

An occasional column, in which Mole, Caveman and other troglodytes involved in cell science emerge to share their views on various aspects of life-science research. Messages for Caveman and other contributors can be left at [mole@biologists.com](mailto:mole@biologists.com).

Any correspondence may be published in forthcoming issues.



## Chalk it up

For once, I can't complain. I'm sitting bayside at a rustic Florida Key resort, enjoying the sun and the view, having completed a grueling, multidisciplinary workshop (I'm sure you feel very sorry for me), and listening to the water lap the shore as the pelicans fish. In a Talking Heads-related moment I'm thinking, "Well. How did I get here?"

There are, of course, several answers ("Practice," for example), but one relates to a long line of teachers and mentors – my seventh grade biology teacher, my professor for field biology and evolutionary systematics, my terribly hard biochemistry professor in grad

school, and so many others. They say, "Those who can't *do*, teach." But what do *they* know? They probably never had a decent teacher.

Many of you reading this either teach or will teach as part of a job in biomedical research. Some of us teach undergraduates; some teach graduates, med students, or our colleagues in industry. And some won't have to teach at all but may relish the opportunity. But here is the realization that struck me (right after "Hey, a *rum* drink would be nice"): none of my wonderful science teachers ever used computer-assisted lecturing aids – like PowerTalk or Lectureshop, or any of the others. True,

the only home computers in those days were the *size* of a home. But I like to imagine that they wouldn't have even if they had a brainiac available to them complete with Jabberpoint.

So where am I going with this? Well, I want to propose something outrageous. I suggest that we can be better teachers and I'm going to tell you how.

First of all, stop using such aids. Put away the computer (for now). No, you won't be using overheads, slides, videotape, or interpretative dances (actually, strike that; the dance idea is worth exploring). If possible, use a chalk board or, barring that, a white board. Chalk on one's clothes was once a beloved symbol of the venerated professor. (Unfortunately, colored marker on one's clothes is, alas, simply slovenly, and garners no respect at all.)

"But wait, Mole!" you cry. "Our students love our computer lectures, and they will look down on these antiquated methods." But I'll take care of that. Begin by explaining to the students, be they undergrads, grads, med students, or corporate employees, just what I'm going to tell you now.

"I propose," you might begin, "that my job is to transfer knowledge from up here in me," indicating the region around the head, "to up there in you. And the tried and true way to do this is for me to describe something and for you to write it down. In that process, the magic has a chance to work, as information passes through your brain to your writing hand, and back to your brain as you see what you've written. And meanwhile," you continue, "I'm also writing things up on the chalk/white board so you've got a chance to take these notes." And you start to lecture.

Computer-assisted lecturing aids are terrific. I use them all the time, when I'm giving formal talks at professional meetings and seminars. The function of these lectures has relatively little to do with teaching and everything to do with advertising ("See what we've done? Maybe some of you know some good

ways you can help us do more!"). In these sorts of talks we use a completely different approach – save that for a completely different time.

Because now you're lecturing to students, students who have grown up with mass media in all its forms – a barrage of mixed information, misinformation (intentional or not) and anti-information (intentional). And they have learnt by adaptation to filter all this out, and by the time they are sitting in your class, they do so automatically. They might even *want* the information you will impart, but unless they concentrate hard, it isn't going to go in. Unless they (a) write it down, (b) read it, and often (c) discuss it.

Which leads me to the subject of prepared notes. Many students expect you to take notes for them. Supposedly this lets them concentrate on lectures while having the gist of it already written down, usually in web-accessible form. But again, this does next to nothing to get the information from our heads to theirs. I contend that it actually does the opposite: they know that the information is already written down somewhere; so they don't have to even look at it until (and if) they need to. But here's the thing: whatever it is you're teaching them is in preparation for a professional activity where there will be no prepared notes. Once they leave the learning environment, nobody is going to list what they need to know; they've got to learn to learn, and now is a good time to start – by taking notes.

The problem is that, unless the information is actually in the mix-master of the mind, it doesn't have an opportunity to combine with other information into something new. Rearrangement and recombination of ideas is the stuff of creativity, and comparing these ideas with a knowledge base is the stuff of scientific creativity. Unless it's learnt, it isn't particularly useful as a foundation for doing science.

"But Mole," you say, "We need to give them notes so they don't get it wrong!" Well (I say), a long, long time ago, even

before person-sized computers, students used to go to discussion sessions – either formal (organized for them) or informal (organized by them) – in which the notes were compared, corrected and, most importantly, discussed. And they learnt a lot. When the discussion group could not agree, they approached the professor (in that early version of email called office hours) and hashed it out – and learnt more.

"But Mole!"

"Hmmm?"

"Back then we knew so little, and now our poor students have to learn so much. They don't have time. We don't even have time to tell them everything they need to know, and they don't have time to write and discuss. They barely have time to watch 'Survivor'. The modern world moves *fast, fast, fast*, and your way is...s l o w."

It's all so much illusion. Any additional content you think needs to be crammed into your lectures, their notes, and (perhaps) their heads, is flotsam on the sea of noise that will wash away in the next class. There has always been too much information. In the second class ever taught, the students complained that now there were so many more grunts to listen to, when the first class only had one. Most of what I learnt that very long time ago was wrong or irrelevant, or right but not very important, but there was just as much of it as there is now (and in the not too distant future, much of *this* will be wrong or not very important). But it's all okay, as long as it goes into the brain blender to eventually stir up something new.

It's your job to focus the information they need so that they can learn it, and that means you have to prepare your lecture – not *more* information, but *better*. Which is just what we're going to do next.

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Journal of Cell Science 119, 1677-1678  
Published by The Company of Biologists 2006  
doi:10.1242/jcs.02917