Getting started as a teaching assistant

Hyperlinked PDF edition

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Preface

This booklet aims to introduce some themes common to all of us, regardless of what we teach and in what kind of space and format. It isn’t a comprehensive survey, nor does it go into much depth. Our purpose is merely to bring to mind a range of topics, many of which you will soon find yourself thinking about if you’re not thinking about them already, in a welcoming format and with just enough detail to be worth turning to again throughout your student years.

The selection of topics owes much to guides written by graduate teaching centers elsewhere, but nothing here has been parroted verbatim. All has been written afresh with Rochester and current research in mind.

Some of the content is based in mere experience — suggestions of things that you might try given that they have worked well for so many others, and become part of the ‘traditional knowledge’ passed down from generation to generation. More intellectually, we could say that it rests on a descriptivist approach to studying the profession. This approach lets many weak ideas die natural deaths, and many good ideas are perpetuated in a kind of natural selection. But, as you likely know, natural selection is not consistent about supporting only the best, nor does it guarantee that ‘best’ in one circumstance is ‘best’ in any other. Many excellent ideas and efforts at improvement simply vanish. For, just as in the natural world, radical change results often from accident: volcanoes, meteorites, floods, revolutions.

We can get a different kind of value from decades (and in some cases centuries) of scholarly research in psychology, philosophy, anthropology, sociology and education. This sort of research is often theoretical and sometimes prescriptive, and hard for outsiders to access, but it tends to be generally applicable, it can challenge traditional norms, and it primes us to improve as knowledge advances. Recent decades have witnessed substantial growth in the discipline-based scholarship of teaching and learning, notably in physics education and mathematics education. Much of this proves more widely accessible because it is written by others based in your fields, with you and your colleagues intended as the primary audience. It is hard to introduce it satisfactorily here, partly because this is a book for all disciplines, and partly because the purpose here is to facilitate a quick start. So I have tried to put more emphasis on research-supported ideas but, rather than fettering you with a surfeit of pedantry and prescriptiveness, have corralled nearly all of the theoretical discussion to a single ‘Pedagogy’ section.

The research gives us a far stronger justification for broad recommendations than we can expect from personal experience, but even so, your long-term development as a teacher depends also on you. You need to find a palette of techniques and conceptual frameworks that fit your own talents and temperament, in addition to the more widely promoted goal of making your teaching ‘student-centered’. It takes time to work out what your talents and temperaments are. It
takes time to try things out, to discover what fits. In your first few weeks at this, you may feel that there is a lot to grasp about immediate practicalities, but look to see what this same period reveals about yourself and your future. Build your arsenal on a few solid techniques and frameworks, and they will become the basis on which you collect and develop more. Given that you are working on an educational relationship between yourself and your students, it is only natural that your teaching will be student-centered only if it is teacher-centered as well.

Should you want to know more about any of the pedagogical theories, or to consult with someone about your own teaching and its development, visit us at the Center for Excellence in Teaching & Learning at 107 Lattimore Hall.

For the sake of future revisions, please let me know how useful you find this booklet. Is there anything more you’d like to have seem covered? Anything that proved distracting, misleading, incomprehensible, intimidating? Typographical and editing errors?

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I. The common cause

Whether you’re teaching in the lab or at the chalkboard, through calculations or through literary analysis, there is much that teachers have in common. Many of the challenges in teaching have to do with personalities, with interpersonal relationships, with how minds work, with what motivates people.

Many challenges have to do with the (sometimes intractably philosophical) problem of identifying what you are trying to do, and how to measure whether you’ve achieved it.

Some challenges have to do with the pastoral duties of looking out for people who need help and either providing that help or guiding them to get it elsewhere, standing up for those who need defending, tempering those whose personalities stifle others.

Other challenges still have to do with ethical conundra and formalities: keeping records straight, balancing confidentiality against pre-emptively heading off difficulties, and dealing fairly with people who miss deadlines, do substantially more than is required, or cheat.

In spite of our disciplinary and contextual differences, we all agree on a common goal: that the students will learn. And in spite of the difficulties that we inevitably face along the way, take heart in what Aristotle observed: “By nature, everyone reaches for knowledge.”*

2. Where teaching happens

Teaching at the University of Rochester takes place in various formats: lectures, workshops, seminars, laboratories, study groups, recitations, discussion sections, office hours. As a teaching assistant, you’re most likely to operate primarily in discussion sections, laboratories and recitations, perhaps in office consultation, perhaps remotely via grading and written feedback.† Whichever format you’re in, we’ll call it a ‘class’ in this booklet.

If you studied elsewhere, workshops and study groups may be new to you. Workshops are collaborative problem-solving sessions run mostly by undergradu-

*Metaphysics I.1, 980*.

†Depending on where you previously studied, you may have called recitations and discussion sections by another name such as ‘tutorials’ or ‘precepts.’
ate peer ‘leaders’ rather than teaching assistants. The leaders operate primarily as facilitators, dispensing very little direct teaching, concentrating instead on guiding group interaction. The purpose is for students to actively and critically solve problems by contributing approaches and information. We believe very strongly that workshops work well: the Center for Excellence in Teaching & Learning formally analyzes grades and attendance to test and demonstrate this.

Study groups are also peer-led, and operate on the same collaboration-based philosophy. But they are run independently of the course, and aim at offering a collaborative environment for students who prefer to work with a small group.

Most graduate students will not teach workshops or study groups, but you can benefit nonetheless from the collaborative ‘learning culture’ that they develop. Because most upperclassmen have experienced a few workshop-based courses, you can expect that most of them be well prepared to engage in class. Freshmen also get to know, within a few weeks, that it’s normal at Rochester to speak and collaborate.

3. **Why teach?**

*Because you love the subject*
This is among the best motivations. Not only to indulge your interest, but also because your passion will rub off onto your students. Once your students develop similarly intrinsic motivations, they’ll do most of the work by themselves, having come to enjoy your subject as much as you do.

*Because students are paying for your service*
Whether you agree or disagree with the sale of knowledge, you’re at least providing saleable services: to assist people to learn (which isn’t necessarily the same as selling knowledge), to grade their work, to contribute to the institutional activities of certifying that they’ve attained a level of mastery.

*Because they’ll be tomorrow’s surgeons, businessmen, politicians, parents, teachers, police, …*
As a scholar, and later as a retiree, you’ll have an interest in the people who set public policy. As a customer, you’ll have an interest in how sellers run their businesses. As a parent, you’ll have an interest in how your children’s friends behave. As a patient, you’ll have an interest in the skillfulness, adaptability and concentration span of the person unblocking your arteries. Teaching is an opportunity to shape the world that you want to live in.

*To become a better teacher*
If you’re interested in a career involving teaching (or even if you’re not — it’s no secret that teaching skills contribute to many workplace activities), you now
have an excellent opportunity to try things out, and to practise.

To truly learn the material
Teaching puts you in direct contact with variant ways of perceiving, and misperceiving, your subject. When the students’ views are correct, you’ll be corrected, or your palette of ways to understand, conceptualize and explain will be enriched and broadened. When the students’ views are wrong, you’ll grapple with the challenge of working out why they think that (it’s often very well justified), then unravelling their conceptualization far enough to allow a better one to take its place, and finally guiding them in forming and internalizing that better comprehension. Every time you go through this, the problem and solution are different, and your understanding expands. As Heraclitus put it, “The road up and the road down are one and the same.” *

Because it’s intrinsically good
Don’t be surprised if you find teaching fulfilling, and even fun. Many a graduate student comes to love teaching before long, and makes it into a career. “Consider your roots — you were made not to live like brutes, but to follow virtue and knowledge.”†

Just be wary of following virtue and knowledge at the expense of your dissertation.

4. Continual learning
Teaching involves continual response to your circumstances. You’ll go in with a plan, and you’ll adapt as you find out what your students do and don’t know, what’s difficult or easy for them, what requires more time or less. It takes some planning to prepare for this, especially for the first time you teach a class. This booklet offers some suggestions on how to get that done.

As you proceed, you’ll get better at it. At some stage, you may decide that you’re good enough for your immediate needs but there will always be scope to learn more still.

5. Self-assessment
One of the hardest things about teaching is how to know whether you’re doing it well. The key questions are, are the students learning? And is my teaching responsible for any part of that?

There are many, many ways to measure how well the students are doing. In general, the most accurate and reliable measures are slow and pedantic, and you

*Fragment 69.
†Dante, Inferno, XXVI, 118–120.
can’t use them very easily or very often. Most of the time, you have to rely on information gathered informally on the spot, responding to it there and then. Such on-the-fly assessment is daunting at first but can also provide fun, inspiration and motivation.

Most of us take a while to learn how to do this. It’s not completely unlike engineering group conversation as a salon or dinner party host, or matchmaking prospective mates. You develop a certain perceptiveness to how people use words and body language, how they handle laboratory apparatus, how they choose fonts and format their research papers, how they comment their code, how they lay out their notebooks and spreadsheets. At the start, what you see could look like individuality and chaos. With practice, you’ll gradually see what small signals can tell you about how students (and hence colleagues) think and operate, and you’ll spot opportunities where you can contribute to their doing things better.

6. Relationships

Teaching is largely about establishing, shaping and managing interpersonal relationships. Most, of course, want to be seen as approachable and friendly, but in pursuing that we often get trapped in having gone too far. Being too close with your students makes it hard to be fair, and can open you and them to various accusations. Exactly what works best will depend on your own personality, and on the students you’re working with.

Your students will have relationships with each other, as well. It’s your job, as a teaching assistant, to shape those relationships to make the class run well.

And there may be times when you cultivate more than one relationship with some individuals: perhaps teacher-student in one context, and classmates in another. Because individual differences play such a large part in these relationships, we can’t tell you in advance how to cope with them. But you must at least be aware of the potential for difficulties to arise, and be willing to deal with them before they get out of hand.

As a teaching assistant, you also have a relationship with the course instructor. You’re the assistant; the instructor sets the mission. In many cases, the instructor will serve you as a mentor or tutor, guiding you on the path to becoming an ever better teacher. In others, the instructor will delegate responsibility and you’ll be largely unsupervised. What you do with the guidance, or the liberty, is up to you — but remember that you can always ask for advice if you want it.
Your first class

I. Advance reconnaissance

Talk with the instructor
Ask the course instructor what should be achieved in the first class, and what the goals are for the course overall. Get the syllabus, and get any other materials that are already available.

What will the instructor do, and what will your role be?

Find out about the students
What do they tend to major in? What prior knowledge could you count on them having, or having been exposed to? What classes have most or many of them taken before, that you could draw on? What year-level will they tend to be in? Do you already know any of them — if so, does that pose any problems?

Depending on how the class is organized, the instructor may be able to supply a roster. Maybe even with photos.

Scout the territory
Find the room. Get a key, if you need one, and test it. Wander around the room and get a feel for where you’ll be, where your students will be, and how you’ll interact with them. Will it be crowded? Too sparse? Can you rearrange the furniture for different kinds of activity? Do the windows open, are there blinds to control glare and distraction, can you adjust the heating? What’s it like when you sit in the students’ seats — are there spots where it’s especially cramped, or a draft that chills the bones and ruffles papers, or glare or a distracting view from the window or door? Is the whiteboard view impeded by bad reflections or the overhead lights for students in certain seats?

Will you need to bring your own dry-erase markers or chalk? (Even if they’re provided, it doesn’t hurt to keep a backup for the day when your secret nemesis atomizes the chalk, or bleeds the markers dry.) Write on the board, then sit in the students’ seats to see if it’s legible. Adjust pen, chalk and size accordingly. Use the dimensions of your hands as a guide to how large the writing must be.

By ‘class,’ we mean any teaching context: lab, discussion section, recitation, lecture, office consultation, ....

If it’s a lab or a machine shop, check for the location of first aid supplies, eye bath (check that it works), fire extinguisher and telephone. Be sure that the emergency telephone numbers are visible to everyone: the windowed side-panel of your wallet won’t be accessible if the lab coat on fire is yours. Undertake any mandatory safety training, and find out what training the students will have to undertake. You may be the one providing it.

Lab or not, safety entails knowing at least where the nearby exits are.

*Think about yourself*

What will the students call you? Can they pronounce your name easily; if not, how can you help them to get it right? What will you call them?

How will you dress — what sartorial signals (authority, severity, rigor, professionalism, distance, formality, subcultural sympathy, political beliefs, ...) will make your first impression? Don’t go too far, though: you need to feel comfortable. Some people go for a tweed sportcoat and heavy-framed spectacles to fit a scholarly stereotype, but end up too straitjacketed to be convincing. At the other extreme, a favorite faded t-shirt and torn jeans can communicate laxity and dismissiveness toward your students and responsibilities. See what others in your department wear, and have worn. Sumptuary codes differ between disciplines, and transgressing those codes can result in distraction. While we want students to accept you as you are, you’re functionally a teacher in this context — which may not necessarily be your usual grad student self. It’s entirely conceivable that you’ll adopt a whole new persona for your teaching, treating it as a kind of interactive performance in which your true self is never revealed. Great performances are really about the audience, not the performer.

Out of the limelight, will you be regularly available to your students? When and where? How will they reach you?

Be sure to reserve some time, space and means of communication for your own needs: you have to study, too. Block off time for your laboratory work, library research, attending seminars and other duties, and reserve time to eat, wash and sleep. Being a teaching assistant doesn’t entail being on 24-hour call. Not even on the day before a test.

2. **Make a plan**

Use your reconnaissance findings to plan what you’ll do. One of the more important goals in the first class is to establish the tone and expectations for the rest of the term. Whatever you establish in the beginning will evolve as you and your students get to know each other, so don’t expect it to work out perfectly.
You might write a page to hand out listing your name, contact details, office location, key dates.

Think about how to introduce yourself: what sort of background you have, why you’re teaching this particular course, your research interests. The purpose is to open a nexus for an instructional relationship, so you needn’t mention that you’re single and looking.

Many TAs get the students to introduce themselves in like manner. Take notes. Or bring in sheets of paper or index cards for them to write these notes for you. This will help you to learn their names and other knowledge that could be drawn into your classes. You can collect their contact details at the same time. Namecards may help not just you, but also the other students. The students can make these if you bring along a pile of heavy paper (your department might have 8.5” × 11” card (it’s called ‘cover stock’) in its stationery cupboard) and marker pens (dry-erase whiteboard markers are fine).

Perhaps you will allocate time for an ice-breaker to establish rapport, or to let students to talk in pairs before introducing each other.

You needn’t script a detailed screenplay. Just get a list of topics and tasks together, and an estimate of how much time you’ll spend on each. Leave the finer details to fill in once you’re in class with your students, seeing what they do and don’t need to hear, and responding to how the class develops.

3. Things that you might cover

You and the course
Introduce yourself. Introduce how you see the course, and the role of your class within it. Let the students know what they can expect to get, and what you expect them to put into it.

Bureaucratic matters
Most first classes involve some discussion of things like grading, lateness, cheating, absences, safety. Hardly anyone finds this fascinating, and it’s possible that students won’t internalize it anyway. It may suffice to offer an overview that demonstrate how flexible or rigorous you are, and refers the students to fine details elsewhere.

Indicate the purpose of your class
You probably identified some goals to achieve in your first class; you need to think about your broader structural goals as well: what is the overall purpose of your class? How does it relate to lectures, labs, homework, problem sets, readings, term papers? What will your class do that these other tasks don’t? Consider telling your students so they know why they should attend, and what they should work at getting out of their time with you.
Set your expectations
Set the basic ground rules. Be clear about your attitude toward attendance, participation, work standards, lateness. Err on the side of being too strict, because it’s easier to lighten up later than to bear down more heavily.

Establish an open climate
The students should feel that they can speak freely about their ideas, and to ask for help or advice from you or anyone else. Depending on the kind of class you are leading, it may be worth eliciting or laying down discussion rules such as not conflating a mention of a subject or viewpoint with personal endorsement, and not speaking in emotive, derogatory, invested or otherwise manipulative terms. (You know the sort — ‘You’d have to be stupid to believe that …’ ‘Only a communist would support …’ , ‘As everyone knows, …’, ‘Obviously, …’, ‘This is easy, …’)

Ideally, things should be so open that the students will seek help and learning from each other. This is not only good for them, it’s good for taking the pressure off you.

One of the most proven ways to establish openness is by example: accommodate and encourage, and elicit critical thinking. Focus on getting the students to learn, rather than on teaching them.

4. Anxiety
You’ll probably be nervous. This is good, in that you haven’t completely dismissed the seriousness of the situation. Many of us never lose the anxiety. What we do is manage it, and use it to our advantage. Nervousness keeps us alert and self-critical, but it ceases to make us so stressed.

Preparation
Preparation is probably the most important thing for any meeting with anyone. This doesn’t necessarily entail scripting your every word, facial expression and gesture; for most people it’s enough to assemble a list of the things that you have to cover, and how much time you can devote to each one. Once class begins, you’ll respond to what happens and alter course accordingly.

Pace
Anxiety sends your brainstem into overdrive: Your heart rate increases, your breathing speeds up, your breaths become shallow, and you speak allegro staccato. Pace yourself. Consciously take a moment to breathe between sentences. A slow, deep breath will help to calm you, and your students will appreciate the pause to digest what you’ve just said. Andante.
A deep breath also does wonders for the strength and clarity of your voice. (What counts as a deep breath? It makes your abdomen and lower ribcage expand.)

**Look for security**
Knees weak? Lean discreetly against the edge of a desk or the chalkboard. Students sneering or dismissive? Direct your gaze to the ones who look friendly; return to the more challenging glares when you’ve regained your ground.

**Give up the security blanket**
You might be surprised to find yourself cowering behind a sheaf of papers or your whiteboard marker. Put them down. Sheltering behind your desk? Get up and walk around. Warding off the class with folded arms? Throw your hands into the air! As much as we say ‘arm-waving’ to connote lax logic, keeping your hands free for gesticulation can contribute a great deal to good communication, and keeping your hands and arms busy may counter at least the impression of timorousness.

5. **Know thy self**
Good teaching depends not just on knowing your students, but on knowing yourself. Play up your strengths, and play it safe. Not only will you feel better about what you’re doing, you’re likely to do a better job than by rigidly obeying a strict ‘rule of good teaching’ formulated with someone else’s idiosyncracies in mind.

As you gain experience, use the opportunity to try things out. Initially you’ll find out what you can do well, and what others do differently. Later, as you see what lies behind those differing sources of success, you can work more productively on broadening your repertoire.

Developing a teaching style is much like trying on clothes: the choice spans dazzling and plain; expensive and cheap. Some items are nice in themselves; others contribute to multiple outfits. But none of it works if it doesn’t fit.

6. **Know thy students**
If you’ve been able to find out about the students in advance, you’ll already have an advantage: you’ll know that they won’t get allusions to the Berlin Wall in the same way that you might, and might never have used a personal stereo system. You’ll know whether you can ask them to interpret data in Bayesian terms, or whether they can connect today’s experiment or reading to the resolution of Renaissance pyrrhonism.

When they introduce themselves, take notice: often they will provide information that you can use to make your teaching more accessible: hobbies, home towns, countries of origin, languages spoken.
As the term proceeds, you will get to know your students better and better. You’ll hear them speak, you’ll see their working habits, and you’ll read what they write. All of this provides invaluable information that you can use to guide your teaching.

In the first class, try to encourage a little conversation when the introductions happen. Perfunctory introductions like, ‘My name is ______, and I’m a ______ major’ tend not to get very far. Draw out a little of the person within, get them engaged, and get others engaged with them.

7. Summary

All of the above can be summarized in a few short points:

1. Find out about the course in advance.
   - Talk with the instructor about the course goals, and your role.
   - Gather materials, and do your preparatory reading.
   - Scout the room where you’ll teach.

2. Plan your first class: make a list of things to do and cover.
   - You.
   - The course.
   - Your students.

3. Relax.
   - Breathe!
Icebreakers

Good icebreakers help people to feel familiar with each other, to recognize commonality and differences that would not otherwise be obvious, and may help them to learn each others’ names. Opening communication channels in the beginning may pay off throughout the entire term. On the other hand, you won’t want to take time away from the content, nor will you want to set a party tone.

You may wish to avoid icebreakers completely. Maybe you don’t like playing silly games that belong at parties, not the classroom. Maybe you don’t have forty minutes to spare. Before you commit to that decision, however, consider what would happen if you don’t break the ice: students won’t know each other as well, and you may be guaranteeing a measure of dysfunction that could hold back some students, or even your entire class, for the whole term.

Icebreakers need not be trivializing, nor silly, nor demeaning. They need not involve the whole group, either, nor a huge amount of time: if your class involves small group work in pairs or triplets, give them just a five-minute exercise. Perhaps repeat this, shuffling the groups, at the start of every class for a few weeks.

One of the icebreaker activities below may strike a good middle ground for you between nexus-nurturing and rabble-rousing, but use your own judgement as to what outcome your students need and how much time you can invest.

Two truths, one lie
Give everyone a few minutes to write two truths about themselves, and one lie. Individuals then share their names and the three claims, and the rest of the group has to work out which claim is false.

Curious fact
Get people to introduce themselves in turn, including a memorable fact about them that’ll help you to remember them. If the fact can be somehow tied to the course topic, all the better.

Introduce each other
Divide the class into pairs, to talk for five minutes. Then they introduce each other to the whole group. It may help to offer some unknowns to find out, and also to ban certain topics that are ‘too easy’ or insensitive.
**Common experience**
Divide the class into small groups, and get them to talk for five minutes to find as much as possible that they all have in common. Ban easy topics (e.g. ‘we all study at the University of Rochester’, ‘we were all born in the same year’) in advance. Then have them introduce each other to the class.
Teaching in a lab

Labs offer a very special opportunity to deeply affect how students understand science. There is a vast array of knowledge, skills and cognitive habits embedded in laboratory science that never gets mentioned in lectures, problem sets or exams.

If you believe in modern science, you have to believe in empirical verification. Put simplistically, the reciprocity between model and fact is inherent in the relationship between lecture and laboratory. You could say that half of science’s authority lies in empiricism. That’s your mission.

I. Before each lab

What’s the purpose: to introduce a concept, methodology or technique? To demonstrate or illustrate a particular lecture topic? To expand upon a lecture topic? To practice quantitative analysis methods, or observational technique, or test a manual laboratory skill?

Knowing the purpose makes it much easier to motivate and direct the students. If you’ve been attending the lectures and know what they have been learning in them, you will find this easier still.

Get to know the design of the lab, the required techniques and apparatus, and the reagents and specimens.

Work through the lab manual: anything that isn’t immediately clear to you will probably not be clear to most of the students. Many things that are clear to you won’t be to the students because they aren’t yet familiar with the jargon and assumed foreknowledge. Try to catch most or all of these instances in advance so you can consider including some of them in your introductory talk.

Try the lab session yourself to check for design flaws, bottlenecks, anything that the students could find difficult.

Look for pivotal moments when you might draw the whole class together to summarize what has happened so far, what comes next, and why.

Check the timing: at what times do you want the class to arrive at particular milestones? At what times do you need to check that everyone is correctly interpreting what they’re doing?

What should students get done before they leave?

What preparation should students have done before they come in? If they’re to read the lab and work a few pre-lab problems, you could ask them to e-mail
you in advance about concepts, definitions, processes, apparatus that they’d like explained.

Arrive early to check that everything is in order. This way you won’t lose time during the lab session searching for an extra fuse or Florence flask.

**Safety matters**

Hardly anyone enjoys a safety talk, and in many cases it doesn’t mean as much as we’d like — chemical burns, jammed fingers, splashed solvents, broken test tubes, electric shocks are perceived in an abstract, imaginary way that have little to do with real life. Many students have never experienced enough laboratory or machine shop activity to develop the haptic intuitions needed for safe behavior.

While safety talks and tests may be mandatory, you must assume responsibility for what the students haven’t internalized. You’ll need to know where the showers and eye-baths are, and that they work. Where the first aid kit and fire extinguishers are. Where the telephone is, and where the phone numbers are posted, so students, as well as you, can easily find them. (In your wallet is not much good if the lab coat on fire is yours.)

As the term progresses, you can help students to develop these intuitions gradually. Safety lies not in blindly following the rules, but in acting reasonably and thoughtfully, and is often taken care of simply by acting courteously.

2. **The preliminary talk**

If you give a preliminary talk, try to impress the big picture as well as any key details that need to be known at the outset. Topics might include the following:

- Safety concerns particular to today’s experiment.
- The experiment itself — its relationship to lecture material, to other experiments.
- Theories that this experiment draws on, or that it demonstrates.
- Key phenomena to look out for.
- Skills to focus on developing.
- What you would like to see completed before students leave.

Keep your introduction short: avoid any air of lecturing; think of it as talking, and take questions. Try to shape the students’ overall perception of what they’re doing and why it matters.

3. **During the lab**

Lab teaching is challenging for the sheer volume of information that you have, and the difficulty of seeing it in plain view. It takes a lot of time and practice to see what students are really up to; it requires subtle observation skills to do with
reading facial expressions and body language, and deducing the assumptions and thought patterns that manifest in the students’ work.

The following guidelines should help to get you started:

- Never settle into your own work, your e-mail, or web surfing. Doing so both robs you of opportunities to see what the students are doing, and gives them the impression that you shouldn’t be approached.
- Stay on your feet. No lab is so long that you’ll need to sit down.
- Check in on students at least every thirty minutes.
- Watch how students handle apparatus — do they do so with the confidence and firmness that goes with understanding how the apparatus works?
- Watch how students measure — do they hold the instrument at the right level, at the right angle, in the right light?
- Watch how students spread their measurements — do they work methodically through the full range of the independent variable, or do they actively narrow in on the interesting phenomena to ensure that their efforts are well-spent?
- Observe how students lay out data tables and spreadsheets. What do their decisions reflect about their underlying comprehension of what they’re doing?
- Look out for students who measure uncritically: they might think that they can write it up later, back in the dorm, but then they’ve no recourse if their data are bad. If it doesn’t bias their collection processes, encourage them to plot graphs as they go, using those graphs for instant feedback. With spreadsheets, this is easy. (Even on graph paper it’s not all that hard.)
- Look out for important transition moments, and be there to draw them to the students’ attention. For example: “Why do you think the solution turns red so suddenly?” “What could be cutting the peaks off the waveform at that voltage?” “Why do the rats always go for the camembert, not the brie?”
- Look for opportunities to aggregate data across the room: you could ask one group of students to compare their results with those of another group, you could get everyone to add their results on a single table on the blackboard.

At the level of practicality and courtesy, you may have to ask students to keep their benches tidy, and to push their bags and stools under the benches rather than out in the aisles where the TA will trip over them. For many students, this doesn’t come intuitively. And there’s more to it than safety and courtesy: rigorous control of the working environment is essential to good laboratory work. Contaminants and confusion increase the likelihood of mistakes, and they make it impossible to account for wayward outcomes.

Selling tidiness as a good scientific practice and civility goes down much better than selling it as ‘lab rules’. Just don’t let them see what your lab bench is like.
4. After the lab

Watch carefully as students clean up: if they don’t leave apparatus as they should, it’s typically because they don’t yet understand what the risks are — initially to the apparatus, and then with consequences for future experiments. The same goes for hazardous waste disposal: ensure that the biological, chemical, radioactive, corrosive, organic, sharp and other waste categories go to the right places. Failure to do this correctly can often be attributed to not understanding why it matters.

You can also solicit feedback at this point: ask your students to let you know what the most difficult or confusing part of the lab was, and use that to open your next lab class with them, and to guide how you’ll teach them in future.

5. Grading lab reports

Grading reports is widely abhorred. You could feel that they take over your whole life, that they’re riddled with such hopelessly trivial errors that your teaching seems fruitless, that the hours you put into detailed feedback never seem to achieve anything.

It needn’t be this way. The following suggestions may help; see the Grading chapter for more details.

Construe the reports as a learning exercise.
Reports, in general, aren’t take-home exams. Think of them as opportunities for the students to develop skills and comprehension by working through and interpreting their measurements and observations, and you’ll eliminate your demands for perfect but unattainable outcomes. Make sure that the students see them this way too, and you’ll find engagement and progress.

Determine in advance what you’re looking for.
It helps immensely to develop a grading rubric in advance, assigning a fixed number of points to each of several categories. A rubric offers speed and an easy, effective feedback system. See page 44 for more.

Measure your time.
Many laboratory teaching assistants take three days to grade twelve laboratory reports. At eight hours per day, that’s two hours per report. That’s far too much. While the actual time you’ll need will vary with the course and the type of report, the short weekly reports could be graded in as little as ten minutes each. Longer reports might require a half-hour. Reports representing an entire term’s work might require several hours each, especially if they’re at a senior level and necessitate library research as part of the grading.
Think through how much grading time each report warrants: consider how much work each one represents, how much each one contributes to the final grade, how much time you’re expected to spend on teaching.

**Limit and prioritize feedback.**
Novice graders tend to correct every tiny detail. This both consumes a vast quantity of time, and swamps students with so much feedback that they don’t know where to begin and can be respond by ignoring all of it.

In most cases, feedback does not result in students coming back to do the lab all over again. A more usual benefit of feedback is to shape the next lab. So rehearsing numerous little details about past faults are not necessarily beneficial.

Think about what you’d most like to see the student improve for next time, and give feedback on that. Limit yourself to only a very few points; the rest can come later. You might strategize a path for the student to progress along, addressing these aspects now so as to be able to build on them for those other aspects later.

**Improving their writing**
When students resist your efforts to improve their writing, it’s often because they’re think that you’re referring to baroque flourishes, not clarity, nor soundness of argument. You might hear responses like, “What’s important is the ideas, not how I express them.” But if the expression is not clear, how can you know what the ideas were meant? Regardless of where their careers go, students benefit from writing clearly. As a scientist yourself, you’ll soon be suffering from the problems that unclear writing poses. Why allow those problems to multiply? And why not take advantage of the opportunity to sharpen your own prose while you’re at it?

There is a level at which stylistics does improve the power of written words, but you might do best to avoid the subtleties of meter and literary allusion, limiting your comments to structural matters and clarity of prose.

There are mechanical problems that perhaps don’t really matter, even though they make easy prey. Is the citation format really more important than a serious conceptual error, for example? Which would the student gain most from working on?

Very often, unclear phrasing is the result of unclear thinking. Encourage students to think of writing as a process for sorting through and developing their ideas, not as a ‘final step’ formality.
Facilitating a discussion

Conversation is the key learning activity in many subjects, and it can be important also in many others. A group discussion provides for students to benefit from each others’ insights, and for you to estimate how much they do and don’t know.

Leading a discussion can be divided into three main activities: asking good questions, encouraging students to speak more, and keeping the conversation on-track.

1. In advance

The students probably had to do some preparatory reading, or perhaps preliminary research. You need do that, too. Your preparation will be different, however: whereas the students’ struggle is to master the content, yours is to uncover the places where they might be confused, misled or stumped, and develop ways to guide them through those difficulties.

You can’t get this by just ‘reading’ like many of your students will. It can help to think of your preparation not as covering the material, but as formulating questions about it.

2. Formulating questions

You have probably heard that ‘there’s no such thing as a stupid question,’ but, at the opposite end of the scale, formulating good teaching questions is in fact very hard. It requires a deep knowledge of both the basic facts and the various ways in which we and our students can perceive and interpret them. Good questions generally provoke students to generalize from factual content, to apply higher-order cognitive abilities to solve problems, to interpret information, to develop new ideas.

Most of the time, questions are asked to provoke discussion. Some questions are very good for shutting discussion down, whether because they are answered too conclusively, or because they can hardly be answered at all:

- Yes/no: Did you like the reading?
- Binary: Is this an example of harmony or melody?
- Fact-recollection: What are the elements in group two?
- Compound facts: What are some socialist countries, and what are their GDPs?
• Leading: Don’t you find this author’s books insightful?
• Guessing: Why, do you think, arabidopsis appears so often in the literature?
• Pointlessly elliptical: So, what’s so great about Hellenism?
• Pointlessly perpetuating: Can anyone give me one more example of a ternary system?

Much better questions can be developed by thinking first of a learning objective. Then you can phrase questions in ways that implicitly tell students what to do with information at hand. For example:

• Framework analysis: How can we understand the overall arc of development here?
• Comparison: How does cocaine abuse differ from alcohol abuse?
• Causality: What’s the connection between cellphone use and brain cancer — is there one?
• Evaluation: Explain the first sentence in the book — what does the author mean here?
• Description, definition: How would you describe a Dollond achromat?
• Fleshing out details: Apart from si, oc and oui, what other characteristics broadly distinguish Dante’s three language groups?
• Personalization: What would you say to a politician who had no interest in funding this line of research, and thought it a waste of taxpayer funds?

Sometimes you may in fact want a dead-end question, perhaps to clarify what students do and don’t know, perhaps to warm up a clammy room, perhaps to elicit some facts to feed into your next question, perhaps to bring a wayward conversation to an apparently natural end.

Good questions are hard to formulate ad libitum, so make this part of your pre-class preparation. Put together a list of questions and bring it to class.

3. Reciprocal questioning

Reciprocal questioning teaches students to identify key ideas, read and problem-solve critically, and engage in metacognition.* It begins with teacher-student conversation, with the goal that the students will eventually come to do this independently.

Prepare
• Examine the text or problem set.
• Think about what questions the students might need to ask.
• Write these questions down, perhaps in the margin of the text.

*Metacognition is thinking about how we think — in particular, diagnosing weaknesses in our thinking habits and acting to remedy them.
**Explain the process**

- Get a student to read out the first paragraph while the others follow along.
- Tell the students to pose a question about the text read.
- Answer while justifying your thought process: say what prior knowledge you used, where you got your information, how you combined ideas to get the answer.

For example, “The answer is ______. I know this because it follows from the definition given in lecture last week, and the terminology of the first sentence indicates what model is being used to understand what’s going on. Another way to look at this would be ______, but that has the disadvantage of ______ whereas this approach ______.”

- Your turn: ask a question, and get the student to explain the answer. You may have to ask further questions to coax these details out:
  - Why do you think that?
  - Where did you learn that?
  - Can you elaborate a bit?
  - Can you give an example?
  - Tell me more.
  - What if ______?
  - How would that be affected by ______?
  - Why is ______ important here?
  - What implications does this have for ______?

and so on.

You need not confine your questions to just one student, either. Nor need you do all the questioning — you’ve a class full of students who can do this.

**4. Continuing the conversation**

Students generally participate more when they feel comfortable doing so: they need to feel that they can speak openly to an audience critical enough to be seriously engaging, but hospitable enough not to be condemning. In a word, scholarly.

Reciprocal questioning is one way to set a positive and critical tone for conversation, and it makes good use of your own expertise by putting it on display as an example to be followed.

You need to be careful, though, to avoid letting the students depend on you for prompts. They should take control of the conversation themselves, and engage not just with the subject, but with each other. If too they’re focused on you, the interactions can quickly degrade to a dualistic yes-no, right-wrong quiz sessions.

More generally, you can open the floor by techniques like the following:
Facilitating a discussion

Acknowledge the substance of student contributions.
This affirms the contribution, summarizes it for the rest of the class to build on, and ensures that the intended message has been received: “You’re saying that Socrates was a poor questioner, is that right?”

You need not provide the acknowledgement if another student has done it. In most cases, it’s a good sign when students do this — it shows that productive conversation is occurring.

Give time for students to think of answers.
Jumping in too soon deprives students of the opportunity to reflect. It takes time to reflect; unlike you, the students don’t yet know the answers.

Allow five to ten seconds before you rephrase the question, give a hint, direct it to a particular student (you’ll often see on their faces when they’ve got something to say but aren’t quite brave enough to say it yet) or take a step toward answering it yourself.

You can lower the barrier a tad to encourage preliminary responses. You might have begun with ‘So why is Lactantius’s point in this paragraph so important in light of what we read in Lacan?’; after a silence, you can choose between, ‘How about you, what sorts of things would you start looking at to work this out?’ versus ‘You, what’s the answer?’

Of course, not even a thousand pages of Lacan will cure everyone who knows Foucault.

Change the social dynamic.
Many people talk better in smaller groups, so consider dividing your class into several sub-groups. Your ability to do this will depend somewhat on whether the furniture can be rearranged, and whether people are free to move around.

You can re-convene the sub-groups after a few minutes to share ideas, or progressively merge them as the conversation ramps up.

Or, instead of merging the subgroups, have a representative from each report to the room as a whole. Assign another person to scribal duty at the blackboard.

Consider assigning different parts of a large problem to sub-groups, who’ll later re-convene to assemble the parts into a comprehensive whole.

Arouse conflict
You could divide the class into opposing halves, and stage a debate over a contention. (It is an especially good learning process to argue for the opposite of what we believe.)

Disagreement can also arise naturally. If it does, be wary of injecting your own opinion: if students see which side you support, they may be less inclined to resolve the difference for themselves. You can prompt disagreement, and may have to because dissenters are often reluctant to speak against the masses.
If no one will stand up for an alternative viewpoint, try playing the devil’s advocate.

5. Silence
Silence may well be the fear most commonly voiced by teaching assistants charged with leading a discussion. What causes this, and what can you do if no one talks? There are many reasons why students can fall silent, and each requires a different response.

They haven’t had time to think yet.
Allow time to formulate answers. Time isn’t passing as quickly as it seems, and you’re a long way ahead of your students, for whom this is new. Let them reflect before they speak. Spend that time breathing deeply and recomposing yourself.

The question is embarrassingly trite.
If a question is too easy, many students will avoid answering it. Some will think it’s a trick question. Others will be disgusted by the insult. Maybe someone will roll his eyes, sigh and proffer an answer just to break the impasse. Move on, ask something else.

They’re not prepared.
At certain times of year, class preparation yields to exam preparation and extracurricular excitement. You shouldn’t lower academic expectations during these times, but if you’re aware of what’s happening (the students might tell you if you ask whether anyone did the reading or problem set), you can rework your tactics to help the students along.

The source material’s too hard.
The reading or pre-class problems may have been too tough. You won’t know this until the students come in and tell you so. You’ll have to adapt your class strategy: think about the key points that you need to cover, and be sure to focus on getting those through.

The question’s too hard.
Most undergraduates don’t have a chance when you ask them to try formulating an overarching framework for quantum chromodynamics, or the historiographic background underlying the thirty pages that they read before class. Often we ask these sorts of questions because we’re thinking about our own knowledge, rather than about theirs. You’ll need to target your prompts only a short distance beyond their existing competence: while it’s wonderful to inspire students with a taste of the marvels that lie beyond, you also need to provide some stepping stones by which to get there.
Facilitating a discussion

The usual speakers aren’t there.
Often there are a few students — sometimes as few as one or two — who speak almost continually through class, even if they have nothing to say. The other students grow accustomed to sitting back and listening to the show, so when the usual speakers are away, no one else really knows what to do. Take advantage of that to help the quieter students gain their own footing which may continue on even when the usual speakers come back.

6. Closing a discussion

Many lively discussions end when time runs out. This is usually not the best outcome. Though it filled the full time allocation, it likely missed the goal of that day’s class. Students will get more out of a well-defined conclusion.

Set aside the last five to ten minutes to sum up where the discussion went, and what could (or will) come next. Asking yourself the following questions might help you decide what to do.

- What overall conclusions can we draw?
- How have the students’ ideas developed during the class?
- What can be built on for coming classes?
- What questions remain unresolved?
- How do their conclusions fit into the course as a whole?
- Can we re-use these ideas in later topics, in writing papers, or on exams?
- Was this a difficult topic, and did the students handle it well?
- How do today’s conclusions play into our next week’s topic?

Summing up a class discussion is not easy. In some cases it’s best for you to do it. In others, a question or statement like the following might get you there.

- I think our discussion today has shown how difficult it is to define the nature of goodness. Next week we’ll take this further and apply it to some specific cases in biomedical and civil engineering.
- At the start of today’s class, we read some paragraphs from Machiavelli’s Discourses. Can anyone relate our conclusions about immigration policy to how Machiavelli characterized other nations?
- Take a couple of minutes to look back over all four of these kinematics problems we just solved. What are some of the broad strategies we used to narrow in on a solution, that might be worth keeping in mind for solving kinematics problems in general?
- Today’s problems involved three different concepts of ‘acid’ — can you see what makes the Arrhenius, Lewis and Brønsted-Lowry concepts useful in different contexts?
VI

Problem-solving in recitations

There is a tradition, as ancient as it is unfortunate, of rhythmically stroking the chalk across the blackboard to an incantation of sweet nothings while our conceptual frameworks and solution strategies reveal themselves magically to the twenty or so students at our backs. A few students (people like you, in fact) luxuriated in the revelations implicit in the Great Art, and readily grasped the platonic ideals as they descended from the quintessence. The vast majority, however, didn’t, and are now reassuring themselves that their six-figure salaries is an acceptable alternative to the intellectual fulfillment offered at graduate school. This chapter is about helping that majority to at least sample our cerebral indulgences, preferably without depriving the minority who are just like us.

1. Solution, process and disciplinary ideals

There are three main things that we like students to learn from watching us solve problems: a correct solution against which they can confirm their own, the general habits of problem-solving, and the unspoken disciplinary ideals that distinguish correct solutions into ‘good’ and ‘bad’ or ‘elegant’ and ‘clumsy’.

The weaker students may be interested in nothing more than getting the solution. They characteristically resist explanations about why the method does or doesn’t work, and learn it in only a robotic, algorithmic way. If you’re teaching a course at the forefront of knowledge (such as cognitive neuroscience), these students may be severely troubled by uncertainty and open-endedness and may even leave for disciplines that they perceive to be more factual.

Stronger students will get into the techniques that produce or reveal the solution. You should hope that most of your students get into this stage; this is an appropriate goal for most freshmen and sophomores. It can be a challenge to bring the weaker students up to this level. An interesting challenge, though, and incredibly rewarding when you succeed.

Only the strongest students will have much chance of engaging at the level of disciplinary aesthetic and methodology, though in some disciplines this comes much earlier than others. In history and literature, for example, historiography and literary theory matter as early as the freshman year. Mathematics, on the other hand, offers far less space for experimenting with proof styles in the introductory courses, even though a few theorems might be highlighted for their particular elegance.
2. Think out loud

Much of the Discussions chapter also applies to problem-solving performances. The idea behind thinking out loud is to demonstrate how you approach, conceptualize and solve problems. The answers themselves aren’t the primary point.

The underlying idea is simple: think out loud. If you put your thought process on display, the students will have a much better chance at grasping what you’re doing, and why. This will give them an example to follow. They have probably never seen what an expert actually does: textbooks and lectures usually showcase the finished product after the toolmarks have been polished away: as Neils Abel is said to have claimed about Gauss, “He is like the fox, who effaces his tracks in the sand with his tail.”*

From such displays, students can learn content, and ideals about how they should be presented. Your task, in contrast, is to reveal the often dirty work needed to get there.

Thinking out loud can be much harder than it seems.

State the problem

Read it out loud, or have a student read it. Consider writing it on the board. Work through the phrasing, winnowing the most important information from the chaff, pointing out assumptions that have been made, terminology with discipline-specific meanings, and lacunae that need to be filled.

Often, problems come in ill-stated forms that need to be re-formulated into an abstraction that can be solved. This is a skill that students need to learn, though you might have simply had the right intuition. If you picked it up naturally, explaining what you’re doing can be very difficult — this is one instance in which having struggled yourself can provide useful insight into how your students may have to struggle as well.

Filling lacunae is an important skill in some disciplines, and students whose sympathies lie in other disciplines may not realize that they need to provide such assumptions themselves. Many physics problems, for example, require the reader to supply ‘mutatis mutando, ceteris paribus’, just as intro Latin exercises often require the reader to supply ‘to be’. Experts fill gaps instinctively and are often unaware that they’ve done so.

In short: be not a lector, but a commentator and exegete. The ‘Reciprocal Questioning’ method described in the Discussion chapter can help to demonstrate both the character of the problem and your cognitive processes for revealing that.

Identify possible strategies

Most problems have more than one possible solution. Talk through them to determine whether they’ll work or not.

* Do you know a reliable source for Abel’s words? Please tell us!
Play the strategies off against one another
When you have more than one solution approach that could work, consider out loud which offers more benefits: which is faster? Which requires less effort? Which might require that extra conditions be met, or need more information? Which is more prone to mistakes? Which also provides insight into the problem itself? For an example that you’ve seen not too long ago, what criteria could be used to decide between ‘completing the square’ and plugging coefficients into the quadratic formula? In formal terms, they’re equivalent. In terms of what we can learn from them, not so.

Sometimes you will not know that an approach will fail until you try it. Even if you do know, you can still stage this outcome. It shows students that problem-solving doesn’t always flow perfectly like a textbook exposition. It legitimizes their attempts by demonstrating that trying things out is what experts actually do when no one’s looking.

Openly criticize your actions
As you solve the problem, talk about what you’re doing. Say where the information is coming from, and where you hope it will help later.

When things happen that you don’t like, say so. And say why you don’t like them. Perhaps it’s because you don’t like working with fractions, perhaps you often drop negative signs, perhaps the appearance of exponential $e$ makes you regret having used $e$ for electron charge.

Maybe you’re annoyed that these long equations don’t seem to say anything, that you’re just mechanically manipulating variables as if pipetting cell-laden DMEM into culture trays.

Reporting on such sentiments demonstrates not only that it’s acceptable for students to feel this way, but that it’s actually normal.

When happy things happen, tell the class. Express your relief when a long, cumbersome equation collapses into an especially compact form. Marvel openly at the insight revealed when the equation is written this way, with these terms grouped separately from those terms, and how that now suggests what to do next. There are, of course, words for people who do this. Here is your opportunity to to rescue students described by those words, and to welcome others into the fold.

Watch your language: speak about how you’re thinking, and about the solution process, rather than about the problem itself. For example, rather than saying “Obviously,” say, “I notice here that...”. That way you can avoid giving the impression that the information ought to be obvious to everyone — maybe it should, but the students whom it’s not obvious to may shut off at that point.

Criticize the solution
When you’re done, go back over the whole problem. Talk about the dead ends and how lessons learnt from them guided subsequent attempts. Talk about assump-
tions you had to make. Talk about constraints that limited your options.

Such ‘post-mortem analyses,’ as they’re called, reinforces the emphasis on con-
ceptual process rather than algorithm and fact; emphasizes that a lot of work is
done behind-the-scenes before the final results appear in textbooks and lectures;
and shows the students that this behind-the-scenes work is not just within their
reach, but in fact what they ought to be doing.

You might also talk about how the solution could be improved, perhaps stream-
lined for efficiency, perhaps purged of your working process to get down to a
clear and pure treatment of the problem, perhaps restructured and perhaps ex-
panded in places to better communicate meanings inherent in the solution pro-
cess. How would you get from what you’ve done to a textbook-worthy exposition?
Extending the discussion in this direction can help to develop the aesthetic
ideals that the stronger students in particular will need to recognize and one day
master. And you might just open a new insight into how to read textbooks for
the students less strong.

3. Involve the students

There’s often no good reason why the students can’t help you to solve the prob-
lems. Involving them from the beginning should get at least some more engaged.
Ask them to identify the assumptions, to expand the definitions, to propose pos-
sible solution paths that you’ll try. Stage a blind alley or a mistake and get them
to help you recover.

4. Working the blackboard

The blackboard (or whiteboard) plays several roles in a classroom that have no
strong parallel in the world of digital slides. There is a good deal of technique
involved in blackboard use, but remarkably little literature on it. Most of what
we ‘know’ is transmitted as professional practice.

Blackboard as workspace
As you know, there is only so much that can be accomplished by sitting down and
thinking about it. The blackboard forces you to sharpen your thoughts enough to
express them, and it offers space in which you can lay out many more thoughts
than you can hold at once in your mind.

Show the students how you use writing as a tool in your problem-solving pro-
cess.*

* See ‘Bye-bye blackboard,’ http://www.mhs.ox.ac.uk/blackboard/, for examples of blackboard use
in several disciplines, many of them by exemplary scholars.
**Blackboard as display space**
The students need to be able to follow what you’re doing. Part of that is conveyed in your speech, posture and gesticulation. Part of it is your handwriting and layout.

Practice your blackboard hand. Many people print to avoid having to develop a good blackboard cursive. Avoid unnecessary and idiosyncratic abbreviations — if students are thinking about those, they’re not thinking about the content that you want to convey.

Many, unfortunately, scrawl. This doesn’t just tell the students that your handwriting is bad. It tells them that you don’t really care about their understanding you. Maybe you never got the hang of writing $\zeta$ and $\xi$, and distinguishing $\nu$, $u$ and $\upsilon$. Practice! Leave the chickenscratch to lawyers, medical practitioners and chickens.

You’ll also need to pay attention to keeping the board clean. What looks clear up close can look very murky from a distance. Be sure to erase well enough to let new chalk marks contrast against a dark background. (For whiteboards, the opposite!)

**Organizer and aide-mémoire**
You may have several boards at your disposal. They may be differently sized, and students may have different views of them. Or there could be a single large board. Or maybe no more than a single small one. You’ll have to plan how to use them.

You could assign a space for any of the following:

- notes, data
- temporary working
- things to return to later
- steps to follow, such as an algorithm for a statistical test or an algebraic reduction

**Pacemaker**
Writing on a blackboard slows us down, giving students time to think about what we’re saying and doing.

On the other hand, it slows us down so much that you will not have a lot of time to ramble on and on writing malformed, convoluted, redundant verbiage. Instead of sacrificing legibility, work on being concise, without becoming laconic.
Office consultations

Meeting students for one-on-one or small group consultations is, in many ways, like running a discussion section. Sadly, many teaching assistants find that the students who choose to attend are a self-selected group of poor learners who want a straightforward answer to copy into their assignment, or a well-defined set of steps to get them there, peppered by a few who can’t fathom why they got only 96% rather than 97%. These attitudes can be very disheartening — or your most inspiring challenge.

This chapter is very short because the methods have already been covered in the Discussions and Problem-solving chapters. The main points concern logistics, and the ethical issues surrounding homework.

1. **Beforehand**

Preparation is important, and nearly always possible: get hold of and solve any problem sets in circulation, and do the set readings. The idea is not just to know the content, but to determine where the sticking points are so you can strategize in advance how to help students through them.

See the Discussion chapter for suggestions on how to do this.

2. **Arrange your office**

There are lots of ways to arrange the desk and chairs. The best arrangement will depend on how many students you plan to work with at a time, how comfortable you and they are with proximity, and what other amenities you have — windows, lighting, air ducts, blackboard, sink, coffee table, chaise longue.

Putting a table between you and the student can be either good or bad: it serves as a material barrier, it communicates distance and formality, it allows you to face each other directly, it requires you to write upside-down or to repeatedly invert any papers or books going back and forth.

Ask a colleague to take your seat, and walk in and sit down as if you were a student. Is your colleague silhouetted against a bright window, forcing you to squint at a haloed face hidden mysteriously in total shadow? Does the sun or a lamp shine directly into your eyes? Is there a cold draft? Noise from the corridor? Not enough space for your legs under the desk? Are they intertwined intimately
with your colleague’s? Is your colleague elevated by a chair much higher than yours?

Look around: do the blackboard and noticeboards have demeaning jokes about stupid undergrads, or are your textbooks on cannibalism and new-age witchcraft overly visible? How about information that ought to be confidential?

Perhaps you will want some of these office features. Perhaps not. But you should consider them before you decide — they all contribute to how you and your students will behave, and how the interactions between you will develop.

In some cases, you may have to think at length about whether to keep your door open, closed or ajar. The reasons may be physical: cold, heat, noise; these could affect your windows, too. Other reasons are confidentiality, and safety. There may be times when you don’t want to be closed away with a student out of concern for harassment, impropriety or personal safety. And there may be times when a student has those very concerns about you.

The opposite circumstance — needing to close the door for confidentiality — can sometimes be harder to achieve, and more frequently necessary. If you’re share and office, for example, or a cubicle farm. Consider going for a walk and talking afoot, or seeing if there’s a spare classroom, meeting room or seminar room you can use. You may be able to book it.

3. Get to know them

Icebreakers may be appropriate, even the staged ones from the Icebreakers chapter. But, in general, the less formally structured environment of an office consultation opens the way for casual conversation. You don’t need a lot — enough to open a nexus and ease away nervousness or embarrassment. Candy and cookies on the desk can help immensely. Unless they’re clearly for you, and you alone.

4. Guide them to create their own solutions

Most of us believe that you cannot teach students much by telling them how to do things: they need to be engaged, and to actively participate in their learning.

So, when students come in asking, “How do I do this problem?”, don’t just tell them. Ask questions to lead them through the process. (See the problem-solving chapter for details.)

You may encounter resistance. Persist as far as you can, but recognize also the long-term strategic value of small gains. It’s better to have a student learn a little and come back for more, than to shut down in exasperation at your evasiveness, and never come back at all.

Giving away the answers is almost guaranteed to make you very popular among a certain subset. Doing so is unlikely to contribute much to anyone’s learning (except learning that you’re a pushover), and could contravene the academic hon-
esty code: if you’re offering answers that contribute to a student’s grade, you’re exempting them from doing the work. See chapter X for further details.

5. Summarize

After a problem is dealt with, don’t let that be the end. Step back and elicit a summary of lessons learnt, and ideas to be carried forward. Students should come out of office consultations not with a closed case to set behind them, but momentum to progress.
1. Three roles

Instructor, assistant, student. If you’re clear to yourself about who’s who, and what responsibilities each has to the others, you’ll have a good idea as to how to solve many of the interpersonal difficulties that can occur.

The extent of your discretionary power will depend on the course you’re teaching and whom you’re working with, so always consider whether you can refer difficult cases up the chain for the instructor to adjudicate. At the least, you can postpone answering a student by saying that you’ll confer with the instructor.

None of this prevents you from making special arrangements with students for deadline extensions or alternative work, but make those decisions mindful of your obligation to offer the same treatment to everyone, and of the possibility that you’re acting beyond the authority delegated to you. The better you know your obligations and powers, the easier it will be to decide what to do.

2. Challenges to your authority

Authority challenges typically concern grades. There are a few things that you can do:

- Explain your grading criteria in advance. Not easy, but guidance on this front can help to reduce uncertainty at the least.
- Ask the student to explain what warrants a grade change. If you ask for this in writing so you can give it full consideration, you are implicitly asking the student to answer the question again with far more care. This often takes care of the disagreement — especially if the conclusion is that you were overly generous.
- Concede. But only if you erred — as sometimes you will.
- Refer the dispute to the instructor. You can do this in more than one way, depending on what outcome you’re seeking:
  - “I’ll look at this and get back to you in two days’ time.”
    This gives the impression that you’ll think over this alone, but, because you’ll confer with the instructor in private, eliminates the possibility that the student will get a different response that overrides your decision.
- “I’ll check with Doctor Clarissimus. We should know within a couple of days.”
  This puts the matter completely in the instructor’s hands (whence it may be put right back into yours), delimits the authority that you’ll exercise, and communicates that going to the instructor will not get a different result.

- For mid-terms and other major exercises contributing a substantial portion of the final grade, you may be able to pre-empt many problems by asking the instructor to approve your assessments before you give them to the students. If a student insists that an error has been made, the instructor would check into it — and the assigned grade could go up or down.

Which you choose would depend on what message you want to send, and on the responsibilities that you’re expected to shoulder.

Other authority challenges occur in class. A student may interrupt or talk over you. Students may roll their eyes or talk with each other while you’re speaking. They might habitually arrive late and leave early.

Sometimes there are reasons behind this that can be discovered in a discreet chat outside the classroom — just catch the student after class, or e-mail and ask for a meeting. Sometimes it’s a classic ‘cry for attention’; sometimes it’s innocent ignorance of the disruption and damage being caused; sometimes there is a deeper reason and you’ll be able to direct the student toward appropriate support.

On occasion, postponed or discreet action will not be enough. You may need to say something on the spot for the sake of six students whose body language says that they’re distracted and annoyed by the bawdy couple sitting at the back. Or perhaps the disruption poses a safety hazard because the roughhousers aren’t paying attention to their hands on the bandsaw, nor to the student carrying concentrated nitric acid nearby. You needn’t be afraid of exerting your authority in moments like that, nor when prior efforts at discreet action have failed.

3. Student vs content

Some topics can arouse strong sentiments. Often this is a good thing, especially in a discussion-driven class. But sometimes it can impede the learning: there are views that students will be too scared to voice because they contravene social taboos; there are times when a few opinions come to dominate and alternative views — perhaps very good ones — won’t be raised for simple fear of being the odd one out.

From an intellectual viewpoint, it’s best if even the most unpopular, and even distasteful, views can be voiced without censure: the purpose is to consider them, not to endorse them. Your problem, in that situation, is to prevent a discussion about ideas from becoming a conflict between persons.

Look out for *ad hominem* tactics, and for the typical prejudices against class, culture, gender, race, language, education, finances and so on. These views are
pervasive and go in many directions in addition to those that gain widespread attention.

And rather than combat such viewpoints directly, you can often encourage others to do so by asking for “other views that might help us to better understand the whole picture.”

Openly offensive comments, however, may need to be tackled head-on. By not doing so, or by dismissing them with humor, you risk shutting disaffected students out of future interactions.

4. **Student vs instructor**

Occasionally, a teaching assistant gets caught in conflict between student and professor, or played off as a pawn between them.

Your most likely encounter with this situation is being asked for a concession that the instructor refused — though you probably won’t be told that permission has already been sought and denied. Your best recourse is defense: ensure that you know the instructor’s policies, and if you’re unsure, refer the matter up the chain.

On rare occasions, a student who simply doesn’t like the instructor or the lecture style looks to you as an alternative. You may even feel that this is warranted! Obviously, you mustn’t endorse it, and you need to minimize your involvement in that conflict while maintaining your obligations to students and instructor alike.

5. **Cute student?**

Don’t.

Obviously, there are disciplinary penalties if you get caught. And if you make the first move in this circumstance, it can count formally as harassment — you could soon be in a position of having to explain and justify yourself.

Official and formal responses aside, the immediate problem is that it’s impossible to disentangle the power structures, your classroom dynamic and your influence over all of your students’ futures from even the most seemingly pure attractions. If you’re the object of flirtation and solicitation, the attraction is likely not to you, but to your TA persona, just as your attraction to a student may well be to the student’s in-class persona rather than to the person. In other words, the attraction is based at least partly on rank and hierarchy.

If you receive flirtations in writing or e-mail, save them (not to bolster your self-esteem, but in case you need them for defense.) Deal with the matter as discreetly and tactfully as you can, and remember to hold meetings where you can be witnessed as having conducted yourself appropriately.
6. Favorites

You have to work hard to avoid favoritism. This can be hard because very often a few students will by nature rise far above the others. You’ll talk with your fellow TAs about how bright they are, and you’ll give them extra attention because the results are so productive. That kind of favoritism is only natural, and in some ways it could be warranted. But you mustn’t show it in public, or even in semi-private where you might be overheard: visible favoritism undermines class morale and your claim to authority. Even if you have favorites, make conscious effort to spend about equal time with everyone, and to have everyone contribute and participate.

7. Excessive demands

Sometimes there is one student who wants you to pre-read every assignment, and to provide extra help, especially in the week or two leading up to an exam. Sometimes that student will not be able to make it to your office hours, and will have only one tiny window in which to meet — clashing with one of your classes, clashing with your research time, even well after your bedtime. Sometimes there will be not just one of these students, but many.

You are not obliged to be there for them every minute of the day.

For the most part, you can set reasonable and regular office hours, and stick with them. Many students will recognize hitherto unnoticed flexibility in their timetables once clear contraints come into play. For the others, you could make an exception, but it must be convenient for you as well as for the student: providing them with time and expertise ought not involve sacrificing your own studies.

There can also be times when students ask for so much editorial help that you might as well do the assignment yourself. At the least, you may feel that you don’t have time for it, or are not paid for quite that much one-on-one tutoring, or that it’s unfair to dote so much more on one student than on others. There are other units in the University whom you could refer the student to:

- The department, or a department-affiliated student society, may offer tutoring or helpdesk services.
- CETL has study skills counselors and, for some courses, study groups.
- The Writing Center has writing consultants.
- CCAS matches students to tutors whom students pay directly for their service.

If the extent of the help requested is tantamount to asking that someone else does the work for them, consider warning the student about transgressing the Academic Honesty regulations.
The immediate response to grading generally falls into two categories, and sometimes both: the burden of responsibility, and the dark glow of power. Before long, though, both responses typically give way to being troubled by not really knowing whether you’re doing it right, and overwhelmed by there being so very much of it to do. It’s not uncommon for teaching assistants to find themselves mired in tens of hours of largely unproductive grading each week. This chapter is about avoiding that trap.

I. What grades are for

The first thing to know about grading is the purpose. Most people don’t think about this a great deal because we’ve come to take it for granted. The actual purpose is compound and varies from case to case, but typically includes some or all of the following.

Grades as feedback
Grades tell students how well they’re doing, but only if they know how to interpret them. If your grading methods do provide useful feedback, you can certainly expect that students’ grades will increase as the term proceeds.

Some graders prefer to give feedback with no grade at all, but many students find this disorienting: the purely qualitative recommendations on how to improve can leave them unable to tell whether you’re suggesting minor refinements to already good work, or radical reforms to a miserable effort. Very few students have ever dealt with purely qualitative feedback, having risen through education systems in which grades provided the primary, and in some cases only, indicator of achievement and progress.

On the other hand, once students are getting high grades, some will get the harebrained message that no further improvement is warranted. Or at least that their remaining time is better spent on other things. Which brings us to the use of grades as motivation:
Grading, assessment, and feedback

Grades as motivation
Who isn’t motivated by a D? Given Rochester’s admission process, even a B will be poorly received by many students (especially high-flying freshmen). It’s hence possible to use grades as inducements to do better — A’s as carrots, and D’s (or even B’s) as sticks.

If you choose this route, think carefully about your goals. You may not actually improve the students’ education this way. Extrinsic motivation has generally been found to reduce long-term learning (in fact, to lower performance in numerous contexts), in spite of good short-term results. In fact, there’s a substantial and long-standing corpus of research showing that grading is very bad for education. In spite of that, we still do it, and you’ve now joined the Dark Side, too.

You can, however, balance the Dark with the Light: short-term imperatives such as alerting students to the reality of their situation can be achieved very well indeed with harsh grades. Once the message is through, you can refocus them on the course content, and move on with real learning. “With bitter herbs, the bitter bile purge.”*

Grades as certification and approval
The heaviest grading burden is ethical. As a teaching assistant, you’re part of a system that decides whether students will be allowed to take higher-level courses, whether they’ll be recommended for admission to degrees, whether they’ll get into medical school, law school, grad school. What you do now can have a huge bearing on where people go, for better or for worse.

It can be hard to give a low grade knowing that you’re about to shatter a long-held dream, and perhaps harder to give a high grade to that smooth-talking pre-med whom you just know will spread smallpox to make his practice more lucrative. At this point, those long-term judgements aren’t yours to make. You need to focus on what the moment merits: grade the work, not the person.

Being hardheaded about grades doesn’t entail throwing ethics to the wind. There are other times and places when you can take up those challenges more appropriately. Mostly they involve discreetly talking with students in private, conferring with the course instructor about their progress and needs, referring them to other services in the university such as the Writing Center, the College Center for Academic Support, or the Center for Excellence in Teaching and Learning.

Grading for better reviews
Yes, easy graders can be seen as better people. Save the pandering for your ‘plan B’ career in public relations or your search for a postdoc. And don’t forget the people who like to hear, ‘Tough on crime!’ Really, panderers can’t win.

* Sophocles, fragment 770.
2. Grading for independent spirits

Some students are either so autonomous, or so misguided, that you’ll plead like Scarlett O’Hara only to be told, “My dear, I don’t give a damn.”*

Sometimes the student will be dissatisfied with the course content, and need to branch out or fill in gaps on their own. (For example, not everyone is satisfied by strategies like, “For now we’ll just use the result; you can cover the derivation next year.” Or “We’ll use the translation since not everyone knows French.”)

At other times, the student will unfortunately miss the point in spite of trying earnestly and hard, and all you can give is an ‘E’ for ‘effort’.

As much as we want students to learn, and to be self-motivated, grading does not always support and nurture their learning. We are ethically bound to grade for demonstration of specific abilities and achievements — anything else would be inequitable and, since we’re accountable to accreditation boards, professional institutions and society at large, we mustn’t send out graduates who are very good at trying but not much good at producing or achieving. You may therefore sometimes feel cornered into undermining a rare and brilliant mind.

There are several ways to approach this dilemma:

*Communicate the consequences*

Ensure that the student understands the ramifications of pursuing a variant course of study. Pursuing one’s interests can bring great rewards, but perhaps not of the sort that makes a glowing transcript. Be sure that the student understands that low grades may limit opportunities, even within the university. It gets hard to progress, and even to register, in poor academic standing, for example. And numerous scholarships fly completely out of reach.

You might urge a conversation with the instructor or advisor.

*Accommodate*

If the student is doing well enough, i.e. passing without serious problems, you might offer extracurricular guidance or encouragement to cultivate and assist the students’ efforts. These interactions could provide you with good grounds for writing a recommendation letter that explains and excuses low grades. If you choose this route, attend to how much of your own time and energy you commit, your motivations, and the outcomes — be especially careful of the potential to make things worse.

And definitely urge these students to talk with their advisors. While there are circumstances in which giving up an A to pursue one’s interests is entirely harmless, there are also career paths for which it’s disastrous. Students need to know this, and their advisors are likely the people best placed to tell them.

*1939 film adaptation of Margaret Mitchell, Gone with the wind, dir. Victor Fleming.*
Make exceptions

Some courses lend themselves to permitting exceptions; some courses don’t. It can depend heavily on what you are assessing for: if you’re looking for research skills, maybe it doesn’t matter so much that the essay addressed a non-approved topic or misunderstood the question. On the other hand, if you’re looking for a well-defined ability to recognize and solve systems of linear, homogeneous, second-order differential equations in two variables, an ingenious proof of Pythagoras’s theorem demonstrating a hitherto unnoticed connection between measure theory and quaternion algebra isn’t going to cut it. But look at the big picture: a patchy transcript will soon be overshadowed by a Fields Medal, an armful of honorary doctorates, and grants that dwarf the national debt. Guess who’ll come to mind when the student needs an assistant to solve those dynamical systems problems!

In general, decisions about exceptions should be referred to the instructor. Given that you’ll likely have more intimate contact with students (or their papers and projects), you can raise such possibilities yourself as you think appropriate. Even if the answer is ‘no,’ you’ll have the opportunity to learn why it can or cannot be.

3. Rubrics: dividing grading into easier tasks

One common difficulty is assigning a grade on a 1–10 scale or, worse, a 1–100 scale, based on a broad, overall impression of how good a work is. It genuinely is hard, though in fact we can do it surprisingly reliably, at least as measured by what our colleagues do.

But even if six graders all independently give a score of 73%, it can turn out that they all do so for significantly different reasons. Since the differences will be more apparent to the student than the similarities, repeat grading offers very little in the way of defense, and similarly offers little guidance to the student on how to do better.

Moreover, the difficulty of aiming across such a broad range is very time-consuming. Many a grader vacillates over minute distinctions and meaningless precision — “Is it 73 or 74%? Maybe 72.5%. 72.6%? No, I already gave that other one 72.6%, so this one would have to be 72.55%. 72.557%. Yes. No. 72.558.”

You might be surprised at how many hours such turmoil can consume.

One way around all of these problems is to construct, and use, a grading rubric. A rubric will allow you to focus on several reasonably well-defined criteria one-at-a-time, and to deal with them relatively quickly.

What’s a rubric? Essentially it’s a list of criteria that you’ll look for, and a simple numerical scale for each.

The numerical scale will represent how competence in each criterion is demonstrated by the work. Something like this:
0 Absent.
1–2 Serious flaws; extensive improvement needed.
3–4 Flawed, but nearly meets standard.
5 Barely meets standard.
6–7 Satisfactory; improvement warranted.
8–9 Meets standard well.
10 Outstanding, or exceeds standard.

Very often, grading with rubrics produces something close to a normal grade distribution. It’s as if the Central Limit Theorem kicks in, with scatter in each category accumulating into a nicely bell-shaped curve.

**Identifying and weighting the criteria**
Consult with the course instructor on this, since the criteria will depend on the goals of the course. It may be worth getting together with the instructor and your fellow graders, reading a few pieces of work, and jointly discussing what is and isn’t important.

Ideally, criteria (or categories) won’t overlap. In practice, this is hard to achieve, but just do your best. Assessment is a difficult art, long caught in the difficulty of working out what grades actually measure, and unfortunately often trapped in the circularity of redefining fundamental terms. There comes a point when further refinement does not yield enough benefit for the effort expended.

State the criteria in positive terms: these are things that you will look for. Things that you want to see the students produce or develop. Your criterion list will hence contain items of interest to you and the instructor.

Criteria like ‘interesting,’ ‘creative,’ ‘organized’ are vague and subjective; aim for targets more concrete and measurable like ‘i’s dotted and t’s crossed,’ ‘colors within boxes.’

For weighting, three general rules:

1. Use scales from 0 to no more than 10.
2. Use whole numbers only — no fractions!
3. Express *in words* what each number means, in terms of attainment, not failure.
   
   (This is even harder than generating a good list of grading categories.)

The reason behind all that positivity is not our cheerful, uplifting outlook, nor our motivational energy. No. It is because we are looking for achievement to recognize, and because we want to guide the students toward those attaining those criteria. “Spells like a witch” says (with trying wit and little help) that something’s wrong; “Spells like an orthographer” communicates an ideal to aim for.

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* We assume here that you’ll grade to the instructor’s or discipline’s ideals. In some other contexts, the purpose will be to rank the students relative to their peers, or to measure whether they have achieved their own goals and expectations (which they might grade for themselves). Constructing and using rubrics is a little different in those cases; we will not go into it here.
A rubric for a laboratory report, for example, might look something like this:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>Title, date, etc</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apparatus described</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Method described</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Good measurements</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Good calculations (errors, rounding)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Data recorded clearly (tables etc)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Observations, thought process documented</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Graphs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Clear prose</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td></td>
<td></td>
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<tr>
<td>Good conclusion</td>
<td>1</td>
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</table>

For an essay arguing a thesis, perhaps something like the following:

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<td>Logic</td>
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<td>5</td>
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<tr>
<td>Evidence</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<td>4</td>
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<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Grammar, spelling, usage</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

If the essay is for language study or a translation exercise, perhaps this:

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<tr>
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</table>

For a homework problem in applied mathematics, physics or engineering, perhaps the following:

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<th></th>
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</thead>
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<td>Identifies essential information</td>
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<td>2</td>
</tr>
<tr>
<td>Formulates problem well</td>
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<td>2</td>
</tr>
<tr>
<td>Supplies or looks up missing information</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Identifies appropriate theorems/techniques</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Completes solution*</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Correct units</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Draws reasonable conclusion</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
If you perceive a need for flexibility or to encourage self-motivated work, a category for ‘bonus points’ might just do it.

Try to resist vague categories. What does it mean, for instance, for laboratory measurements to be ‘good’ — are you looking for accuracy, precision, technique, corroboration?

Using the rubric
Rubrics are used three times.*

First use: Before the assessment, you can hand out the rubric to communicate the purpose of the task, the criteria that the students should work on, and your expectations. There are some downsides to this: panderers will see it as a key to fulfilling your every desire without bothering to learn much; students previously motivated to learn of their own accord may lose some of their drive. And you might commit to something that you will later wish you could be more flexible on. A middle ground may be struck by handing out partial information, such as a list of the criteria without their weights or scoring thresholds. After all, “The secret of being a bore is to tell everything.”†

Second use: During grading, the rubrics will aid your speed by keeping you focused on genuinely gradable content, and will help you to maintain consistent standards. Print out a stack of them so you can fill one in for each student; include space for a comment. Make that space small enough to prevent excessive detail.

Third use: After grading, the filled-in rubrics provide feedback. Each category is scored separately so students can see what needs most improvement, and prioritize accordingly. Your comment will be limited to the space available, but similarly directed at a high priority.

Exactly how you use the rubrics is a decision that you and the instructor will have to make, considering your teaching goals, the students you’re working with, and the styles in which you teach.

4. Grading participation and attendance

Attendance
Nothing could be easier, right? Just check who’s there, and check them off a list. Your job would be just like a Federal sinecure. Alas, it’d be like a Federal sinecure for the students, too: does mere presence really warrant credit? Does it have anything to do with learning?

* For problems with well-defined answers, it can be helpful to write out your solution, and identify thresholds or milestones through it; the student gains a point for reaching each one.

* If you’re also writing the problems, we can add a zeroth use: writing the rubric beforehand can help you to formulate problems that examine or address exactly the right kinds of competence.

†Voltaire, 6th of the Sept discours en vers sur l’homme.
Merely turning up to get an attendance point does, of course, bring students within your immediate reach — you can at least find out what they’re up to, if not also help them and provide better motivations. So there can be noble goals behind an attendance grade. The downside is that you may end up with students who resent having to do something so trite to earn a grade, and implicitly endorse the sinecurial lifestyle. Think about the ethical consequences: unable to find a zero-responsibility job, they may be forced into grad school.

Attendance credit can also penalize people who do better when they work independently. Perhaps, though, they’re missing the opportunity to learn other things to do with group interactions, and that may be a central purpose of your course. And your keener students may be missing out on an opportunity to learn how to motivate their less enthusiastic classmates.

As with all grading, think about what you want to achieve. If all you want is to attract people who otherwise have no motivation at all, you might make attendance worth so little that people with good reason not to attend aren’t unduly penalized.

**Participation**

A fathom or two beyond attendance is participation in discussions. As a TA, you may be called upon to assess participation alone because the instructor cannot see what happens in your classes, though you should feel free to ask the instructor what sorts of things to look for, and what criteria to set.

How do you do it? Check each student off a list when they speak? Give them one check for speaking at all, and a second check for saying something substantive? These systems are widespread, but they have several downsides. One is that the students easily see what you’re doing, and quickly learn to pipe up to ‘earn’ their credit — after which they have little cause to do much more. Another is that students may become desperate to squeeze a word or two in no matter what the topic, especially in a large group in which there isn’t enough time for everyone to contribute substantially to developing the conversation. A third downside is that students too shy, civil or introverted to vocally push between their clamoring classmates simply miss out, through no fault of their own.

To escape this dilemma, think about the purpose of grading participation. Usually it is because we want the students to participate, and to do so in a positive, useful way. In general we don’t want the grading system to replace conversation by clamor, nor to elevate pushiness and charisma above intellectual engagement and learning. Unless, perhaps, you’re teaching at a certain business school.

Participation is probably going to improve as the students get to know each other, and as you establish an increasingly open and intellectual environment for them. Students too shy or introverted to speak out at the beginning may find their feet as the term develops. Suave bombasts may find themselves saying less as expectations for substance increase. We have, then, a tension between learn-
ing and assessment. You can reduce that tension by postponing the assessment for a few weeks, perhaps all the way to the end of the term. The students may benefit from a midterm assessment of their participation, perhaps one that does not contribute much to their final grade, and perhaps does not contribute at all. To increase the feedback value, you could ask the students to evaluate themselves, identifying ways in which they could improve the discussion.

One danger with end-of-term participation grades is that you can be tempted to use them as discretionary ‘corrections’ for students who ought to have fallen into a grade bin different from where they ended up, or to ‘correct’ their ranking in the class. This is obviously inethical, and can be largely avoided by grading the participation separately, and before the other grade components are assessed and tallied.

In writing a rubric for participation is very hard, you may want to consider not just the student’s insights into the material, but also their influence over the conversation at large. Many good students are distinguished not by what they say, but what they draw out of others.

**Gaining terms and plussage**

There is an alternative approach to bringing in the crowds: terms requirements. These ‘terms’ are the thresholds needed to be allowed into the room for the final exam. Students ‘gain terms’ by making a serious attempt at the work throughout termtime (though, as instructors came to specify what counted as a serious attempt, some students naturally gamed the system). There might be no grade at all associated with these demonstrations, such as handing in weekly problem sets, or writing a weekly abstract of the class readings. Or, to block students who hand in a sheet of paper bearing nothing but their names, each individual task might be required to cross some nominal threshold. If you didn’t meet the requirements, you’d be either fail or be deleted from the course.

Another system, called ‘plussage’, accommodates people who do well at different times of term, perhaps owing to impairment by unexpected circumstances. Typically, one formula puts more weight on term-time work, and the other on the final exam. Students received the higher of the two calculations.

**5. Evening out the standards**

It seldom hurts to circulate some work between yourself, the instructor and your fellow teaching assistants to cross-check your grading standards and expectations.

More generally, you can consider statistical corrections at the end of the term. It is often possible to map each grader’s distribution onto a standardized one, evening out significant differences between them for fairness. Often this is misunderstood as ‘grading to a curve’, even when the more noble interpretation is
'compensating for disparities.' A downside is that outliers — unusually good students, or unusually bad ones — may get much more or much less than they deserve. Another is that small class sizes make the descriptive statistics weak. A third downside is that sometimes one class really is much stronger than another. By the end of the term, you can hope to know your students well enough to detect and resolve such cases; indeed, the instructor may ask your opinion about individual cases for exactly this reason.

Students often complain about one grader being tougher than another, causing unfair advantage or disadvantage. Assuring students that there are mechanisms in place to correct such disparities (you need not say what they are — it’s usually the instructor’s prerogative) can help to allay such concerns.

In summary: if you are accused of or worried about being unduly tough, you might keep in mind some of the following:

- the possibility of correcting statistically for disparities;
- that hard work now will put students into a better position to cope with the final exam;
- that you’re their teacher — even if they don’t know it yet, they count on you to know better, and to help them understand why your standards are worth their effort;
- that a study of 10,534 students found that those taught by poorly-rated freshman calculus instructors achieved the best grades in sophomore calculus courses a year later — from which we may conclude that instructor popularity does not always correlate with instructional efficacy.* That’s not an excuse to be unpleasant, by the way.

6. Feedback

Feedback can come in various ways: through rubrics, through model solutions posted or distributed for all to see, written directly on the work.

It is often said that graders should avoid red ink because students associate it with hurtfulness and correction, rather than with invitations for potential improvement.† And, indeed, many writers openly resent having been repeatedly confronted by so much red ink that it was as if their work had been scratched until it bled. A rigorous study of the effects proves strangely difficult to uncover, however, so let us focus on some less contentious practicalities:

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† Red came in not for psychological warfare, but because pigments for red were available when other colors were prohibitively expensive, so medieval scribes and early printers used red to stand out against the brown and black inks used for the main text.
Prioritize
There may once have been a time when university students were a peculiar minority who had the time to go painstakingly through all of the comments, sort them out, and take it all on board as useful advice. (And there may even have been a time when all that advice was actually useful.) Today, students don’t have a lot of time: something is due in every week, and courses that used to take a full year are sped through in a mere semester. There is only so much that can be dealt with at a time. You don’t have a lot of time, either.

So, before you dot the i’s and cross the t’s, consider whether there are more important things to comment on. The fine points are important, but fix the big things first.

Lots of big things to fix? Think about the order in which they would be best approached, and how much can be worked on before the next piece of work is due.

Explain what’s wrong
Many of us have had graders who use the proofreaders’ marks of the European typographic tradition; they leave squiggles, lines and symbols that hardly any undergraduate understands. And they do not explain themselves. What’s a student to do with feedback like that? Given that students are expected not to understand such notation, is it legitimately feedback at all?

If the problem matters enough to comment on at all, take a moment to explain what, exactly, the problem is. Compare the following, for example:

<table>
<thead>
<tr>
<th>No.</th>
<th>vs.</th>
<th>This is Smith, not Brown.</th>
</tr>
</thead>
<tbody>
<tr>
<td>What?</td>
<td>vs.</td>
<td>Logic does not follow.</td>
</tr>
<tr>
<td>Check hyp.</td>
<td>vs.</td>
<td>Hypotheses not satisfied.</td>
</tr>
<tr>
<td>!!!</td>
<td>vs.</td>
<td>12 sig. fig. not warranted.</td>
</tr>
<tr>
<td>Grammar</td>
<td>vs.</td>
<td>Genders wrong.</td>
</tr>
</tbody>
</table>

Keep your handwriting legible, at the least. Like it or not, good penmanship is analogous to speaking with a clear voice.

Recommend specific action
Beyond pointing out the error, you can tell a student how to address the problem, preferably by addressing its cause.
This is Smith, not Brown.
  →  Check summaries in textbook.
Logic does not follow.
  →  Look up ‘contrapositive’.
Hypotheses not satisfied.
  →  Test for convergence first.
12 sig. fig. not warranted.
  →  Round according to certainty.
Genders wrong.
  →  Pronoun and participle must agree.

Make the feedback visible
If you write in black or dark blue ink, in tiny interlinear script, in pale pencil: your feedback might not be seen. Secret messages and invisible ink are fun, but save them for your ‘plan B’ career in espionage.

Ask your students to leave margins or space between the lines for feedback. Which system you prefer will depend on your discipline, since different subjects entail different kinds of feedback.

You could use green or purple ink for visibility. Or red.

Grading and feedback with Blackboard
Blackboard offers an easy way to keep a grade tally that you, the instructor, and the students can all access. You and the instructor will be able to see grades for all of the students under your auspices; the students will see only their own. Blackboard thus makes it easy for you to return information while maintaining student privacy. Keeping grades in Blackboard also makes it easy for you and the instructor to collect and process data for end-of-term conversion to letter grades.

Seeing their grades tabulated gives students the opportunity to confirm the correctness of your records, and to track their progress. This is also helpful for you, ever vigilant for students who are falling behind or not keeping up.

Blackboard’s convenience comes at some cost: because Blackboard makes it easy to focus on the numerical grade alone, your feedback may be overlooked. You may be able to shift attention to the feedback by providing it on paper first, and not releasing grades on Blackboard for a few days, so students will have time to digest feedback (an educational task) before checking records (a bureaucratic task). If, however, their work is submitted entirely through Blackboard, you may not have that option. In that case, you could try something like embedding an assessment task in your feedback that’ll let you know whether they’re taking it to heart. For example, you could ask for a response to your feedback — a defense, reflection, strategy — that’s worth a few points. The underlying idea behind those few points is, unfortunately, the ‘carrot and stick’ model that we know to undermine good learning. For this reason, keep the grade value of these exercises low:
not enough to sway the final outcome, nor enough to penalize and deter the good students. Just enough to draw the grade-grubbers into a better kind of action.
If you encounter cheating, your immediate response could be driven by habits acquired at your previous institution, by an intuitive appreciation of scholarly mores, by a concern for epistemic rigor or intellectual property, by the ethical obligations discussed in the Grading chapter. However you approach cheating, it’s clear that something must be done, but different perspectives offer different guidance on what to do. The purpose of this chapter is to introduce some of the issues behind Rochester’s Academic Dishonesty regulations, so you can be better equipped to take appropriate action.

The Honesty regulations are not there just to thwart cheats and promote pedantic rigor: they also protect our opportunities (which could be undermined by deliberately hiding books in the library, or sabotaging a classmate’s labwork), and from false (but perhaps well-meant) accusation. Let’s begin with a few simple facts:

- All students have agreed to abide by the Academic Dishonesty regulations.
- Ignorance of the regulations and standards that they agreed to is no excuse.
- Instructors have to formally report nearly all suspected incidents to the Board on Academic Dishonesty. The only exception is when the instructor, on meeting with the student, is convinced that the perceived dishonesty was a simple misunderstanding.
- Apart from dismissing cases of simple misunderstanding, the instructor cannot make special arrangements to resolve the problem.
- Teaching assistants can’t make special arrangements, either.

Most resources about the Honesty regulations concerns the students’ obligations to be honest, and the instructors’ obligations to report. As a student, you also know and agreed to the rules. But you may also the instructor’s agent or proxy, and informant.

I. A teaching assistant’s obligations

Witness and document
Your obligations can largely be summed up as follows: report your suspicions to the instructor, and lend your assistance if the instructor formally reports the incident. Gather and supply evidence insofar as you can reasonably get it.
The most common interactions with cheating are finding apparent plagiarism when you’re grading in the office or at home. The student isn’t present, so pressure is low. You have to report your suspicion to the instructor, who will want to know why you suspect plagiarism (or another form of cheating). So gather and organize your evidence:

- the suspicious work — mark where the (suspected) cheating occurs, perhaps on a photocopy,
- evidence — such as a book or website that the text could have been copied from.

Chances are that the instructor will induct you into how we detect plagiarism: a sudden change of tone (especially a sudden improvement), or the sudden appearance of jargon, assumptions or advanced concepts that had not previously been introduced. A web search can often dig up the source, especially now that Google has scanned so many printed books. In the old days, you would have had to scour the library — and therein lay the thrill of the chase. Even if you can’t find the source, you should still bring your suspicions to the instructor’s attention. As a bounty for submitting it to a more experienced crime fighter’s eye, you may gain an opportunity to learn more techniques for pinning down your quarry.

In technical tasks, you might notice a proof technique or analytic method that the student wouldn’t know, or it’s in a style that the course takes a stand against, or it seems just a bit too polished. Such excellence can come from having copied from a textbook, but perhaps the student happens to be a stellar outlier. Harder to catch is a project recycled from an earlier year. If you’ve never taught the course before, you may not have had an opportunity to see any previous work, but being a graduate, you might well notice that a piece of work doesn’t match the student’s abilities or interests.

Your obligation is again to witness and document, passing your evidence along to the instructor to support a report.

Suppose you catch a student in flagrante delicto, say in an exam. This might seem to necessitate immediate action, but in fact the same principles come into play: witness, document and report; leave the Board to decide. For an exam situation, a testimony might usefully include:

- The location, the time,
- What you observed — what made you suspicious,
- Who else saw it (ask a colleague to look too),
- What extra actions you took.

Extra action would be warranted if there’s hard evidence, such as prohibited notes or a calculator when only slide rules are permitted: confiscate the prohibited materials at that point, and give them to the instructor as part of your case.

If circumstances require such action, minimize the fuss. You mustn’t deprive students of fair opportunity in case they’re actually innocent (often people look
Cheating

suspicious simply because they’re nervous, and, more generally, we sometimes do make mistakes). Don’t distract other students in the room by cuffing and beating your suspect there and then.

There will be times when you think the situation trivial and not worth reporting. But you should report anyway, to enable the College to compile a record that would reveal chronic re-offending — something that individual instructors and teaching assistants are hard-pressed to detect.

2. A teachable moment

You may feel torn between the regulatory (and in fact ethical) obligation to report, and your classroom duty to teach. You can often do both, and in fact the Board on Academic Honesty sees first infractions as an opportunity for education.

You could say to a student, “As you know, I’m obliged to report this, but it’s important that you understand why this counts as an infraction.” That way, you can explain both that this isn’t a personal vendetta, and that there’s some learning to be done.

For example, you may already know that many undergraduates don’t really understand why we must cite sources, even if they accept that we must do so. If you catch improper citation practice, take the opportunity to discuss it — whether one-on-one or as a class. Elicit what the students think counts as a reliable source, and what purposes citations serve. Those purposes differ between contexts: undergraduate textbook authors often provide citations to ‘helpful’ sources, and take their own authority for granted, whereas authors of monographs and journal articles could cite for any of epistemic rigor, carving out one’s niche, heading off potential challenges, implicitly identifying sources of bias, indicating allegiance to (or dismissal of) certain other researchers. For students undertaking research-based work, some appreciation of those motivations is very valuable.

In approaching the concept of ‘reliable source’, you can show how many authors cite second-hand, and sometimes you can trace back to find that there is actually no sound primary source at the beginning. Many undergraduates are told that Wikipedia is unreliable because anyone can edit it. In fact, formal studies comparing Wikipedia with the Encyclopædia Britannica found that, on scientific topics at least, each met about the same levels of reliability and completeness.* Many common allegations against Wikipedia could be levelled against other sources, too. For instance, scholarly monographs can push social, political or financial agendas, as can technical reports from pharmaceutical firms. None of this is to say that your students should cite Wikipedia: the point is that, when you choose your sources, do so for reasons better than “Because Mommy said so.”

3. Academic dishonesty regulations

Academic Honesty is governed by the Rules and Regulations of the Faculty of the College. The following text comes from the College websites, with which you should familiarize yourself:

- http://www.rochester.edu/College/honesty/
- http://www.rochester.edu/college/ccas/AdviserHandbook/AcadHonesty.html

Academic integrity in the College
Undergraduate education at Rochester builds on the principle that excellence requires freedom. Honesty and integrity are prerequisites of this freedom. Academic honesty in the advancement of knowledge requires that all students and instructors respect the integrity of one another’s work and recognize the importance of acknowledging and safeguarding intellectual property.

As members of an academic community, students and faculty assume certain responsibilities. One of these responsibilities is to engage in honest communication. Academic dishonesty is a serious violation of the trust upon which an academic community depends. The College Academic Honesty Policy is both an articulation of the kinds of behaviors that violate this trust and the means by which that trust is safeguarded and restored. All undergraduate students, staff, and faculty in the College must abide by the Academic Honesty Policy.

Violations of Academic Honesty
There are many different forms of academic dishonesty. The following kinds of honesty violations and their definitions are not meant to be exhaustive. Rather, they are intended to serve as examples of unacceptable academic conduct.

Cheating: Using unauthorized notes or other study aids during an examination; using unauthorized technology during an examination; improper storage of prohibited notes, course materials and study aids during an exam such that they are accessible or possible to view; looking at other students’ work during an exam or in an assignment where collaboration is not allowed; attempting to communicate with other students in order to get help during an exam or in an assignment where collaboration is not allowed; obtaining an examination prior to its administration; altering graded work and submitting it for regrading; allowing another person to do one’s work and submitting it as one’s own; submitting work done in one class for credit in another without the instructor’s permission; obstructing or interfering with another student’s academic work; undertaking any activity intended to obtain an unfair advantage over other students.

Plagiarism: The use, whether deliberate or unintentional, of an idea, phrase, or other materials from a source without proper acknowledgment of that source
in a work for which the student claims authorship; the misrepresentation of sources used in a work for which the student claims authorship; the improper use of course materials in a work for which the student claims authorship; the use of papers purchased online and turned in as one’s own work; submitting written work, such as laboratory reports, computer programs, or papers, which have been copied from the work of other students, with or without their knowledge and consent. The risk of plagiarism can be avoided in written work by clearly indicating, either in footnotes or in the paper itself, the source of any major or unique idea or wording that you did not arrive at on your own. Sources must be given regardless of whether the material is quoted directly or paraphrased.

**Fabrication:** Falsifying or inventing any information, citation, or data; using improper methods of collecting or generating data and presenting them as legitimate; misrepresenting oneself or one’s status in the University; perpetrating hoaxes unbecoming to students in good standing or potentially damaging to the University’s reputation or that of the members of its academic community of students and scholars.

**Facilitating academic dishonesty:** Aiding another person in an act that violates the standards of academic honesty; allowing other students to look at one’s own work during an exam or in an assignment where collaboration is not allowed; providing information, material, or assistance to another person knowing that it may be used in violation of course, departmental, or college academic honesty policies; providing false information in connection with any academic honesty inquiry.

**Denying others access to information or material:** Any act that maliciously hinders the use of or access to library or course materials; the removing of pages from books or journals or reserve materials; the removal of books from libraries without formally checking out the items; the intentional hiding of library materials; the refusal to return reserve readings to the library. All of these acts are dishonest and harmful to the community.

**Falsifying records and official documents:** Forging signatures or falsifying information on official academic documents such as drop/add forms, incomplete forms, petitions, letters of permission, or any other official University document.
Teaching as research

As a scholar, you know that personal observations and conversation can furnish a good start toward answering such questions, but definitive answers come only from rigorous research. We start with informal scouting and get increasingly rigorous. Why not approach teaching in the same way?

I. Teaching as a research activity

How can you know whether you are teaching effectively? Since the goal is student learning, their learning would seem to be your best metric and guide.

It is not always easy or convenient to measure how much, or what, students have learned. In fact, it’s nearly always difficult and time-consuming. If you want to measure, you’ll have to balance accuracy and precision against convenience.

You may be able to use student work as a data source for this purpose. For example, you could offer a short pre-test of concepts, and repeat it a few weeks later to see whether their scores have gone up. Tell them in advance that the purpose is for both you and them to see how much they’ve accomplished, and what needs more work, so they aren’t distracted or threatened by grades. You may be able to administer that test via Blackboard.

If you have weekly quizzes or problem sets, monitor the scores as the term progresses. Does the average go up, remain stable, or decrease? Does the spread change? If you rank the students by score, does the rank order change substantially from week to week?

If the students are turning in weekly papers or reports, you might see something change in how they use terminology. For example, you might be able to measure the changing ratio of correct to incorrect uses of the ablative absolute, or in the confusion of ‘random error’ with ‘human error’, or a reduction in the number of extraneous significant figures in their calculations.

There are also well-established ‘concept inventories’ for some subjects; these have been trialled for validity (i.e. that they actually measure what they purport to measure) which entails reliability (i.e. that they give the same measure when used multiple times).

If you have opportunities and instruments to measure learning, you can use them to measure the efficacy of your teaching. With sufficient care, you can also use them to measure the efficacy of innovations in your teaching.
A conceptual framework for teaching as research

1. Define the learning goals.
2. Choose or devise a measurement instrument.
3. Teach.
4. Measure what was learned.
5. Assess results: successful?
6. Reflect, and revise your research or your teaching accordingly.

The first task — defining the learning goals — is harder than it may initially appear!

Think small
You can get a long way by reducing your research component to very quick, small, on-the-fly assessments that contribute nothing to the grade. Such assessments allow you to take stock of where things stand and decide what to do next. There are various ways to do this:

- A one-question pop quiz. Give a minute to think, then get them to vote. Ask each camp to justify their answers.
- An end-of-class reflection. Give five minutes to write (perhaps anonymously) a paragraph on the topic covered. This can be part of closing your class.
- Just ask them, “What are some of the things that we don’t understand yet?” If the classroom dynamic is good, they’ll tell you.

2. Teaching in a research-informed way
Given the difficulty of measuring how much students learn, and moreover in conducting those measurements in ways that help your efforts to teach better, it may be better to guide your decisions using other peoples’ research.

There is a downside: by using other peoples’ research, you lose some ability to customize for your personal idiosyncrasies. But you also avoid the difficulties associated with conducting educational research on your own.

You’ll also need to know something about what to look for, and where to find it.

3. Kinds of educational research, and where it’s published
Educational research involves a wide range of techniques and disciplines, the bulk of which fall under the quantitative social sciences. You can generally recognize it from a strict adherence to ‘the’ scientific method and a heavy dependence on inferential statistics. A strict sense of method and the extensive use of statistics helps to isolate a clear signal from the numerous confounding influences, many of which cannot even be identified.
There is also humanistic research on topics such as curricular design, the purpose of educating and learning, and the social and political implications of teaching and learning. Some of this overlaps with social science research, especially in sociology, economics and political science.

Of particular interest to your teaching is psychological research, especially in cognition, learning, attention, group dynamics, motivation. Even if it isn’t directed specifically at education, you can often apply it to teaching and learning.

As you’ll know, it takes some preparation before you can read literature in fields other than your own. Fortunately, many disciplines also have their own teaching journals addressed to non-educationists. Some of these journals are listed below. Broader periodicals like *Science* often carry short educational research articles, written with a non-educationist audience in mind. At a less formal level, there are often reports in the *Chronicle of Higher Education* along with the innumerable opinion pieces which, while often conspicuously personal, often offer pointers to useful new ideas and research results, and can be inspiring at the least.

The discipline-oriented literature spans a wide range that might be summed up as a balancing act between rigor and innovation. It is nearly impossible to have both to maximal extent, so take care to distinguish between clever ideas and rigorous demonstrations.

**Further reading**


4. Some discipline-oriented education journals

**Anthropology**

- *Anthropology and education quarterly.*
  

**Astronomy**

- *Astronomy education review.*
  
  [http://aer.aas.org/](http://aer.aas.org/)

**Biology**

- *American biology teacher.*
  
  [http://www.bioone.org/loi/ambt](http://www.bioone.org/loi/ambt)
- *Biochemistry and molecular biology education.*
  
- *BioScience.*
  
  [http://www.aibs.org/bioscience/](http://www.aibs.org/bioscience/)
- *Journal of biological education.*
  
  [http://www.societyofbiology.org/education/educational-resources/jbe](http://www.societyofbiology.org/education/educational-resources/jbe)
Chemistry
• Chemistry education research and practice.
  http://www.rsc.org/Education/CERP/index.asp
• Education in chemistry.
  http://www.rsc.org/Education/EiC/
• Foundations of chemistry.
  http://www.springerlink.com/content/1386-4238
• Journal of chemical education.
  http://jchemed.chem.wisc.edu/

Computer science
• Computer science education.
  http://www.tandf.co.uk/journals/titles/08993408.asp

Economics
• Journal of economic education.
  http://www.tandf.co.uk/journals/titles/00220485.asp

Engineering
• American journal of engineering education.
  http://www.cluteinstitute.com/journals/AJEE.html
• Journal of Engineering Education.

Geography and geoscience
• Journal of geography.
  http://www.tandf.co.uk/journals/titles/00221341.asp
• Journal of Geoscience Education.
  http://serc.carleton.edu/nagt/jge/index.html

History
• History teacher.
  http://www.historycooperative.org/htindex.html

History of art
• Studies in art education.
  http://www.jstor.org/journals/00393541.html

Mathematics
• Educational studies in mathematics.
• International journal of mathematical education in science and technology.
  http://www.tandf.co.uk/journals/titles/0020739X.asp
• *Journal for research in mathematics education.*

• *Mathematics and computer education.*
  http://www.macejournal.org/index.html

• *PRIMUS problems, resources, and issues in mathematics undergraduate studies.*
  http://www.tandfonline.com/toc/upri20/current

**Philosophy**

• *Discourse: learning and teaching in philosophical and religious studies.*
  http://prs.heacademy.ac.uk/publications/discourse.html

• *Teaching philosophy.*
  http://secure.pdcnet.org/teachphil/Teaching-Philosophy

**Physics**

• *American journal of physics.*
  http://ajp.aapt.org/

• *Physics education.*
  http://www.iop.org/EJ/journal/PhysEd

• *The physics teacher.*
  http://scitation.aip.org/tpt/

**Psychology**

• *Psychology learning & teaching.*
  http://www.wwwords.co.uk/plat/content/maincontents.asp

• *Teaching of psychology.*
  http://www.teachpsych.org/top/topindex.php

**Statistics**

• *American statistician.*
  http://www.amstat.org/publications/tas/index.cfm

• *Journal of statistics education.*
  http://www.amstat.org/publications/jse

• *Teaching statistics.*
This section briefly introduces a few of the theoretical frameworks that may help you to understand why we recommend certain practices, and may serve as foundation points on which to establish your own effective teaching methods and identity. They come variously from psychology, anthropology and educational theory. A few readings are suggested for a deeper introduction, or you can find out more from the University of Rochester’s Center for Excellence in Teaching & Learning.

I. Cognitive apprenticeship

Cognitive apprenticeship is modeled on the anthropological study of trade apprenticeships. We attend in particular to the following characteristics:

- A hierarchy of master, journeyman, novice.
- Novices focus on learning specific tasks, but with awareness of and participation in the overall goal.
- Explicit guidance is provided throughout — partly by telling the learner what to do, but largely by showing, and by surrounding the learner with opportunities to observe others both more skilled and less skilled.
- Journeymen — a higher stage of apprentice — take on some of the teaching. But even advanced novices contribute to guiding their less advanced colleagues.

The Rochester workshop model puts journeymen — undergraduates who took the course only recently — into a primary teaching role, and construes the instructor as the trade master.

The chapters on working problems at a blackboard, and on laboratory teaching, are based heavily on Cognitive Apprenticeship.

Further reading

2. Vygotsky’s zone

Perhaps due to the obtuse terminology, people often find it hard to grasp what Lev Vygotsky’s zone of proximal development actually is. To put it relatively simply, Vygotsky’s zone is the set of problems that a learner can solve with assistance. These lie beyond the problems that the learner can solve alone, but closer than problems that the learner cannot solve at all.

Optimal collaborative learning takes place in Vygotsky’s zone: we provide just enough assistance (‘scaffolding’) for the learner to succeed, and then gradually remove the scaffolding as the learner gains independence.

You can expect to achieve good gains by identifying what students know, and helping them to operate just a little beyond their zone of competence until their competence expands there.

Vygotsky also developed a linguistics-based theory of concept formation that works similarly: confronted with a new concept, we develop a metaphor relating the new idea to something that we already know well. As we use this metaphor repeatedly (e.g. through classroom conversation or in problem-solving), it gradually gains more nuance and buds off into a concept in its own right. At that point, it can be used as the base referent to form metaphors of still more advanced concepts.

Vygotsky’s theories offer useful frameworks for sequencing and developing new ideas. They are especially used in constructivist pedagogies, which operate on the principle that comprehension must be constructed by the learner, rather than merely transmitted by the teacher.

In a nutshell: build on what students already know; challenge your students enough to extend them a little. Don’t overshoot.

Further reading


3. Bloom’s taxonomy

Bloom’s taxonomy of learning objectives offers a framework for analyzing, identifying and classifying what you are trying to achieve. Though very influential in curriculum, it lacks the systematic rigor usually associated with taxonomy in both the sciences and the humanities and continues to be revised, with efforts to
develop substantiated a hierarchy and sequencing of the categories, and even to redefine the categories themselves.

Still, Bloom’s taxonomy can provide very useful starting points for critical development of your teaching strategies, and especially for formulating questions and problems.

The skill categories in cognitive domain are listed below. As you will see, they follow an intuitively appealing sequence from low-level memory-based learning to high-level creation and synthesis; they progress approximately from the concrete to the abstract. (There are also categories for psychomotor skills which matter in laboratory courses, and courses requiring the handling of e.g. art, forensic evidence, archaeological specimens, rare books and manuscripts.)

When you’re short of questions to ask, or problems to solve, try running through Bloom’s categories and think about what it is that you’d like the students to learn from, or demonstrate in, each task. Perhaps develop a sequence of questions or tasks, using answers from simple questions in low-level categories as material for tasks in higher-level categories.

1. Knowledge
   - facts and definitions
   - how to work with facts and definitions, e.g. classification systems, methodology, criteria, conditions
   - structural knowledge, e.g. theories, universal principles and laws

   Knowledge-based questions often ask for enumerations and definitions.

2. Comprehension
   - comparison
   - interpretation
   - translation
   - extrapolation
   ‘Compare and contrast’ questions generally fall into this category.

3. Application
   - Use knowledge in a new context.

   Applications of science to technology and engineering often fall under this category, as do efforts to apply a general theory to a prospective case study.

4. Analysis
   - analyze elements of a composite problem
   - analyze relationships between parts
   - distinguish facts from inferences

   Reading and diagnostic tasks often fall under the analysis category.

5. Synthesis
   - Combine information, producing a whole greater than the sum of the parts
• Organize and structure content from multiple sources

Synthesis includes many design and documentation tasks.

6. Evaluation

• Form judgements about the value of ideas, materials

Many comparison-based questions fall under this category. It differs from the ‘comprehension’ category in requiring a subjective (but informed) critique.

4. Perry’s scheme

William Perry’s nine stages of cognitive development offer a surprisingly applicable overview of how learners progress — not just in what they learn, but in their attitude toward learning, and hence in the subtlety of the problems that they can cope with. Overall, the sequence runs from simple ‘yes/no’ knowledge through to juggling and balancing the virtues and defects of competing possibilities. The latter need not be at the cutting edge: this is less about what we know than about how we approach knowledge.

A skeletal simplification:

1. Basic dualism

Students believe that all problems can be solved. They work at learning the right solutions, and expect teachers to teach them. Dualists respond poorly to open-ended problems. They don’t think much about their peers — only the teacher speaks authoritatively, and dualists expect the teacher to be right.

2. Full dualism

Students perceive that some subjects (like chemistry and calculus) clearly distinguish right and wrong; whereas others (like philosophy and history) don’t. They attribute the difference to the facts not yet being known, and resolve that it is best to stick with subjects with well-established right answers.

3. Early multiplicity

Multiplists work at finding existing, known solutions. The learning emphasis moves off the solutions and onto finding solutions in reference books and other sources. The teacher is expected to guide students to good sources.

4. Late multiplicity

Students conceptualize differences in outlook as due to mere opinion: there’s no true certainty; the best thing to say is whatever the teacher wants to hear. Panderers can thrive in this stage. Students looking for stability generally don’t.

5. Contextual relativism

Relativists understand that possible solutions have to be seen and judged in context, along with their supporting reasons. Relativist students understand their task as being to evaluate which of the possible solutions is (or are) best.
6. Pre-commitment  
Students gain enough knowledge about the differences between possible solutions, and their consequences, to realize a need to choose between them, and commit to one.

7. Commitment  
8. Challenges to commitment  
Committing to a solution has consequences — intellectual, ethical, social — which the student now bears: commitments must be defended.

9. Post-commitment  
Students realize now that commitment is a continuing activity involving ever more learning, keeping abreast of the competing options and new information: and that, as we learn more, we may have to abandon our commitments in favor of something better.

It is possible to go both up and down this scale. For example, it’s common for students to respond to position 4 (late multiplicity), by switching subjects (e.g. from literature to mathematics) for the greater security of position 1 or 2.

It is also possible to be at different positions on the scale in different subjects, and in different contexts.

Perry’s scheme offers a sequential framework for understanding why students have certain problems with the content or each other, and what they expect from you and their other teachers. You can in turn develop individualized strategies to help them progress.

Further reading  

5. Gardner’s multiple intelligences

It is widely accepted that IQ does not measure every aspect of intelligence, and that people do better at some kinds of problem or task than at others. But how to define, measure and account for those differences remains contentious. Howard Gardner’s list of intelligences is one proposal. Curiously, all of Gardner’s categories fail the criteria that he requires them to satisfy. But multiple intelligence theory appeals strongly to common intuition, and has been especially influential in curricular design and pedagogy by diversifying learning activities.

1. Spatial intelligence.  
This includes visualization. You can expect it to see it in interpreting geological cross-sections, in imagining molecular geometries, in choosing good geometries that make the mathematics easy in physics problems, in architectural programming.
2. Linguistic intelligence.
   Speaking, writing, listening, reading. Applications include taking lecture notes, writing and describing, debating and arguing.

3. Logical-mathematical intelligence.
   Logical, abstract and quantitative reasoning. This is not necessarily mathematical, and it corresponds strongly with IQ.

   Control of one’s body, strong perception of space and time, and of texture, pressure, smell, sound and other senses, ability to develop ‘muscle memory’.

   Sound, rhythm, pitch, music.

6. Interpersonal intelligence.
   Interaction with other people: perceptiveness of other people’s feelings, and ability to draw them into collaboration (or perhaps to control them). Associated with extroversion.

7. Intrapersonal intelligence.
   Strong understanding of the self, and ability to reflect on one’s own feelings, thoughts, intuitions, motivations. This intelligence goes with introversion, and with knowing one’s own strengths and weaknesses, and what defines one’s unique identity.

   Perceptiveness of one’s environment. Usually this is thought of as the natural environment, i.e. a keen awareness of ecosystems, plants, animals.

From the multiple intelligences, we get multiple ‘learning styles’ and applications both excellent and laughable. Among the good applications is that instructors and teaching assistants teaching in multiple modes, switching between lecturing, discussion, voting for a prospective answer, spot quizzing, debating, and so on. Among the less substantial applications is that a student who has trouble spelling a word can be told to draw a picture of it, or to express it in creative dance.

Why might multiple intelligence approaches work? One possibility is that changing activities helps students to maintain attention by shortening the duration for which they must concentrate on a single task (such as listening to a lecture). Another possibility is that, by allowing for different preferences, we make students feel more welcome, carving out space for people who aren’t comfortable with the old bookish norms. That’d make this a diversity issue.

Take multiple intelligence theory with a grain of salt, and you could find it very useful.

Further reading

6. Motivation

Put simply, extrinsic motivation comes from external pressures, praise, money, rewards and coercion; intrinsic motivation comes from interest and enjoyment. Intrinsic motivation usually goes with high achievement and continuing interest; extrinsic motivation typically partners with grade obsession and deliberately forgetting everything immediately after the exam.

Various theories attempt to describe and explain motivation. A few especially relevant ones are listed below:

**Incentive theory** concerns rewards, both tangible and intangible, and both from the self and from external sources. The rewards are given promptly, to reinforce desirable behaviors. This is the praise issued when students contribute to class discussions, or the gold star that you stick on their papers. It’s also the pat on the head for your dog who brings your pipe and slippers when you return home from the lab. For the dog, being loved and welcome is generally enough. But, for your students, what good is a gold star?

**Cognitive dissonance theory** examines what we do when discomforted by dissonance between two ways of thinking. This can be very useful when you want to transform how students think; a school of science pedagogy based on T.S. Kuhn’s ‘paradigm shifts’ depends on evoking cognitive dissonance in Vygotsky’s zone of proximal learning (see above). The idea is to guide students to critically examine their own conceptualizations in detail, in the face of contradictory evidence, or alongside a competing alternative that offers more benefits.

**Self-determination theory** speaks to the fulfilment of basic needs to do with growing and developing, mastering challenges, and developing an experience-informed sense of self. Self-determination theory is of particular interest in teaching because it guides us toward expanding the role of *intrinsic* motivation on the basis of an inherent tendency toward growth and development. (Recall the quote from Aristotle at the beginning of this booklet.)

The three needs underlying intrinsic motivation:

1. autonomy: to control one’s own life;
2. competence: to cope with one’s environment;
3. relatedness: to interact, and to be connected with and care for others.

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* On paradigm shifts, see Kuhn, *Structure of scientific revolutions*, 1966. Some educationists have taken large-scale paradigm shift as a model for individual learning.
Goal-setting theory concerns some people’s inclination to be motivated by well-defined outcomes. Often, though, especially in educational contexts, the outcomes are not as well-defined as people think. People can strive for grades, for example, without knowing what accomplishments and efforts are required to attain those grades. This makes the goal very hard to pursue. Sometimes the goals are actually pointless abstracts: there are people who want to get into law school, for example, but have not realized that getting into law school typically entails studying law, and becoming, and then working as, a lawyer.

If you can identify students’ goals (‘to finish this paper’ or ‘to answer this question’ vs ‘to understand this topic’), you’ll have an advantage in determining how to help them. Sometimes it involves persuading them to choose a different goal.

Desire-fulfilment theories. Reiss identified sixteen basic desires, and the feelings that they generate:

- Acceptance, the need for approval → self-confidence
- Curiosity, the need to learn → wonder
- Eating, the need to satiate hunger → satiety
- Family, the need to raise children → love
- Honor, the need to follow group values → loyalty
- Idealism, the need for social justice → compassion
- Independence, the need for individuality → freedom
- Order, the need for organized life, culture and environment → stability
- Physical activity, the need to exercise → vitality
- Power, the need for influence of will → efficacy
- Romance, the need for sex and courting → lust
- Saving, the need to collect → ownership
- Social contact, the need for peer companionships and play → fun
- Status, the need for social standing → self-importance
- Tranquility, the need to avoid anxiety and fear → safety, relaxedness
- Vengeance, the need to get even, to compete, to win → vindication

You’ll find people driven to their studies by many of these motives. Some desires are unproductive: for instance, a student may insist on taking a course too difficult for the sake of honor and status. A student may be driven to argument by vengeance toward the archnemesis who happens to be in the same class. Such motivations can be unknown to the student: people are not always aware of the desires that they’re trying to fulfil. But if you can identify the motivation, or perhaps guide a troubled (or troublesome) student to identify it, you may well better someone’s learning. Keeping motivational categories in mind can make this process a lot easier.
Further reading

This chapter contains some teaching scenarios, not entirely unrealistic. Work through them, trying to identify:

1. The immediate problem — what’s happening, what’s irrelevant, what else matters.
2. The underlying causes.
3. What you could do, if confronted with that situation.

Often there will be more than one good course of action.
Space has been left for you to write in.
Scenario 1

Joyce, a freshman at UR, signed up for American Culture (ANT245) because the course description promised some insight into the culture of the country to which she had fled as a ten-year old child. She was looking forward to engaging with her peers (both American and foreign-born) about the major anthropological debates in the discipline. She was a high-performing student with equally high expectations of the course. However, after two weeks, it was clear to her TA, Chris, that Joyce was not feeling as stimulated as she had hoped to be by either the material or the classroom engagement. Chris was aware that Joyce was a high ability student who had a deeply personal cultural interest in learning about her adopted country. By contrast, her peers in the class possessed a more general and transitory interest in the course content.

What strategies could Chris employ to both challenge and advance Joyce’s learning, on the one hand, and to get her peers in the class to adopt a deeper approach to their learning?
Scenario 2

Charles is the TA for Psy383 — Moral Development. He is very excited about facilitating recitations for this course because it aligns with his research interests (the morality of serial killers and rapists). However, the first two recitations do not go well. Deborah, a junior, keeps interrupting other students with comments such as ‘That’s rubbish! Everyone knows that …!’ When Charles gently suggests that there are alternative ways of looking at the debate, she sneers, ‘Oh, please! This is black and white — there are no grey areas!’ She also dismisses with an eyeball roll and a snort of contempt all attempts by her peers to offer evidence to the contrary. She knows it all, and they know nothing. The other students in the group are becoming increasingly frustrated by her attitude, and by Charles’ perceived inability to control Deborah.

What advice would you give Charles?
Scenario 3

Suzanne is a TA for Prof Cruze’s Signals (ECE241) course. It is described as an ‘introduction to continuous and discrete time signal theory and analysis of linear time-invariant systems. Signal representations, convolution, Fourier analysis, filtering of continuous and discrete time signals, Laplace and \( Z \) transformations’. It’s complicated stuff, but Suzanne is optimistic that she can facilitate student engagement with the content and application. What she did not anticipate was having an international student in the class whose English pronunciation was problematic. For instance, ‘discrete’ was pronounced ‘discrit’, ‘Fourier’ as ‘For-air-ur’ and ‘signals’ as ‘sine-als’.

Suzanne would groan inwardly when she saw his hand in the air, either to ask or to answer a question — she knew that it would take a lot of concentration to decipher what this student had to say, and even then, she might not get it right. Other students in the class experienced similar frustrations — they tended to turn their attention to something else when this student spoke because it was too much effort to try and understand what he was saying. As a result, numerous opportunities for learning were missed (by all of the students).

How could Suzanne deal with this issue?
Scenario 4

For your first Calculus 1A class, you spent a great deal of time developing challenging problem sets that will stimulate your students. You base them on ‘real life’ contexts, and you are excited about getting them engaged in finding solutions. However, your class takes place the day after the U of R’s football team has won a major tournament, and most of your students are tired and hung over when they arrive at the recitation. You redouble your effort to focus their attention onto the problem sets, but to no avail.

What options are available in order to salvage the lesson?
Scenario 5

You have a group of sixteen students in your Introduction to Premodern Chinese Literature class. One of the male freshmen has taken a shine to you. He starts sending not-so-subtle messages that he finds you attractive, including staring at you unwaveringly during the class, coming to class early and staying on afterwards to discuss ‘questions’ that he has about the material, and ‘bumping in to you’ every time you are in the cafeteria and the library. He always sits right at the front of the class, and laughs at (and agrees with) everything that you say. He has sent you a friend request on Facebook and has emailed you his cellphone number, inviting you to call him ‘anytime’.

It’s flattering, but how can you decide whether it’s appropriate? How do you deal with the student?
Scenario 6

You are a TA in STT221W, the Sampling Techniques class. The nature of the subject content lends itself to group work, so you ask the students to divide themselves into groups of three or four so that they can work on solutions collaboratively. Without fail, the same students form groups: the males in a particular fraternity immediately clique, as do a group of students who had attended the same high school. Invariably, the remaining students — who seem to have nothing in common except that they don’t belong to the ‘popular groups’ — have to work together. While each group does find solutions to the problem sets, you are uncomfortable with the way that ‘like’ seems to attract ‘like’, and you want to alter the classroom dynamics a bit so that different people work together.

How do you go about doing this? And what benefits might that bring?
Scenario 7

You’re grading a paper, and recognize some of the text. Several sentences have been lifted verbatim from Diderot without quotation marks or a citation. The student responds quizzically to your attention. “But that’s in the public domain now. The copyright’s expired.”

You query a second student who quoted the instructor’s lecture. “But isn’t that a reliable source?” she asks.

And a third student explains his use of uncited text with, “In my culture, we quote well-known phrases from our predecessors as a way to show respect for the intellectual tradition. Don’t white people also use lines from Shakespeare without citing where they’re from? The professor uses lines from Foucault and Marcus Aurelius in his lectures all the time.”

How do you answer these students, and what else can or should you do?
Scenario 8

Your students turn in their group projects, and one of them stays behind to explain why he has been so grumpy for the past three weeks. The other “team” members, he says, gesticulating quote marks with his fingers, didn’t do the work that they agreed to. One had to be ‘out of town’ for unrevealed reasons; another was around but his contribution amounted to brainstorming a whole bunch of unfeasible suggestions and photocopying a stack of mostly irrelevant journal articles that he didn’t even read; the fourth was just uselessly unproductive. So the submitted project is essentially the work of just one person.

On conferring with each of the other three students, you learn that Absentee was out of town because his parents had prepaid for a low-season family vacation in the Caribbean; Copy Boy says that he did all of the background research for the project and has the stack of journal photocopies to prove it; Useless complains that Industrious excluded him from participation.

How can you assign the group grade?
Discuss among yourselves what sorts of teaching have helped or hindered you or your classmates. List some outstandingly good and bad characteristics you’ve seen in your past teachers. This and the next page are for you to write on.
From the preceding pages, identify three good characteristics that you would like to develop in yourself over the coming year or so, and three bad characteristics that you would like to purge from your being.
Resources

Academic Honesty Policy
http://www.rochester.edu/College/honesty/

Academic advisors
Rochester undergraduates have three kinds of advisor: pre-major advisors guide them until they declare a major (or, if they are slow to do so, at the end of the sophomore year); major advisors guide them within the department in which they’re majoring; CCAS advisors are available throughout the whole undergraduate career.

Center for Excellence in Teaching & Learning
CETL offers advice and general support for improving your teaching and your learning.
In addition to meeting your own needs, you can refer students to CETL for any of the following:
- study skills counseling — for strong and weak students alike;
- organized study groups;
- information about accommodating disabilities (e.g. extra time in tests, or disability-specific apparatus). CETL administers these services; you may have to stop by to drop off or pick up exam papers for students receiving testing accommodations.

Location: Lattimore Hall, room 107.
Telephone: 5-9049.
E-mail: cetl@rochester.edu
http://www.rochester.edu/college/cetl/

College Center for Academic Support
CCAS is a good first stop for any undergraduate with an academic-related question or concern.
Location: 312 Lattimore Hall.
College Dean of Students

See here for policies relating to the College's overall principles and social and intellectual climate.

http://www.rochester.edu/college/dos/

Classroom Technology Services

CTS supports and services many, but not all, teaching spaces around campus. They also lend audiovisual equipment.

At their website, you can request a technician or equipment, and submit service requests.

http://www.rochester.edu/its/cts/

If you can't get things working, call for immediate assistance: 5-1438 or the general ITS helpline 5-2000 (and choose option 4).

Clusters

You may hear students talk about 'clusters'. Clusters provide the college curriculum with distributional breadth via thematically coherent engagement: a cluster comprises coordinated coursework totalling at least twelve credits (typically three courses). Most clusters fall within a department; some combine courses from multiple departments. Most undergraduates must take a cluster, major or minor in each of the college's Divisions.

There are three divisions: Humanities, Social Sciences, and Natural Sciences & Engineering.

Students fulfilling a professionally accredited engineering major get a partial exemption: they need take only one cluster apart from their major.

Students not satisfied by existing clusters (there are over 250) can arrange new ones.

http://www.rochester.edu/College/CCAS/clusters/
http://www.rochester.edu/college/academics/curriculum.html

Diversity

The University promotes an inclusive outlook, pursuing not only legal obligations to avoid discrimination on the bases of age, color, disability, ethnicity, marital status, national origin, race, religion, gender, sexual orientation and veteran status, but also in broader terms of universal participation and human dignity.
Several offices work on diversity and related issues: OMSA, Human Resources, ISO, CETL.

http://www.rochester.edu/diversity/

**Educational Technology Center**

Located on the ground floor in the Rush Rhees Library, the Ed Tech Center is a one-stop-shop that assists Arts, Sciences, and Engineering faculty through individual training and departmental support in the use of information technology tools for instruction, including, multimedia, collaboration software, and Internet resources. The Ed Tech Center also provides support for academic and administrative department web sites in Arts, Sciences and Engineering.

http://www.rochester.edu/it/edtech/

**International Services Office**

ISO handles matters to do with visa applications and immigration, and run or sponsor several orientation programs and intercultural events. Of particular interest to teaching assistants, ISO offers cross-cultural counseling to international students and scholars.

http://www.iso.rochester.edu/

**Multimedia Center and Gleason Theater**

The University Library lends audiovisual media, and some equipment. They also have non-circulating equipment that you and students can use in-house to view or listen to recordings, slides, films. And there is a theater that you can book for screenings.

If you need to borrow televisions, DVD or VCR players, or video cameras for class use, contact Classroom Technology Services.

http://www.library.rochester.edu/mmc/

**Office of Minority Student Affairs**

OMSA provides counseling, disseminates information, initiates programs and serves as a liaison with other departments and divisions of the university to enhance the environment in which minority students live and learn.

http://www.rochester.edu/college/OMSA/

**Printing**

UR Print Services offers printing on larger paper sizes than you can get at the library. Their main office is in the Medical Center, and there is a satellite office
in the basement of Meliora Hall. The Meliora Hall office can be a useful teaching resource, if you want students to work through the process of getting something printed: learning the terminology and constraints, and preparing pre-press output.

- UR Print Services Medical: 5-3879
- UR Print Services Meliora: 5-0334
- Document Connection: https://webcrd.its.rochester.edu/

Wide-format poster printing can be done on a 36-inch roll printer in the Barnes Computing Center in the Department of Physics and Astronomy, in Bausch & Lomb Hall.

http://www.pas.rochester.edu/bcc/

**Security**

If you are locked out of your classroom, call 275-3333. The same number is also good for more urgent security needs.

**University Counseling Center**

UCC is available as a resource for you in dealing with distressed (or distressing) students, and equally as a resource to help you through your own difficulties.

- Location: University Health Service Building (next to the Susan B. Anthony residence hall), 3rd floor. There are satellite offices at the Medical Center and the Eastman School of Music.
- Hours: 8:30 am to 7 pm, Monday–Thursday; 8:30 am to 5 pm Friday.
- Telephone: 5-3113 (available 24/7).
- [http://www.rochester.edu/ucc/](http://www.rochester.edu/ucc/)

The following are some signs that it may be time to call UCC for a consultation, to have a sounding board, to get advice, to get support, or for help in a crisis situation:

- **You see**
  - Significant changes in mood or behavior
  - Self-harm behavior (e.g., cutting)
  - Signs of drug use, excessive alcohol use
  - Signs of disordered eating (e.g., excessive weight loss)
  - Other students are activated (e.g., worried, angry, afraid)
- **You hear**
  - Suicidal threats
  - About a sexual assault
– About abusive behavior
– Concerns of other students about a particular student
– About any extreme behaviors

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  – Significant changes in mood or behavior
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• You hear
  – Suicidal threats
  – About a sexual assault
  – About abusive behavior
  – Concerns of other students about a particular student
  – About any extreme behaviors

Referring students to UCC
• Share your concern.
  – Talk in private, where you won’t be disturbed.
  – Stick to nonjudgmental, factual information. E.g., “I’m really worried about how sad you’ve been lately” or “I’m concerned about how much weight you’ve lost this semester.”
  – Don’t label their problems e.g., “you’re depressed” or “you need therapy” — that can make people feel defensive and not understood.
  – Do let them know that you are not rejecting or abandoning them, that they can still talk to you about what’s going on.
  – Remind them it’s a sign of strength, not weakness, to ask for help.

• Let students know what to expect at UCC.
  – On the phone: questions about what times they are available and the general gist of why they are coming.
  – They will be asked to come in early to complete paperwork before their first appointment.
  – When they arrive: meeting one-on-one with a therapist for 45–50 minutes who will ask about what’s wrong and talk about what they can do together.

• Follow up with the student.
  – UCC can’t tell you whether or not a student has called or come in, but you can ask the student if they took your suggestion.
  – If they weren’t happy with their session, remind them that they can request to meet with a different therapist.
• What if the student refuses help?
  – If you feel it is an urgent situation, use the on-call services (275-3113) for support and assistance.
  – Remember that your responsibility is only to tell them about the services that are available to them, not to be their therapist or fix their problems for them. Some people take longer than others to warm up to the idea of therapy. You may be one link in a long chain — be patient.

  In those rare events when you feel that you, the student or others are in danger, the most prudent action may be to call security: 5-3333.

**University Intercessor**

Intercessors investigate and respond to questions and concerns about issues of harassment and discrimination expressed by any member of the University community. Intercessors serve as a resource to the University to provide guidance and education on University policy related to harassment and discrimination.

  [http://www.rochester.edu/intercessor/](http://www.rochester.edu/intercessor/)

**Writing Center**

The Writing Center offers consultations and tutorials for writing in all disciplines. They have offices in several places around campus, and on-line tutorials via Google Chat and on-line submission of papers for criticism.

  [http://writing.rochester.edu/help/](http://writing.rochester.edu/help/)
XVI

Appendix

This chapter lists some important issues raised in the classroom scenarios in chapter XIII. There are many possible good answers, so the notes here are deliberately scant, and are not necessarily recommendations.

Scenario 1, p. 74
- High-ability, high-achiever with higher expectations than the course and students can fulfil.
- Perhaps the other students are unable or unwilling to engage.
- Perhaps the other students are fully able, but need more TA facilitation to actualize their potential or raise their aspirations.
- What activities or strategies could the TA employ to elevate the discussions to a more substantive level?
- Could alternative projects (e.g. an observational investigation into subcultures on campus, in a nearby neighborhood, or via on-line communities) serve this student better?

Scenario 2, p. 75
- Two challenges to TA authority: both expertise and classroom control.
- Open disrespect of other students.
- Very superficial level of engagement.
- This could be understood as a problem with any of social control, politeness, intellectual ability.
- A dualist in Perry’s scheme of intellectual development?
- Perhaps motivated to speak by a need to assert and demonstrate competence?
- What could be done to tone down the student’s belligerence?
  - Private conversation about civility, propriety.
  - Public rebuke aimed also at standing up for the other students. Risks shutting the student out completely. Maybe it’s worth the price.
  - Make space for others — take up the student’s claims, and assign a few minutes for others to respond *uninterrupted*.
  - Raise the stakes — ask the student for evidence or other forms of support that would convince others. Perhaps prompt other students to do this.
Scenario 3, p. 76

- First, note that even ‘correct’ pronunciation often confuses native anglophones: place names (Paris, Tian’anmen, Göteborg), people’s names (Fourier, Ångström, Thucydides), literary speech and borrowed terminology (belles-lettres, Bremsstrahlung, hoi polloi).
- Second, this is an opportunity for all students to learn how to cope with difficult communications. Multilingualism isn’t uncommon among Rochester undergraduates, so maybe one or two of them will be able to bridge the divide. If so, you could work at facilitating that.
- Would it help to ask the student to slow down, to repeat, even to write the word if need be? Do you have time for this?
- Construe group activities so that other students don’t have anywhere else to turn; spread the expression so this student doesn’t have to bear all of the consequences. For instance, have students flesh out each others’ statements.
- There are other ways to communicate. Reassign the activities so the student can have more tasks involving diagramming, graphing or otherwise communicating without the speech difficulties interfering so much.
- See whether CCAS, CETL, ISO, OMSA can arrange or direct the student toward pronunciation coaching or some other form of guidance. Graduation is widely (but not universally) understood to indicate mastery of the language of instruction. Even if not, there’s an opportunity to learn the language anyway.
- Communication matters to everyone in your classroom, and will continue to matter as the student moves on in life; take the opportunity to help.

Scenario 4, p. 77

- Cancel and reschedule? No! Hold them to their obligations, and don’t add your time to what has been wasted. We often forget that the students have social and moral obligations toward us and the institution, in addition to our more recognizable obligations toward them. At a grander scale, you might also consider their obligations toward all of the funding sources and other forms of generosity and social infrastructure that provide for their education: government and polity, family, philanthropists, social fabric more generally.
- A quick adaptation to more action-based activity: quizzes, for example, or everyone working at the blackboard so they’re at least standing up.
- Open windows, bring in fresh, cold air and bright light. Anything to counter the intoxication. Ultimately only metabolism will get rid of the consequences, but you can’t wait that long.
- Patting people on the head gets very clear responses if they have hangovers.

Scenario 5, p. 78

- Why is this inappropriate (if, indeed it is)?
- What if it’s not inappropriate, but makes you uncomfortable regardless?
- Escape by switching groups with another TA.
- Casually mention your children (“Sorry for being so tired today; my three-year old had a fever last night.”) Or your partner (“... my wife had a fever last night.”) Or a parasite that you carry. (“I didn’t even know that I’d caught these nematodes, and you never get rid of them once they’re inside you...”)
- Ask someone else to talk with him about it. Perhaps the instructor.
- Increase physical distance and decrease your personal accessibility by changing seating arrangements. One way is to move the furniture around before the students arrive. Another is to ask students to switch seats ‘to work with someone else today, so we can increase the diversity and richness of our discussions.’

**Scenario 6, p. 79**
- Randomize group allocations. Draw numbers out of a hat, for example. The instructor might have a spare doctoral cap lying around for this purpose.
- Why would this matter? In addition to making the minority students feel less excluded, switching groups increases opportunities to learn how to work with diverse collaborators. And for those who always think alike, it’s an opportunity to freshen well-worn ruts.
- There are possible downsides: people may not be able to communicate with their new collaborators. A few minutes could be needed for icebreaker exercises, and to begin forming new group structures.

**Scenario 7, p. 80**
- Various problems: epistemic rigor, academic honesty, intellectual property. These three don’t fully coincide.
- Sometimes students bluff.
- Students agreed to the honesty code when they joined the University. You might remind them of this.
- Your formal duty is to document and transmit evidence to the instructor, and to assist as needed in generating the report.
- For the good of your intellectual field, take advantage of the opportunity to turn such confusions into a learning activity — probably one that would benefit the entire class, since many, many students (including graduate students) don’t fully understand what citation is meant to achieve.

**Scenario 8, p. 81**
- Biased testimonies — whom will you believe?
- Individuals bear a responsibility to the group.
- Was the grade meant to reflect group interactions?
- Unfortunate consequence of the TA and instructor not becoming involved earlier. Some groups need much more guidance than others.
• Extra task, such as an oral exam. Perhaps the students would propose something. Or they could decide, in your presence, how to distribute the group grade.

• Some easy facts: student going away on leisure vacation is clearly neglectful (unless there are extenuating circumstances such as this being the last vacation with a dying relative); the stack of photocopies should reveal whether the ‘research’ student was selecting material critically with a research mindset, or merely mechanically.

• There also seem to be some misunderstandings about collaboration: the testimonies suggest that the students split the project sequentially, without attending to how the parts fit together. The ‘research’ student exemplifies this by saying that supplying a stack of photocopies suffices. Such problems in group structure need to be addressed at the very beginning, and are not always apparent to the group (who may not understand what group collaboration entails) nor to the teaching assistant and instructor. It may not be the TA’s or instructor’s responsibility to facilitate the group interactions, either — is it?