. But we should also recognize that not all students want that level of involvement with every part of the educational experience. There should be an opportunity for students and instructors to find some sort of balance between the acquisition of information and more significant encounters with some of the objects of education.

More importantly, there are some critical, unavoidable limitations to direct experience or exploration. The problem is illustrated by some lines by Walt Whitman:

When I, sitting, heard the astronomer where he lectured with much applause in the lecture room,
How soon, unaccountable I became tired and sick,
Till rising and gliding out I wander’d off by myself
In the mystical moist night-air, and from time to time
Look’d up in perfect silence at the stars.

(from “When I Heard the Learn’d Astronomer”)

There is a quality of direct experience in looking up “in perfect silence at the stars” that cannot be duplicated in the lecture hall. At the same time, however, it can be instructive to consider some of the limitations in what we can see. On a good night, and there aren’t many nights in Logan that would be better than the nights available to Whitman, we may be able to see about twenty-five hundred stars, and if we know what to look for, we may even identify some smudges of light that are about all the naked eye
can see of other galaxies. But there are some ten billion stars in our own galaxy, part of which we see in the Milky Way, and our galaxy is only one of literally billions of galaxies.

To get an idea of what a minuscule portion of the observable universe we see when we look at the sky unaided, I'd like you to recall, if you can, the majesty, the splendor, of the stars you may have seen on a camping trip in the darkest night, far from the lights of any city. Now multiply every star by 400 to get a million stars. How does that compare with the ten billion stars in our stellar neighborhood, our one galaxy? We often casually toss around numbers like millions and billions as if we had a real feeling for them. As one senator is supposed to have said, "A million here, a billion there, pretty soon we're talking about real money." Using a comparison from John Paulos' book, *Innumeracy*, it may help to think in terms of time. If we could count stars at the rate of one per second, the twenty-five hundred visible stars would take about forty minutes. For a million stars, we'd need eleven-and-a-half days; the ten billion stars of our one galaxy would take more than three hundred years.

Direct experience is not the only, or the most valuable, way of learning, and it is certainly not the most efficient. No geology field trip can possibly show students the vast variety of kinds of rocks a geologist must know, but no exposure to varieties of rock samples in the laboratory can compare with the significance of seeing different kinds of rocks in nature, seeing how some sandstones retain the patterns of winds and waves from their geologic origins or how certain rocks called intrusive really do intrude into the surrounding matrix.

To return to Percy's essay, he has a proposal that is pertinent to my concern here. He says, "I propose that English poetry and biology be taught as usual, but that at irregular intervals, poetry students should find dogfishes on their desks and biology students should find Shakespeare sonnets on their dissecting boards." He contends that such unexpected encounters might teach the English major more than a semester of biology and might allow the biologist to "catch fire at the beauty" of the poetry, unmitigated by the teacher's expectations and explications.

Each discipline differs with respect to the opportunities afforded for meaningful involvement, and each instructor must make choices about how much and when to encourage students to look for such
involvement. And here I must insert a caveat. In talking with my severest critic and valued collaborator, my wife, about some of the ideas we’re considering here, she got the feeling that I was criticizing lecturing as a method of effective teaching. I intend no comparison of teaching methods. I myself have been as deeply involved in the learning process while listening to a gifted lecturer as ever in any laboratory or discussion class. The presentation of important ideas in a lecture format, if it excites and stimulates responses from a listener, if it changes the way the listener views the world, is the very essence of that engagement that I consider to be the primary right of every student. Whatever method a teacher chooses for interacting with students, the primary obligation remains the same: to allow students the opportunity to find their own response to the objects of learning.

One additional caveat. I contend that I am obligated to offer engagement to students; I can’t force it on them. Those who choose not to avail themselves of the opportunity, as for example, those who come unprepared to class, simply abdicate their right to engagement in that particular class.

Some students obviously choose to limit their encounters with originality. A number of years ago I was invited to teach a course in a summer program for in-service secondary teachers. Very shortly after the class began, a delegation from my class marched in to the program director to complain about my teaching. “He talks about ideas and then gives us problems and asks us questions. But when we ask about the problems, he doesn’t give us answers. He just asks more questions.” As the director talked with them to better understand the difficulties, he discovered that their goal for the summer was “getting information.” They wanted to be given facts so that they could, in turn, pass on facts to their students. I believe that before the summer ended, I made a number of converts to the idea that they really could gain a greater level of understanding by wrestling with concepts, guided by what I hope were helpful questions. I am still convinced that such a format makes for effective learning.

Unhappily, from my perspective, in many of my classes I am constrained to convey a large body of information, techniques, and skills. I haven’t learned how to get first quarter calculus students ready for the second quarter except by working very steadily through the book, talking about ideas, working examples and exercises, assigning lots of homework, and then discussing questions coming from students.
after they have worked on homework exercises. I hope the process isn’t uniformly dull. I still get excited by sharing with students the remarkable discoveries and insights of the mathematicians who have explored the calculus before me. In fact, when I no longer find excitement in teaching at any level, if ever I find myself yawning in my own lectures, I plan to quit—but the excitement hasn’t disappeared yet. I am also convinced that this approach, which we use for most of our undergraduate sequence courses in mathematics, probably serves the needs of most of our students better than any other method I know. Face it; most students taking such courses are primarily interested in gaining skills and knowledge that will enable them to succeed in taking other courses, and so on with more courses, to their ultimate goal of getting through with taking courses, preferably by graduation at some level.

But as for me, I hope you will give me a failing grade for my teaching years if I do nothing more than convey information, regardless of whatever enthusiasm or grace or effectiveness that (I hope) may attend my teaching. You are entitled to more. You have a right, if you choose to exercise it, to be engaged, to discover some things for yourself, to find—and answer—some of your own questions, to find a dogfish or a Shakespearean sonnet on your desk occasionally. I have an obligation in my teaching to raise questions and issues that give you a chance to find out for yourself that mathematics is not a creation solely of geniuses from long ago and far away. Mathematics is a living, growing, vigorous discipline, nourished by the curiosity of people of all ages, in all ages. You are entitled to the experience of discovering your own mathematics. And things you discover yourself are truly yours, whether or not they may have been discovered by someone else earlier. As Jacob Bronowski observed in his little book, *Science and Human Values*, “We remake nature by the act of discovery, in the poem or in the theorem. And the great poem and the deep theorem are new to every reader, and yet are his own discoveries, because he himself recreates them. ... [W]hen the mind seizes this for itself, in art or in science, the heart misses a beat.” So your right to be engaged in your learning process is the first criterion by which I wish to be judged. Just as important, for me, is the next right on my list.

The Right to Question. An instructor in the classroom is empowered in many ways to impose her or his will on the class. The way the class is structured, both the way it is taught and the content to be
covered, is largely up to the instructor. In our present system, the teacher must also make some kind of judgment of student performance, almost always in terms of a grade or certification. Grading unavoidably warps the relationship that should ideally hold between teacher and learner. Subconscious biases of the teacher (or sometimes even conscious biases) can distort the perspective of a presentation and unfairly color the understanding of the student.

I suppose that the right of a student to question a teacher about the education he or she is given impinges on questions of ethics. Rushforth Kidder, in a column in The Christian Science Monitor, quoted a remarkable definition of ethics as "obedience to the unenforceable." As a teacher, my obligation to minimize the improper imposition of my authority really is unenforceable. Thus I have a responsibility to be ethical in my teaching, to obey the unenforceable. To help in that regard, to help remind me of my ethical obligation, I want to encourage questioning.

Questions can't be limited to a task I always assign my students. They know they are responsible for any errors that are allowed to remain on the board. I feel no shame in making an occasional sign error or mistake in arithmetic or integration or whatever, but my students must not leave the error uncorrected. They know, unfortunately, the accuracy of the description of a mathematician as a person who "says A, and writes B, when he means C (and it really should be D)." They also understand a statement by Marcia Sward, presently the Executive Director of the Mathematical Association of America, "There are three kinds of mathematicians: those who can count, and those who can't." (Think about it.)

What I hope to encourage in my students, and I fervently believe this should be their right in every class, is the willingness to question every unstated assumption and every explicit assertion passed on as received wisdom by the teacher. Not all statements should be questioned equally. When I am speaking from my own knowledge or communicating the generally held opinions of the informed professionals in my field, then my expertise should qualify me to communicate that information. If, however, I stray into personal biases or opinions, then I should be questioned. I should distinguish between my knowledge and my opinions clearly, but sometimes I don't even realize the difference myself, so I must be willing to discuss any point a student wishes to consider, to defend any questioned assertion, to provide
any extra information needed to improve understanding. In mathematics we sometimes talk about various methods of proof. Unfortunately, we may occasionally practice "proof by intimidation." "It's true because I say so, damn it! Any questions?"

Some disciplines are more subject to abuse in this regard than others, but the possibility for abuse exists in every class. When an instructor attempts to exert some authority simply by being "the expert" in front of the class, when there is an attempt to oversimplify complex issues, to give simple answers where there may not even be answers, let alone simple ones, when an instructor promulgates society's prejudices, or passes on unexamined attitudes, then basic student freedoms are being impinged upon. I like what MIT's Noam Chomsky said, "People...ask me, 'Who should I believe?' and my ...answer is, 'If you ask that question, you're in trouble, because there's no one you should believe, including me.'"

A frequently mentioned goal of education is the development of "critical thinking," the capacity to critically evaluate arguments. I agree that critical thinking is a worthy achievement; I hope that in our system we can help increase the capacity for thinking carefully, but there is a difference between educational goals and rights. Here I'm concerned with your rights, and the right to question is not the same as developing a capacity for critical thinking. I want you to have the right to question me, no matter how well- (or ill-) informed your criticism may be. Any judgment of my performance must take into consideration your right to question. The third item on my list of rights of students is not easy to encapsulate. I call it the right to appropriate respect.

The Right to Appropriate Respect. Let me introduce it by quoting from one of our long-time favorite books, dialogues between two gifted American men of letters, Archibald MacLeish and Mark Van Doren, both poets, writers and teachers. Van Doren says,

A teacher must understand, if he is a teacher, that his students potentially know everything, no matter how young they are. You know, a student who is only seventeen, has lived, after all, on earth seventeen years, and that's a good deal of time. He's been born and he's had parents, he's lived in houses, he's had friends... . There isn't any passion that he hasn't experienced in one sense or another. ... So what folly it is to address a group of [students]...as if they were blanks. They're not blanks. They're already filled up. It's necessary to remember how much they know, and to have faith in the knowledge that they do have, and then to assume that they can use their knowledge in understanding Shakespeare or Homer or Walt Whitman or Lincoln.
There is an all too common tendency among teachers to view students as empty receptacles into which they are to pour their wisdom. The more difficult challenge is to respond to Van Doren’s charge to “remember how much they know, and to have faith in the knowledge they do have.” And the opposite tendency can be just as much a problem, assuming that students already know so much more than they do that we overwhelm them and make it impossible for them to follow us.

In our home, for a good many years, we have had the pleasure of having a wonderful variety of young people share conversation as they shared our table. From time to time, all of our children, and most of our visitors, have experienced what we call “overkill” in response to something brought up in a dinnertime discussion. My wife and I are both teachers and book-people, absolute lovers of the written word. An innocent question or comment at dinner will trigger a rush to the bookshelves. “Do you remember what so-and-so said about that? Let me find the book and read it to you,” or, “There was a marvelous article about that in an issue of Dialogue about ten years ago,” (or in a book review in The New Yorker, or in an essay in The New Republic, or in any of the other sources we keep piled on our shelves or filed in our books). Someone who is incautious enough to mention a paper to be written may be deluged with a pile of eight books and fourteen articles, all of which are absolutely essential to the proper understanding of the topic of the paper and which we assume can be instantly absorbed, thus enabling the person to become sufficiently informed to write the paper. If we are not very careful, we run the risk of not respecting the knowledge the individual already has or may have gained in working on the paper or of imposing our particular view when a differing perspective is just as valid. And we may simultaneously make the recipient of our bounty feel inadequate, by an implicit comparison of his information with the literal pile of knowledge we’re sharing, forgetting for the moment that we have been gathering our information, adding to, and refining our store over many years of reading, talking, arguing, and wrestling with ideas.

Instructors in the university are liable to tendencies in both directions, and students have a right to expect us to resist. I must, somehow, maintain realistic expectations of those I teach. I must meet them at an appropriate level, as adults with informed opinions and as much right to their opinions as I
have to mine. I must try to stretch them, to not allow them to get by with less than they are capable of
giving, but at the same time to teach them patience with their limitations, to help them to understand
their potential and to gain confidence that they can work toward achieving their potential at a pace suited
to individual capacities. This brings us to my next teacher obligation.

**The Right to Happiness.** My contention is that it isn't my responsibility to make students happy. Lest I
be accused of not caring, let me quickly qualify that statement. I do care very deeply about the happiness
and well-being of my students, but my care is as a concerned individual rather than as a representative of
the university.

The question was raised initially, for me, by an article that appeared in a publication from the
University of Rochester titled "Is It a College's Job to Keep Students Happy?" I believe that some of the
responses quoted are pertinent. Let me share just a few. One dean says, "It is...not a university's job to
keep its undergraduates happy.... [I]t is [our] job...to introduce students to the pleasures of learning and
work well done." Another dean contends that "[A] college education...provides people with a set of ideas
and the equipment that allows them to cope with all kinds of complex situations... ." From a historian,
"... one of the important things we do...is to let students in on the real pleasure that comes with doing
scholarly work,... how happy you can be in using your mind." I think my favorite statement is from the
Director of Admissions, "[Y]ou should, through your experience both inside and outside the classroom,
grow to be comfortable with complexity and ambiguity."

Students sometimes come to the university having a fully formed picture of the world and its rela-
tionships. Learning that there are moral ambiguities, that some questions are not easily answerable, that
the pluralism of our society must encourage diversity of opinions and must consider differing opinions
equally valuable even if they do not have equal value to individual members of society, all this can be
extremely uncomfortable. It is my job as a teacher to make students share a certain amount of this
discomfort, at least to the extent that they examine their set of ideas and values. Whether an individual
concludes that her world picture and values are adequate or whether she decides that the world is a more
complex, less well-defined place than she had realized, makes little difference. In either case we will have
a better member of our society, one better able to contribute for having undergone the searching, and I will have met part of my responsibility as a teacher.

**The Right to be Unlabeled.** If we are to recognize and live with complexity, we need to understand some of the opposing forces. Magazines and television and movies are powerful attitude shapers. They probably do more to "educate," to tell us how to think about ourselves and each other, than all of our schools and universities. And much of what we're taught by these image makers is anything but complex; most often we're given stereotypes or oversimplified categorizations. This realization struck home when I was reading an address by Wayne C. Booth of the University of Chicago. The occasion was an examination of liberal education with a group of freshmen. Booth had given a similar address some years previously, titled "What Must a Man Know?" and he was struck by the sexism implicit both in the title and in the language he had used earlier. He first wondered if he couldn't simply change a few pronouns, but he discovered that more fundamental issues were involved. He brought to his talk a copy of *Penthouse*, saying that he had become one of several millions of people with that issue. Dr. Booth talked about the definition of woman conveyed by the magazine, one I think we all know. Contrast the number of people whose idea of women is colored by *Penthouse* or *Playboy*, with the number in classes who read books that might convey a more realistic picture of men and women and the way we interact with each other. You know as well as I the stereotypes that surround us.

It is not just that the university must help us to critically evaluate such damaging stereotypes, but to the extent that we have the job to prepare students to live in a complex and multi-faceted world, we must learn to recognize stereotypes in our own thinking and get rid of them. If as a teacher I lump all of my women students under the label "women," if I allow a single metaphor to define my ideas about women as a class, then I will make no effort to help any individual woman be anything other than what my label defines her to be. The same danger exists for any labeling, positive or negative. If I mentally put a tag on a student such as "jock" or "airhead" or "very bright," I run the risk of allowing the label to unfairly determine my expectations of that student. And studies have verified what we all know, that teachers see what they expect to see from their students. I don't even want to have the label of a person's
name when I grade an exam paper, lest my grading be unconsciously shaded by associations I may have formed about that person's performance. If I ever think of a student just as a member of a group about which I have fixed ideas, I run the risk of limiting what I can do for that student, perhaps even limiting what I can teach.

The area in which I feel my greatest failure is the fact that I don't think I have made enough of an effort to help my students be aware of such problems. What is my responsibility to inform students that they live in a world in which too many attitudes toward women are formed by Penthouse-like magazines? At the very least, I should alert prospective teachers to the fact that preconceptions or misconceptions of their students can severely limit achievement. Limitations can come from many sources. Too often I talk with students in my office and discover that their self-image makes it almost impossible for them to succeed. They have been labeled by teachers or parents or themselves as being so limited that there is no expectation of success. Have I done enough in my teaching to help overcome such limitations? I have tried, but I do not yet, and hope I never can, feel that I have done enough. This brings us, finally, to a last right, but one I'm not going to discuss in any detail.

**The Right to Have Teachers Who Think About Their Teaching.** I think teaching should be done by teachers who care enough about their students to think carefully about the ways they function as teachers. In the past I have sometimes been guilty of thinking a lot about my students, without thinking a great deal about how I was teaching them. More recently, I have begun examining myself and the teaching process. It has been both hard enough, and rewarding enough that I'm convinced I will continue. I hope I'm not so close to giving my last lecture that I cannot benefit from the learning I've done in preparing this Last Lecture. I believe that I can be a more effective teacher after thinking through some of your rights, and for this I am truly grateful. Thank you.