

ASPECTS OF TEACHING

I see teaching as a multi-faceted venture. I will spell out the different aspects on which I focus.

TEACHING AS COUNSELING

Having experienced students even at M.I.T. as fearful motivated me to delve into the role these generally destructive emotions play in the learning process. My own early jitters alerted me to the fact that instructors could suffer from painful affect as well. In both cases, I assume that fears inhibit learning. This has implications for teaching, at least for me: I found it impossible to ignore the degree of anxiety I observed and so deemed it necessary to address and deal with the underlying feelings. I needed to understand what psychotherapists did when dealing with their clients' anxieties as well as with their own. Could I transfer some of this to the educational arena?

Clearly, a lot carries over. I see parallel processes. First, the instructor needs to withhold judgment even when teaching subjects with clear answers. Instead, the instructor needs to investigate students' errors and elicit their reasoning (this parallels therapists investigating clients' "mistakes" in life, i.e. maladaptive behaviors while delving into the underlying feelings). Second, premature advice giving or in general, doing "it" for them or telling them what to do robs the student/client of the opportunity to grow by his or her own personal discovery – another parallel. Instead, the instructor can provide resources in a timely way that allows students to make breakthroughs in their learning – just as therapists put their clients in a position to grow.

In addition, the instructor can function directly, albeit in limited fashion, as a counselor in helping students confront their feelings, focusing mainly on their apprehensions about learning a specific discipline. I consider this a "cross-over" from counseling to teaching. And the cross-over goes the other way as well: opportunities exist for counselors to educate their clients – about the growth process, about choices they have, and about interpersonal issues.

The interpersonal dimension of the teacher-student relationship generally does not receive the same scrutiny as the therapist-client dynamic. In the latter case, concepts exist to explain client behaviors as having a symbolic significance – e.g. the transference reaction, wherein the client's drive for therapist approval reflects an unresolved need for parental love. Again I find parallels, such as transference-type responses in the classroom, although obviously far more muted.

Conversely, instructors often symbolize their audience as parental, seeking love and approval. Or they react to the students' symbolic needs defensively. In either case, there is a parallel to therapists' reactions – labeled the “counter transference” in that field. Thus, cross-overs inhere in the dynamics between teacher and students: even though interpersonal issues might appear to carry little weight in determining student learning outcomes, especially in “technical” disciplines like mathematics, they can disrupt the learning process in many ways.

I took a leave of absence early in my career to study psychotherapy more closely, working while receiving training at a psychiatric clinic in Los Angeles. This enabled me to solidify my grasp of the counseling process in general even though the focus at the clinic was quite specific. When I returned to the classroom, I saw the impact of childhood based unresolved feelings on students' capacity to absorb information and apply it. The role of instructor as counselor began to seem natural.

TEACHING AS SOCIALIZING

As I spent more time with individual students and focused more on the process of getting at self-imposed restrictive assumptions generated by students anxieties and culminating in self-defeating behaviors, I felt I knew them not only as learners, but as people – people whom I cared about. I wanted to see them on a regular basis and class provided a natural setting for us all to get together 2 or 3 times a week. The group environment of 40 students differed obviously from the 1, 2, or 3 students I would assist in office hours, but the combination of connection with many of them individually and the potentially high energy level of the class as a whole provided me with another focus. I saw our coming together as a visit with me as host. We had an ongoing project that gave us the impetus to meet; in a figure-ground shift, the course sometimes would become a vehicle for socializing, albeit in a structured manner.

Taking on the role of host, I felt it important to maintain a spirit of friendliness and fun in the classroom. I had to think about how to keep the social aspects of our meetings alive and well. This influenced my planning of activities as I monitored the pace and rhythm of our ongoing academic conversation, e.g. the development of concepts and review of problems. I wanted the spirit of friendship between me and them, and within their numbers to make it more natural and easier to participate, especially for them to feel free enough to ask questions. Now, I spend 25% of class time with them in small groups (up to 5) to work on problems. Although hardly a novel idea, by emphasizing the social aspect of the project, again I hope that students will help one another with good fellowship. I encourage this in office hours as well, seeking to bring three

students in at a time. This does not replace the one on one venues; rather it simply adds another dimension, enriching the social fabric of the class.

Thus, my second role is instructor as host. I try to make them comfortable and I try to instill the best values of a social occasion through pace of activities and through friendship. To do so, I feed off the energy of the class, tapping into it as a result of knowing enough students individually and as a result of having developed an instinct for entertaining.

TEACHING AS ENTERTAINING

An aspect of entertaining and important enough in its own right to deserve separate mention is the use of humor in the classroom. Not all instructors can be funny, of course, in the sense of joke telling and delivering one liners with the timing of a good stand up comic, but anyone can learn “process humor.” This term, coined by co-author Suzyn Ornstein and myself (1990), refers to capitalizing on shared history, discussing the “undiscussable,” personal associations, self-disclosures, exaggerated visuals, and situational peculiarities, just to name a few. After all, it’s particularly difficult to find anything amusing about calculus, if one must take this course to satisfy a requirement. So if the content affords few opportunities for humor, we must look to certain processes linked to teaching.

For example, the class establishes certain patterns after a while and these become tacit, or at least part of the background. Making explicit reference to them on occasion seems to invariably lighten the mood, eliciting laughter. I take particular pleasure in “responding” to someone’s cell phone ringing, announcing “I’m out of the office.” This not only is perceived as humorous, but unexpected since I don’t get flustered or angry at the ringing of the phone: of course it’s rude to leave it on in class, but I get better results both as a manager of the class (more in the next section) and as an entertainer.

To illustrate self-disclosure, exaggerated visuals, and discussing the undiscussable, I bring up my 8th grade English teacher, on noticing someone squinting at my writing, often perceived as small from the back row. I do make an effort to make the symbols larger, but not before commenting on my D in handwriting in the 5th grade and the reaction Miss Hampton, my teacher in grade 8 had to it. I depict her on the board as a scowling 6’8” variant of Shaquille O’Neal, with accoutrements such as a Philadelphia Phillies baseball cap, a tattoo, and two cigarettes dangling from her mouth. This making fun of a fellow educator borders on blasphemy for a few students, but most seem to really get a kick out of it. The topper comes when I whack her “face” on the board with my fist, announcing “I feel so much better now!”

To introduce humor in normally anxiety producing symbolism, I exaggerate to the point of being ridiculous. For example, with Bayes' formula in statistics, I start with a division line that stretches from one end of the board to the other. In effect, I'm saying that this is how students see it and I join with them temporarily in experiencing "the big fright." I then switch gears and become serious, focusing on structural issues (more on that in the Education section); but this bit of humor, playing off the feelings typically triggered, often helps students buy in to "the math."

Sometimes, I lapse into French for no apparent reason. This becomes an example of repeating a "bit" so that after a while it takes on structural meaning. Sometimes, I free associate and then remark that they as a group act as my therapist. Finally, when we go over problems in class, I find ways to have fun with the contexts.

TEACHING AS MANAGING

The class can be viewed as an organization, even if a temporary one. The instructor occupies the role of manager/leader in terms of determining what takes place, starting with the syllabus and continuing during classes. The potential exists for either an adversarial relationship with students qua followers or a cooperative one. The instructor faces a special challenge when managing courses that intimidate students – like the quantitative methods offerings I teach. This becomes even more pronounced when students also deem the courses to be irrelevant and thus of no interest. In situations like these, the manager must be a leader who somehow finds a way to motivate followers. My recipe for doing so comes in the Education section.

The instructor also must manage the interpersonal "punctuation" – that is, which comes first, student interest in learning the discipline or instructor interest in learning about the student. Showing students that he or she wants to learn about them even while they remain guarded is almost always helpful and an easy choice for the instructor interested in getting a deeper understanding of the learning process. It moves the relationship in the right direction, generally enhancing student motivation to learn.

The real dilemma instructors as leaders face is how much to do for students, in terms of resources. Should certain resources be withheld, e.g. special software or instructor time/directives, because instructors fear that students will abuse them by reducing effort; or should they be given freely as students argue for their legitimacy? In a cooperative relationship, trust carries the day: the instructor as leader sets the tone and uses his or her judgment as far as how much to provide.

If trust has taken root, students will likely believe that the instructor acts in their best interests. Some of the other aspects of teaching referenced earlier can help establish trust.

On the other hand, nowhere is the potential for an adversarial relationship to materialize greater. Without solid trust, each side tries to protect its interests and typically marshals seemingly objective rationales with respect to the resource issue. And yet it may all come down to a disguised struggle over control: “do it for me, this is too hard” v. “this is as far as I go, you have to do the rest on your own – in order to learn.” Argyris notes that this kind of interaction occurs when either or both sides in an organizational context feel threatened.

Lack of trust and perceived threat may follow from the vulnerability of both instructor, who has to stand and deliver knowledge to a large and often initially hostile audience, and students, who fear failure and judgment. Most of them are worried not only about learning, but also about the instructor’s response to their performance. Typically, students as followers are the more vulnerable party. A sarcastic or impatient leader, or one who lashes back at disgruntled students can be considered verbally/mentally abusive.

This issue can be viewed from the perspective of instructor emotional intelligence, a concept that speaks to his or her self-awareness, empathy for others, and willingness to self-monitor, among other characteristics. Very often, events in the classroom trigger feelings that propel instructors toward “acting out” – that is, to suspend self-control in favor of an immediate comeback, often over reacting in the process.

TEACHING AS EDUCATING

Obviously, the instructor’s main role, figure to the ground occupied by the others, is as an educator. The instructor brings knowledge of a discipline. In addition, he or she follows a paradigm of instructional delivery. I now quote from an article I wrote, published in 2003:

“The **discipline-based** paradigm of instruction is grounded in the vision of the field of study as inherently valuable with an accompanying mission to focus solely on content according to its internal logic and its applicability. This paradigm defines the instructor’s role as provider of knowledge, based on his or her expertise, and students’ objective the mastery of that content. *Process issues*, i.e. how students go about learning, enter only tacitly into the equation: the discipline’s rigor and lack of ambiguity ostensibly point the way unequivocally toward implementing an effective pedagogy. Required are clarity of

presentation, patience with student learning efforts, and acceptance of a certain level of poor student performance as inevitable.

It is suggested here that (especially) in quantitative methods courses, this is the default paradigm on at least three levels: personal, psychodynamic, and political/professional. "Personal" refers to the instructor's passion for his or her chosen field; "psychodynamic" refers to the instructor's needs, fears, and other feelings possibly driving him or her in the teaching process and based on the interpersonal context; and "political/professional" refers to the instructional implications of the profession's needs.

On the personal level, instructors who love the discipline will likely gravitate toward the discipline-based paradigm. They find the discipline so compelling that they need to talk about its content as much as possible, with very little concern for the process of learning it. They want to share their knowledge with others, in particular treating students as junior colleagues.

On the psychodynamic level, instructors (like anyone else) have a tendency to generate assumptions about what to expect in the classroom. They may safely assume, for example, a high level of anxiety and a low level of interest in much of their audience, especially with required courses of a technical nature. In response to this anticipated and often realized reception, they find the discipline-based paradigm comforting, the focus on content a refuge from any interactive tensions.

On the political/professional level, instructors serve as advocates for the discipline. In this context, they seek to protect the profession's interests by competing (with other disciplines) for new "recruits." This impacts presentation both in terms of method (topics, focus, and pacing) and audience (the profession may favor an elitist orientation to grow its membership). The discipline-based paradigm satisfies this need efficiently and straightforwardly.

This paradigm tacitly endorses the "talent – terrain – tenacity" (3Ts) attribution for poor performance. That is, those students who consistently exhibit confusion about basic concepts and commit errors in problem solving lack the requisite talent; they tend to become discouraged and give up (lack of tenacity) in a difficult learning context (the terrain).

I suggest that the three T attribution holds the default position for both teachers and learners. In some ways, students and educators alike take comfort in the belief that nothing fundamental will change. For example, it may be more psychologically palatable for a student to type him or herself as "not good at this" and look elsewhere for academic achievement than to invest in a change

process involving technical courses. Faculty may justify their current pedagogical approach by appealing to acceptable performance distributions (normal or bimodal).

The Development-Based Paradigm

The **development-based** paradigm of instructional delivery serves as an alternative. It has as its vision the value of scholarship and learning in general. Its mission is to explore the learning process. Its implementation requires focusing on the discipline's "infrastructure" and on the psychology of learning as well as on the mastery of content. The role of the instructor shifts to that of facilitator and investigator of student learning. Students' objectives now include growing more self-aware as learners and using the course as a vehicle to become more precise in their thinking in general.

This paradigm attributes poor performance to the "3As": negative affect, triggered by the content and task (of problem-solving), in concert with or leading to restrictive and unrealistic tacit assumptions about content and task, in turn leading to counterproductive "programmed" actions. These "blocking" assumptions and automatic actions function as concealed contributors to poor performance.

(Amplifying, I suggest that for poor performers, the perception of threat that initiates the 3A cycle has two main triggers. On a (more obvious) macro level, a shaky history with mathematics, lack of proper "general scholarly training," and the reputation of the course all serve to intimidate many students. On a (more subtle) micro level, the concealed structural, psychological, and even interpersonal issues turn confusion/negative affect into anxiety. Then should the subsequent 3A cycle produce negative outcomes, its role is also concealed, under the discipline-based paradigm. As a result, some students internalize the poor performance and suffer a particularly pernicious form of anxiety known as "learned helplessness". That is, they experience a sense of personalized (my lack of ability), permanent, and pervasive feeling of failure. This reaction quickly becomes entrenched and renders them far less open to subsequent forays into the quantitatively based disciplines.)"

To implement the development-based paradigm, I give a structural example and then a psychological one:

"I also note the shifts in focus from individual entities to relationships between them: a crucial transition takes place when constructs originally defined on "individual terms" are now set up to preserve a relationship. The 0th power provides an example. Students who have no trouble with 10^4 defined as 4 tens

multiplied together often find the 0th power a source of confusion. Fundamentally, they try to construe it in individual terms. But the defining feature is grounded in extending the contiguity relationship $10^{n+1} = 10^n * 10$, with $n = 0$ in this case (forcing the 0th power to be 1). Bringing such transitions into the open reduces their potency as concealed contributors to confusion. This represents the structural side of the development-based paradigm.

On the psychological side, I make explicit the 3A attribution for poor performance, i.e. that failure to comprehend concepts and to make headway on a word problem have their roots in anxiety and flawed assumptions. Students will benefit from hearing this in at least two ways: it removes the stigma of failure associated with lack of ability and it offers new hope in holding out the possibility of surfacing the assumptions and working through the actions. They will also become more cognizant of the cycle's triggers. Finally, they will be less likely to become discouraged by errors as indicative of a negative self-assessment."

TEACHING AS SKILLS TRAINING

I extended the analysis of scholarly skills in two other articles, the second co-authored with my colleague Laurie Levesque:

"Consider a two-stage model of learning applicable to grasping new concepts and solving problems based on them: to be successful, students first must gain a tacit and intuitive grasp of the construct (concept or problem) through a set of private associations, the result of linking aspects of multiple familiar schema to the construct (Resnick, 1983); they then proceed to transform that tacit sense into explicit knowledge, intuitions into precisely articulated conjectures, and the private associations systematically into an appropriate course-specific public framework. The process replicates learning how to communicate getting to a certain destination, first by simply having a "good sense of direction" with private/tacit landmarks and then being able to give explicit, precise, systematic, and formal instructions for others to follow. These can be considered as non-subject specific scholarly skills.

Student issues

Many students tend to have a tenuous grasp on these basic scholarly skills -- to make the tacit explicit, to articulate precisely, to adopt systematic approaches, and to work from course defined frameworks. The conundrum they face is that no one course in their academic past teaches these skills, yet all act as if students should and do have them in place. In addition, Quantitative Methods instructors tend to assume that students have a fundamental grasp of the role of symbols and the process of translating implicit in equations. When faced with a verbally

presented problem of some complexity, students are likely to feel threatened, especially if these skills are not solidly in place. Under threat, they tend to regress, reading hurriedly with little reflection and then “taking a stab” at an answer, based on premature one-dimensional non-course specific private reasoning, including guessing. These are counterproductive behaviors that keep them from a useful process.

TEACHING AS LEARNING

We now come full circle. I had been an indifferent learner in school, in spite of my academic success. I learned more from teaching than I ever did from studying per se. In fact, I didn't appreciate learning until I began teaching. Starting with that existential moment when I first saw my students' fears, I have been learning. I have learned about teaching; I have learned about learning – how people learn and what gets in their way when they don't. To do so, I engaged in self-study and in studying them. For example, when students come for help in office hours, I invariably find a little unexpected wrinkle when I go over the same ground as I do in class; this wrinkle tells me more about the way people think about the concepts, symbols, and problems. Sometimes, I feel a bit of frustration rise to the surface when I can't get through to them. I realize that's my issue and work on wrinkles in my role as provider.

At times, the cumulative effect of many wrinkles leads to a fundamentally new grasp of the educational process. In effect, we have partially switched roles – they teach me, or more precisely, I learn from them. I learn what works and what doesn't. The more open I could be, the more I would be surprised and truly discover something new about my profession; that engagement and discovery empowers me. This also promotes a sense of partnership, which empowers them as well.