

Notes on Effective Teaching

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Core Principles

(1) *Why are you telling them this?*

For *every* topic you cover, ask yourself the same question: “Why do I want my students to know this?” That is, ask yourself why you, *personally*, want them to know. If you don’t have a good answer, why are you teaching it?

- It’s your class – take ownership
- For them to be interested, you’d better be interested

(2) *Never wing it.*

Be prepared, including writing out all details of all numerical examples. Never wing it: it is unbelievably easy to snarl up a simple calculation at the board.

(3) *Be straightforward and transparent.*

You won’t be infallible and things will go wrong. If you don’t know the answer to a question admit it and don’t try to fake it or hand-wave it away. Figure it out for the next class. If an explanation goes badly off the rails, come back the next time and say “This is what I should have said ...”

Top Twelve Tips

- (1) Put ALL the rules in the syllabus, including dates of exams.
- (2) Be aware of the implicit contract you establish at the beginning of the semester.
- (3) Honor BOTH contracts: explicit (syllabus) and implicit (conduct of class)
- (4) Figure out what you want the students to learn how to DO and give them lots of concrete examples and opportunities to practice. Most people learn best by doing, rather than seeing or listening.
- (5) Prepare detailed notes for your lectures. Include: worked examples; marks showing points to emphasize; key questions to ask the class; what should be put on the board; transitions between topics.
- (6) Tell the students EXPLICITLY what's important. HOW: say it; write it on the board; give the review sheet for the final exam at the beginning of the semester.
- (7) Learn names as fast as possible. HOW: call roll for a few weeks; hand back assignments individually; get photos; use names when calling on people.
- (8) Consciously fight sedation: physiology makes it hard for people to sit quietly for long periods paying close attention. HOW: make eye contact; vary the stimulus; move around the room; ask questions; modulate your voice; periodically sit or stand among the students.
- (9) If you're teaching anything involving math, remind yourself that it's a movie, not a painting: the students need to see the reasoning that gets you from A to B, not just see the result. Tricky because they will be tempted to write down only the result in their notes.
- (10) To quote the Talking Heads, "Everything on stage should be larger than life." People will simply not see or hear everything you do. Be sure the big things are easy to see, so to speak. Repeat important points; use verbal punctuation (silence, etc.).
- (11) Keep your door open whenever you have a student in your office.
- (12) There will be ups and downs. When things go wrong, work very hard to be the best version of yourself. Take responsibility and initiative for getting things back on track. Keep all promises to your students (e.g., don't blow off your office hours) and follow up on things.

Lots More Tips...

1 Before the Semester

- Get a sample syllabus from someone who's taught the course before.
- Select and order any textbooks.
- Assemble packet of readings; put things on reserve.
- Put all of the following into writing and include in the syllabus:
 - Important policies and dates.
 - If attendance is required, say so.
 - How will missed exams be handled? Late assignments?
 - How should people contact you?
 - Rules on group work: what's allowed and what isn't.
 - Include a statement about cheating and academic integrity.
- Check out the room: layout, technology, lights, etc.
- Get a roster.

2 The First Day of Class

- Put your name and the course number on the board.
- Collect information from students: preferred name, email, background.
- Go over the rules in the syllabus.
- Consider doing something to break the ice.
- Start covering real material.

3 The First Few Weeks

- Butterflies are normal – expect to be nervous at first.
- Setting tone of class: dress; sitting vs. standing; podium or not.
- Be consistent in whether you call on people who don't volunteer.
- Make sure there is real work up front so students know what to expect in time to drop.
- Learn names as fast as possible.

4 Day to Day Operations

- Revise your notes before each class.
- Show up a few minutes early so students can ask informal questions before class.
- Talk to PEOPLE, rather than to the room in general; make eye contact.

- Don't talk and write at the same time: you'll almost always have your back turned.
- Undergrads: put a brief outline in the corner of the board; include impending due dates.
- What you put on the board will get into people's notes. What you don't, might not.
- Answering questions:
 - Repeat and reinforce (encourage) the question.
 - Rephrase ill-posed questions.
 - Draw connections between questions and previous or upcoming material.
 - It's OK to defer some questions to later in class but *follow up*.
 - It's also OK to defer to after class or office hours.
 - It's OK to defer to the next class if you need to think it over but *follow up*.
 - Be sure to take turns calling on people.
- Asking questions:
 - Mix of levels: some easy, some hard.
 - WAIT for an answer. (Waiting will be harder than you think.)
- Fighting sedation:
 - Vary the stimulus, especially in long classes.
 - Vary voice volume. Shifting to a quiet voice gets people's attention.
 - Move around the room: turning heads is good.
 - Standing closer to students helps them stay alert.
- Sit or stand among the students and look back at the board to get their perspective.
- When an example or explanation goes wrong, follow up next time with the right answer.
- Make sure the assignments are aligned with the exams: they should be practice.
- When things go wrong, get back on the horse right away: clear up confusion in the next class.

5 Outside Class

- Keep your office hours.
- Keep your door open when students are in the room.
- Make sure your TA follows the same rules.
- How accessible you are outside office hours is your choice, but students will really appreciate flexibility.
- Consider putting old exams and extra exercises on the web. Good students will use them to study and bad students won't be able to complain they didn't know what to expect.

6 Exams and Grading

- **RULE NUMBER ONE:** You are responsible for all grading, including that done by TAs. NEVER, EVER delegate any sort of grade dispute to your TA.
- An extra hour spent preparing an exam carefully will save 3-4 hours of grading time by catching ambiguities and typos.
- Your first few exams will be much too hard. It's very easy to overestimate what people can do under exam conditions.
- There should be a mix of questions: some easy, some hard.
- For calculations, divide questions into multiple parts for stability -- keeps early errors from wreaking havoc with the rest of the steps.
- Have someone else take your exam to check the length and to find ambiguities. If that's not possible, try taking it yourself. You should be able to do it in about 1/4 of the allowed time.
- Questions with right answers (unambiguous) are easier to grade.
- Be consistent across papers when grading exams. **HOW:** grade question 1 for all exams, then go on to question 2 for all exams, etc. Shuffle the stack periodically to deal with grading fatigue.
- When grading, variance is more important than the mean: it's the difference between scores that will justify the eventual difference in grades (but try not to be too harsh).
- In general, students prefer more exams: less is at stake on each one.

7 Other

- Every class will be different: class chemistry plays a big role.
- Students are most engaged when assignments are due or just before exams.
- They are also most engaged at the beginning and end; there may be doldrums in the middle.