

## On Teaching

**What role do I play as a lecturer?** Every time I walk into a classroom, I see a room full of students with diverse backgrounds, each with their own distinct ways of learning. There is no magic trick to reach into those different minds to teach each of them in the way they want to be taught. What I do have is a sense of excitement about the intellectual journey I'm about to embark upon, and I'm inviting the students to come along with me. I will be their knowledgeable and enthusiastic guide, full of stories that I can't wait to tell. But I demand that the students own their journey – they have to do the hard work – and it will be difficult and challenging. I provide all the tools for them to succeed, but it is their responsibility to use the tools to succeed in their own way. I want the students to *earn* their success. I want them to feel the sense of accomplishment that comes from having successfully gone on a difficult journey.

For me, the greatest delight in learning is the feeling that comes from understanding a complicated concept deeply after a long struggle. If the students leave the classroom filled with this feeling of delight (and the knowledge that comes with it), then I have achieved what I set out to do when I walked into the classroom.

**Why teaching is important to me.** Teaching is also a selfish activity for me. I love the challenge of explaining a difficult idea in the simplest possible way and with the least possible scaffolding. I find great pleasure in chasing down the series of *why*'s to its most basic core – “Oh! That's *Why!*” Teaching gives me the additional pleasure of an excuse to share this joy with an audience – “Look how cool this is!”

**On good practical lecturing practices.** I teach using the black/white board supplemented with written lecture notes that are made available before the class begins. Over the years, I have learned a set of good lecturing practices from many mentors and from watching great lecturers. I strongly believe that the *quality of teaching is directly proportional to the amount of lecturer preparation*. The dedication in preparing your lecture always shines through and the students care more about your teaching.

*A lecture is a theatre performance – prepare and remember your lines.* A great lecture filled with seemingly spontaneous prose is almost certainly meticulously prepared beforehand. I prepare by asking myself these questions: “How do I tell a coherent story? Which part is difficult? Is there a story I can tell that can reinforce an idea? Are there memorable phrases that I can use to emphasise a point?” I write them down and practice them before the lecture.

*Show, don't tell.* A good lecture is like a good story – it has a first act which is the introduction to the concept we want to understand, or the statement of the problem we want to solve; a middle act where we construct the argument with minimal assumptions of the audience's foreknowledge; and an ending with the payoff of the problem being solved. To write a good story, we must minimize *deus ex machina* assertions and give agency to the ideas introduced (i.e. they have logical consequences in the story). I try to lead the students to the right ideas by laying down a logical path so that they can walk themselves to the right conclusions.

*Equations are the main actors – use them sparingly and wisely.* A lecture with too many equations is like a movie with too many main actors sharing the stage. Understanding a few equations deeply is more important than seeing a lot of equations.

*Speak out loud the equations you are writing.* Engaging both the audio and visual senses of the students helps them follow the lecture better.

*Don't talk to the black board.* I turn to face the students often, make eye contact while I speak to them, and watch for cues of whether the students are following or not.

*Ask questions.* A simple question like “what do you think is the answer to this?” generates suspense and anticipation that not only enlivens a lecture, it also gives space for students to engage their thoughts and slows down the lecture for slower students to catch up.

*Ask students to ask questions.* I actively solicit questions from students. I lead them to the question if necessary. This makes the classroom “safe” for questions for shy students. I often remind the students that “the question in your head is probably also a question in the heads of ten other students in the class – they will thank you for asking it for them.” On the other hand, I am careful not to let a few very strong students to dominate the question-asking chores!

*Write lecture notes, for your students and for yourself.* I prepare for a class by writing the complete set of lecture notes in advance before the first lecture is taught – see <https://nms.kcl.ac.uk/eugene.lim/> for a sample of my lecture notes. This allows me to walk in to the first lecture of the class knowing exactly what the final lecture will be.