In clinical medicine a pearl is a nugget of wisdom that is passed from generation to generation. In this article, the pearls are the little bits of wisdom that we gather as teachers. Most of them never appear in print, and usually experienced teachers learn them the hard way – by doing the “don’ts” and not doing the “do’s.” So in the interest of helping the newest generation of teachers avoid the errors of their elders, I gathered pearls from many colleagues about teaching. What follows are semi-random, mostly pragmatic, bits of advice about teaching. Many are common sense. Not everything will apply to every teaching situation, so take what is helpful and ignore the rest. And be sure to add your own pearls at the Mentoring Forum website!

This article is not a full-fledged “how to teach your first course.” For information on that subject, see the Mentoring Forum column on “Teaching Your First Course” by Jodie Krontiris-Litowitz. One of the most important pieces of advice that Jodie had was about writing the syllabus. Most schools consider the syllabus to be a contract between the instructor and students, and you should consider which of the pearls discussed below are important enough to have a place in the syllabus.

**Before the First Class Meets**

DO your homework before the first class meeting!

Find the classroom. Time how long it takes you to get there. Double that if you have to go outside in bad weather to get there.

- Play with the computer console and make sure you know how to hook up your laptop, download your PowerPoint to the console computer, and start the web browser. Check for logins and passwords and write them down.

  Time how long it takes to get everything powered up and functioning. Make sure you get to class each day with that time + 5 minutes to spare.

  Find the light controls for the room and test the different settings by putting up a slide and moving around the back of the classroom to make sure it’s visible.

  Find out who to call when you have technology problems during class and keep their phone numbers in your class materials. (See Technology DO #1.)

  Try to remember what it was like to not understand. DON’T ever say “It should be obvious...”

  DON’T let the class make critical decisions. Ask for input, but you are in charge.

  DON’T ever say “This won’t be on the test.”

  When speaking, own every word. This will slow you down and give a different emotional tone to what you are saying.

  DON’T let the students see you flinch.

  If you give a traditional lecture, rehearse! Lecturing is a performance.

  Humor goes a long way but it should be appropriate and kind. DON’T tell jokes if you’re not good at it.

  If you have an interactive classroom, get students comfortable with talking by having them talk to each other.

  If you want students to behave a certain way in the classroom, such as having them work in small groups, introduce the behavior the first day and make sure you repeat it each session.

  When the class is discussing a question in small groups, use the “triple roar” rule. The first roar is, “What’s the question?” The second roar is students discussing the answer. The third roar (and time to call everyone back together) is, “What are you doing tonight?”

  If possible, get to class early and chat informally with the students.

  If you expect students to turn their cell phones off, make sure you turn yours off, too!

  Plan ahead when teaching a class for the first time. Figure out how long you think it will take to put together each lecture. Then double that time or be prepared to stay up all night. Developing a class for the first time always takes longer than you think.

**Teaching with Technology**

Technology is wonderful until it doesn’t work. DO be prepared for when it fails.

Have a backup plan in case the computer fails or your file won’t open. Bring a duplicate copy of your presentation file. Have a print copy of your slides so that you can use the chalkboard if all media options fail. (In PowerPoint, select the “handouts” option in the...
PRINT window to print multiple slides on one page.)

If you’re presenting with a classroom computer console:

PowerPoint software versions are not equal. Open your PowerPoint presentation and run through ALL the slides. Look carefully at equations and symbols, and make sure links to websites or video clips work. My embarrassing moment was the lecture where I put up the slide with Poiseille’s law, only to find a telephone, airplane, and happy face in replace of the delta, eta, and pi symbols in the equation.

Test how to switch from your PowerPoint to a web page or to the document camera.

If using your personal laptop, check what you have set for your desktop image and screensaver. It can be embarrassing if your screensaver turns on and starts running through images of your last family vacation at the beach.

Putting together a PowerPoint presentation takes longer than you think it will.

DO consider using a personal response system as part of your teaching. Even if you give a traditional lecture, you will find it enlightening to stop at the end of a 10-to15-minute section and ask a clicker question or two to test whether the audience understood what you just covered.

One of the new technology innovations coming soon will be software that allows students to use their cell phones as “clickers.” I have already made the decision that I will hold to my cell phone ban and not use this software.

I turn down requests from students to videotape my class as I have no desire to appear on YouTube. I do allow students to audiotape. This can be particularly helpful for students whose native language is not English. If they use a tape recorder with a counter or timer, they can note the locations of segments that they need to review, which saves having to listen to the entire recording.

For additional pointers on effective presentations, see the Mentoring Forum article by Susan McKarns on “Delivering a Dynamic Job and Chalk Talk.”

Teaching Large Classes

Large classes are not merely teaching—they are performances. To communicate effectively, you must project and be larger than life. Unless you have a booming voice that you can sustain for the entire period, a microphone is a necessity (portable is preferred, to give you mobility).

DO try to create a sense of community in the classroom so that the students become less competitive and more willing to help each other learn. This is not as much of an issue at smaller schools or at institutions where students move through the curriculum as a cohort, but it can be a major impediment to creating an interactive classroom at larger universities where a student may not know anyone else in the room.

DO learn student names. It becomes a form of crowd control. If you call someone by name who has never spoken to you, the students will think you have learned everyone’s name, and they suddenly become more responsible about showing up for class. It also shows the students you care about them as individuals.

The best way I’ve found to learn names is from photos of the class. Even if your school provides photo rosters, the photos may be out of date and the students unrecognizable. I like to have students stand in front of the board in groups of three to four and write their names over their heads, then take a digital photo. The 4x6 prints then make a good set of flashcards for learning names.

Distributing handouts in a large class can eat up time. Try the “cell division” method. Split the handouts into two piles and give one pile each to two students in the front row. Those students take one handout, then split their pile in two and pass the two piles on to students who continue taking one handout and splitting the remainder into two piles.

Handling Questions When You Don’t Know the Answer

DON’T pretend to know the answer. If you do, someone in the class will have worked with the expert in that area and you are sure to be exposed as a fraud.

You can always turn the question back to the class: “Interesting question. What do you think?” or “Can anyone answer this?” Or take advantage of the situation to model for students how you would find the answer. There is nothing wrong with admitting (occasionally) that you don’t know. There is no way we can all know everything.

If you have internet access in the classroom, go through the steps you normally use to find the information, explaining what you are doing as you go. Introduce the class to Google Scholar and to PubMed as you search. Many students have never been formally trained in how to do an efficient search, so you can take advantage of not knowing the answer to create a teachable moment.

Testing and Grading

DO develop clear guidelines about what constitutes an excused absence for a class or exam and spell it out in the syllabus. DON’T be shy about requiring documentation for a death, illness, or other family crisis. This will help you avoid the “dead grandmother syndrome” that peaks right around exam time. (For a humorous description of this phenomenon, see Mike Adam’s essay at http://www.math.toronto.edu/mpugh/DeadGrandmother.pdf.)

Decide in advance how you will handle makeup tests for excused absences. In my class, I give cumulative tests, so the final exam is optional for students with a B and required for students with a C or less. If someone has an excused absence for a test, they must take the comprehensive final exam, which then
counts for 50% of their semester grade. (The final is 40% of the grade for other students.) This policy has almost eliminated the problem of absences for a test.

DO write your tests sufficiently in advance that you (and ideally someone else) can proof them. Number each page and check the page and question numbers for duplicates and omissions. Write the key before giving the exam; it’s a good way to find your errors. For free-response questions, restrict the amount students can write by giving them an answer box.

DO be consistent in your grading. The students talk to each other and you’ll have a rebellion on your hands if half the class gets credit for an answer that you counted wrong for the other half.

DO develop a grading rubric before you start to grade. Then look at 5-10 random student answers to see how well the answers match your rubric. A revision of the rubric may be necessary. As you grade, make notes of which answers you give partial credit for and how much credit each partially correct answer gets. If you are grading a large number of tests, this step is essential to maintain consistency.

DON’T post a test key until you have finished grading the tests. Early posting means early protests. If you are giving multiple choice exams that are graded by computer, look at the item analysis to decide if you will throw out a question or allow multiple correct answers.

DON’T hand tests back until you are ready to dismiss the class. No one will hear a word you say once they have their tests in their hands. If you want to talk about the correct answers, do it before you give the tests back.

Returning tests in large classes can be difficult, especially given guidelines for maintaining student privacy. We put a cover sheet on our tests that has the student name near the top. The test starts on page 2 and grades go on page 2. With this system, we can lay out the tests alphabetically and have students come up in groups to get them while keeping grades confidential.

DO require written challenges to grading. This makes the students think through why they believe they should get credit. Often you will uncover their misconceptions in their written challenges.

An efficient and fair process for students to cite or challenge ambiguous or otherwise unanswerable questions (no, or more than one, correct answer) is to add a last page to an exam for this purpose, with instructions to explain the reason for the challenge. You can tear off the pages and collate them, which is especially helpful if you have a team-taught or large class.

**Cheating**

It would be nice to pretend that academic dishonesty doesn’t exist, but the sad truth is that it does. Find out if your institution has an honor code and what the policies are for handling suspected cases of academic dishonesty. At my institution you cannot lower a student’s grade for cheating without going through a formal procedure in which the student signs paperwork that either accepts the penalty or requests a formal hearing with the Dean of Students office. It seems rather bureaucratic but you do not want to find yourself in the position of the faculty member who was sued for defamation of character after the president of his institution overturned a cheating penalty that had previously been upheld by the faculty member’s Chair and Dean.

What are some of the ways students cheat? Probably the most prevalent and insidious is plagiarism. Many students honestly do not understand what consti-

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**Table 1: Getting Started with a TA.**

The following checklist describes some of the duties that you may expect of your graduate teaching assistant. You should make an appointment to sit down with your TA to discuss which duties you expect of him/her.

**TAs often:**
- Attend class. Distribute handouts, take attendance, take notes. Administer quizzes. Operate classroom technology.
- Run discussion sections (professor not in attendance).
- Hold weekly office hours or review sessions prior to tests or both.
- Meet weekly with professor and/or other TAs for the class.
- Proctor tests, both at scheduled times and for students who need to take them at other times. Help document cheating.
- Type and/or photocopy quizzes, tests, handouts.
- Grade homework, quizzes, exams. Maintain course grade records.
- Proofread and comment on drafts of exams. Write some exam questions.
- Advise students on the course, on other academic matters, and on non-academic personal problems.
- Assist with class e-mail and class administration.
- In lab courses, run a lab section without the instructor present. Participate in setup and cleanup.
- Accompany field trips.
- Run library errands and sometimes other errands.

**Specific points to think about and discuss with your TA**

The TA may need a copy or access to the class roster for grading purposes.
- Do you plan to make old tests available for students to study from?
- How are tests administered and who will be present? Any special procedures enforced to prevent cheating, such as alternate test forms, showing IDs, etc.?
- Who will do the grading? Who writes the key to the tests?
- How are tests handed back? Who handles student questions about grading?
- What is your policy on regrades and grade changes? How/where are grades posted?
- How do you plan to tell students what their letter grade is during the semester?

**FOR DISCUSSION SECTIONS:**

Are discussions required or mandatory? Will discussion attendance be counted in the course grade?

Who sets the agenda for discussion section meetings?

**FOR LABORATORIES:**

In laboratories, who handles stocking materials if the labs run short in the middle of the week?

What special procedures do you need to know, such as safety and checking out equipment?
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Preventing plagiarism: http://www.lib.utexas.edu/services/instruction/faculty/plagiarism/preventing.html.

Interactive tutorial on what constitutes plagiarism: http://www.lib.utexas.edu/services/instruction/learningmodules/plagiarism/about.html.

Guide for students, with examples: http://www.utexas.edu/lbj/students/writing/plagiarism.pdf.

DO establish a set of rules for testing situations, be explicit about them in the syllabus, and enforce them. Cheating on tests may be worse in large classes where students feel some sense of anonymity. Sometimes the cheater is working alone, but all too often there is collusion. This can range from elaborate systems using cell phones and pagers to communicate to “cheating rings,” where students pay other students to take their tests for them. Some testing rules to consider include no talking except to the instructor; students with wandering eyes will cause someone to be moved to another seat; no books, backpacks, coats, etc. at the student’s seat; no hats except baseball caps turned backwards. No calculators unless specifically permitted; no memory calculators; no cell phones or pagers. Exams cannot be written in red or pink ink; no “white-out”; exams written in pencil will not be re-graded if there is any evidence that the answer has ever been erased. There must be one empty seat between students. If a student leaves the room once the exam has started, s/he may not return.

If you suspect cheating, you should do whatever you can to stop it (take away notes, move someone) but you should always let the suspect(s) finish the exam. If possible, have someone else in the room to help proctor the exam and ask the second person to witness any suspicious activity. You may not search a student’s personal belongings or person suspicious activity. You may not search a student’s personal belongings or person without their explicit permission.

DO Know the Rules and Ethics.

Some of these will vary by institution but others are universal.

Know your institution’s policies on handling students with disabilities, particularly those that require special classroom or testing accommodations. Some students are allowed double time for tests (unless speed is one of the skills being tested) or must have a low-distraction environment. You usually receive a written notification from the office for students with disabilities that spells out what special considerations a student needs, and you must meet those accommodations, even if it is inconvenient.

The Family Educational Rights and Privacy Act (FERPA) governs the privacy of student records and academic performance. If a student is over 18, you cannot talk to Mom and Dad about their child unless you have explicit permission from the child. If Mom and Dad get nasty, refer them to the Dean.

Know your institution’s resources for students with emotional or psychological problems. Where can you send students who are depressed or suicidal? You should also know the institution’s recommendations or rules for handling in-class disturbances. Who do you call when a student who just failed your test puts his fist through the glass door to the classroom?

Most schools have a sexual harassment policy. In general, you should not socialize with students until they are no longer your students. But sexual harassment works both ways, and students who become obsessed with you can be very creepy. Know who to contact if a student starts stalking you.

We recommend to new faculty that they keep their home address and phone number unlisted. Many students are night owls and you may not appreciate a 1:00 AM call from the study group who can’t agree on the right answer to a question.

Watch What You Say to Students

If you want information to spread, tell a student. Their communication network is amazing. Unfortunately, the network also can work like the whisper game, where the original message is significantly altered after being filtered through many iterations. Use discretion and never talk about one student to another except in the most general, unidentifiable terms.

Working with Teaching Assistants

Many of you reading this are at institutions that do not use graduate teaching assistants (TA). But if you are at a school where graduate students teach the laboratory classes or extra sessions associated with a lecture class, (called discussions, tutorials, or recitations, depending on the school), you will find that this adds another dimension to your teaching obligations. All too often faculty members do not think about the mechanics of working with a TA. Table 1 is a set of questions that can serve as a guideline to setting expectations for your TAs.
Improving Your Teaching

Find an on-campus mentor, ideally one who has taught in the same area. Connect with your school’s Center for Teaching Excellence (CTE) or equivalent. They can be an invaluable resource. They usually have classes to teach you how to use the campus technology, such as course management software (e.g., Blackboard) and classroom response systems. Many CTEs will video your class, then sit down with you and give constructive feedback on how you might improve your teaching. (Aside: Our CTE professionals were appalled by how much vocabulary/jargon is used in the average biology class—more per session than in the typical foreign language class.)

Consider giving your class an anonymous, informal mid-semester evaluation of the class and your teaching. It can be as simple as “What do you like best about the class? What do you like least? What can I do to improve the class this semester?” And if the students make constructive suggestions, try to implement them.

In Summary

This sounds like a lot to remember—and it is. The bottom line is that teaching should be fun and exciting, something you look forward to. Don’t worry when you make a mistake. We all do (even experienced teachers). Maintain your sense of humor, know your options, and establish a support system of colleagues.

Many thanks to the colleagues who contributed pearls to this article.

To comment on this article, go to: http://www.the-aps.org/careers/careers1/mentor/teaching.htm.

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APS Councillor Joey Granger, University of Mississippi Medical Center, visits a second grade classroom to engage and inspire students in learning about the heart. Granger left the students with PhUn Week sportpack bags and the teachers with PhUn Week t-shirts. Get ready for PhUn Week 2009 by visiting www.PhUnWeek.org and connecting with a teacher now!