

## **Criterion of Success in Teaching**

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I am humbled by this honor being conferred on me. I am not about to protest that I am not deserving, but I have my private doubts. There are many from whom I have learned the art of teaching, not least of all the students themselves. None is here to share the credits or the blame.

In my professional career, I was fortunate to have been surrounded by many people with exacting and high standards; the department of Computer Science boasts many superb teachers. And, personally, my wife Mamata, who was herself a Computer professional, has very high standards in writing and speaking, which makes for an interesting marriage. Let me specifically thank two individuals, Elaine Rich, who is in the audience, in her role as the associate chair for undergraduate education, and J Moore, the past Chair of Computer Science. They dragged me forcibly to design a new course in computer science, unlike any course taught elsewhere, to show where theory meets practice. I insisted that I will teach whatever I like in this course, and they insisted that I teach it to every undergraduate. I am grateful to them for taking away many many hours of valuable research time.

I had a distinguished colleague, Edsger W. Dijkstra, who would often ask our seminar speakers “What is your criterion of failure?”. Most of them did not even understand the question. Since their research efforts were funded, by definition, they had succeeded. The question, of course, did not endear Dijkstra to any speaker.

Let me put a positive spin on the question and ask “what is my criterion of success in teaching?”. I take this question seriously, first because it is a much harder question to answer for teaching than for research, and I still have not found the answer.

The sole numerical measure, student evaluation, provides only partial answers. It is useful for getting tenure, and awards like this. But it is a one-sided predictor. If it is excellent, it mostly means that the students expect a good grade, and if it is abysmal, well, I am left in doubt. It is not a reliable basis for self evaluation nor a guide to teaching improvement. I would like to know if my teaching has been effective, that is, if I have instilled some discipline in the students’ thinking, if I have taught them how to approach a problem, and if I have imparted some knowledge relevant to my discipline. Imparting of knowledge is the last item in my list. Knowledge in my discipline is quite transitory. Computer Science is a young discipline, and it does not yet know what it wants to be when it grows up.

Another way to look at success is what I would call the here-after measure. I don’t mean that I will pop the question when I meet my maker, but more like I should observe how the students have succeeded many years after their graduation. It is gratifying to meet an ex-student at a conference who is profoundly grateful to me for setting him right. But time has a way of smoothing over many uncomfortable facts. Additionally, here-after is a long time to wait, particularly to revise the next term’s curriculum.

Philosopher Kierkegaard had observed: Life can only be understood backward, but it must be lived forward.

A prescription I tried, early in my career, is inflicting pain. I deluded myself into believing that a large amount of effort is all it takes to be an effective teacher. Spend a huge amount of time preparing the course notes, overhead foils, and homeworks.. Well you know the routine. The argument is very similar to what I hear from students after the first test: Professor, I have studied so hard; so, I deserve a better grade. This is triumph of activity over accomplishment, abdication of responsibility because we did our damndest.

A somewhat more useful measure is to look at the student answers in the tests. Obviously, bad teaching will show itself up. But, I have not found tests to be useful predictors. Bad teaching becomes obvious much earlier, the class becomes quiet, the students bury their heads in their note books and the atmosphere feels like a speak-only conference.

Teaching in a large public university has an additional component, variability in student background and talents. I once attended a lecture in a undergraduate computer science course at Stanford. The lecture room had two TV monitors, and excellent equipments and facilities (unlike most of our lecture rooms). The atmosphere was sombre. The instructor was well prepared. She lectured precisely, ticked off the points she has made, and reminded the students about the home-works and tests. There were no questions. The students filed away silently afterwards. I liken this to a ride in a Swiss train: calm, smooth, punctual and disciplined. Now, I contrast our situation with a ride in an Indian train: boisterous, rambunctious, children running around, people speaking loudly over cell phones negotiating marriages or purchase of cows.

Our situation demands a more broad brush, nimble form of teaching suitable for a range of student talents. Mark Yudof, when he was a provost here, once asked me for a definition of a first rate manager. I answered, somewhat cynically, that a first rate manager coaxes out second rate performance out of third rate workers. We have no third rate students, and I am not being cynical in saying this. I would like my teaching to inspire the very best, so that they go on to graduate education and research, the mediocre to become excellent, and the unsuited to realize that their talent lies elsewhere.

The only measure I have found mildly useful is anecdotal evidence. My colleagues may tell me that students who had taken my class are doing better than those from another section of the same course, or a student may come by and tell me that she has been thinking about a new algorithm for a well-known problem because I had helped her see things in a different light. But, these episodes are infrequent, and I suspect, they would have happened any way without my intervention.

Life holds no perfect answers. There is no royal road to geometry, nor teaching, but there are probably several roads of uneven quality. I have often tried new roads and failed.

I told you I had private doubts about this honor. But, thankfully you can't take it away now. I still have not found an answer to my question: "what should be my criterion of success in teaching". There is work to do. Thank you for listening.