DEPARTMENTS

Ecology 101

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The recruitment of new faculty members is an important function of any university academic department. Once hired, the new recruit is often faced with a significant portion of their time devoted to teaching. Of course, another significant portion of time is devoted to research, and another significant portion of time is devoted to service.

I think the following article by Karen Wilson, University of Toronto, and Stephanie Hampton, University of Washington, will be useful for both rookie and the veteran professors. Whether you are at a R-1 university or private undergraduate campus, the emphasis on quality classroom instruction begins with your first semester and continues through posttenure review. If you can document that you are effectively using most of these methods and strategies suggested by Wilson and Hampton, your students will benefit and the teaching portion of your promotion and tenure application will be applauded.

Harold Ornes

Ecology Teaching Tips for First-year Professors

The first term of teaching undergraduate and graduate courses as a new faculty member is an especially challenging new duty for those who have no previous teaching experience, but also can be unexpectedly difficult for those who thought they were prepared by graduate teaching assistantships. Teaching assistantships introduce us to many fundamental educational concepts, increase our comfort with teaching, and may have even taught us to prepare a lecture or two, but creating and delivering an entire course—or several different courses in the same semester—is often beyond the training graduate students receive. The tips in this article emerged during the fifth DIALOG Dissertations Initiative for the Advancement of Limnology and Oceanography Symposium <http://aslo.org/phd.html> for new Ph.Ds in Limnology and Oceanography as we shared our experiences in the 1-year sabbatical replacement positions we each took prior to our postdoctoral research positions. We both feel we had excellent training as graduate teaching assistants, but were still somewhat overwhelmed when we faced numerous unanticipated questions and challenges in our first year of faculty-level instruction. In these jobs, all our time and energy was consumed by teaching, and we learned to teach in proverbial trials by fire. We have organized the tips into four categories: (1) getting started with a course, (2) teaching style and resources, (3) methods of teaching other than lectures, and (4) course evaluations. Our primary goal in compiling these hints is to deliver some information that would have greatly reduced the first-term panic we felt, and the amount of time we spent in self-instruction. Additionally, we have included many tips for making the experience more enriching for both you and the students. In the busy life of a new professor, incorporating all of these suggestions into your teaching

at once would be overwhelming. Start slowly, and allow your teaching to build over time.

1) Getting Started

- When preparing a new class (or revamping an old one), ask for syllabi, notes, slides, etc. from your advisor, mentors, and fellow new professors (or whomever you are replacing while they are on sabbatical). Don't worry about using other people's work; you'll find yourself modifying other's lectures to meet your own specific needs and character. You can return your colleague's generosity by giving your benefactor your version of the notes when you have finished your class, scanning your advisor's slide collection into digital form in return, or passing your notes on to the next sabbatical replacement in line.
- Get to know lab coordinators, IT personnel, secretaries, grant coordinators, and housekeeping staff quickly and treat them well. These people are essential.
- Order your "free" examination copy of textbooks from the publisher at least 6 months before your class will occur. You may need a letter from your Department Chair confirming the name of your course and enrollment, but most publishers will send things for free, or charge only for shipping. Find the publisher's web page for information on how to order. Be aware that once you are in their database, publisher representatives may e-mail and call you indefinitely.
- Make a syllabus:
    - Put some thought into your syllabus as far in advance as possible (i.e., not the night before the first class).
    - Your first syllabus may closely resemble the syllabus of a senior colleague, but not necessarily. Take ownership of your course.
    - Realize that it is initially very rare to have the order of lectures, and even content, remain the same over the term. Don't worry about changing the order of your syllabus as you go along, but do give students fair warning. However, it is unfair to increase your students' workload as the term progresses or change the dates of major exams or projects.
    - Syllabus should state clearly your course objectives, your expectations for students, and how you will grade the students. Be very specific with regard to class policies. See below for some topics to cover on grading.
    - Think through the timing of your assignments, exams, long labs, and field trips. Ask other professors when students are usually bogged down in midterm exams, and try to have large assignments due at other times. If your students commonly take a set of courses together, work with their other professors to set nonoverlapping exam days.
    - Scan the Web for examples of syllabi from other courses to give you an idea on how others have organized the information.
- Set up a course web page. Course web pages are a great way to keep in contact with students and quickly disseminate information. Support staff are generally available to help with setting up course pages, but even simple, functional web pages can be created using commonly available programs such as the Composer page in Netscape.
    - A course web page can be a place to:
        - Post handouts for students to download before or after class; this system eliminates an enormous amount of paper waste from students who miss class. If you have students download their own handouts to bring to lecture, you must post them several days in advance of the class.
        - Post take-home exams or homework assignments
        - Post instructions for term projects or research papers, course expectations, or links to other information.
        - Post your updated syllabus and reading list (very useful for the first time you teach a course when the order of lectures and assignments is often in flux).
        - Share articles/readings (in pdf format)—note that because of copyright restrictions, you may need to limit this part of your web site to your students only (password-protected).

        - Share data files.
- Before the term begins, familiarize yourself with your institution's policies and resources for:
    - Accommodation of learning disabilities
    - Failing students
    - Dishonesty issues (e.g., cheating on exams, plagiarism)
    - Student mental or physical health
    - Know who to call or where to send students if issues arise (they will, unfortunately)

2) Teaching

- Preparing lectures. For those of you who came of age in a big-school environment, realize that lectures aren't the only way to teach, and, in many cases, may not be the best or most enjoyable technique!! See Part 3 for some other ideas.
    - *Time management* is critical
        - Limit the time you spend researching and preparing each lecture – some can do it in 2 hours per 1 hour lecture, but others (like us) need 6–8 hours per lecture, at least the first time through. If you are starting from scratch, you'll need at least 6 hours per lecture the first time through (and possibly twice that).
        - If you have a chance to prepare some but not all lectures for a new course before the term begins, prepare lectures for the first week or so and do a good job outlining your main points for each lecture for the rest of the term. Then complete lectures that you can spread out across many weeks so that for the remaining weeks in the term, you only have to complete two instead of three new lectures a week. Having a break one day a week will make your first term bearable.
        - Always have a big-picture general-interest lecture or two in your back pocket just in case things get crazy and you cannot complete a scheduled lecture. In a Limnology course, we have used topics with which we are very familiar, such as eutrophication, food webs, and biomanipulation as "safety" lectures because they often fit just as well interspersed throughout the course or at the end.
        - See **Fig. 1** for suggestions on how to manage your time. It is helpful to have a copy hanging above your desk.
    - Lecture Style
        - The key point to remember is that students need to be able to listen to you at the same time that they write notes. Some instructors try to eliminate note writing by giving extremely thorough handouts to students, but we have had students tell us that they frequently stop paying attention if they don't have to write notes. At the other extreme, instructors may not provide a handout at all, which forces students to watch them and write everything. If you use the latter tactic, honestly evaluate whether your lecture style allows students to write everything down while listening. We have found that an intermediate approach, with handouts that function as an outline of the lecture and include copies of key figures, can be very effective.
        - PowerPoint lectures are a great way to organize information and present (and archive) photos, figures, and notes in one medium.
            - HOWEVER students often dislike PowerPoint lectures because it is **so** easy to make them impossible for the student to follow:
                - No student can copy notes as quickly as you can flip through slides.
                - Students will copy EVERYTHING on your slide, regardless of its relative importance, and ignore what you are saying while they write.
                - If you post your complete PowerPoint lectures on your website, you may find that students will not attend class.

Fig. 1. At times it helps to be reminded what is really important and urgent, and what is not. Redrawn from *Seven Habits Of Highly Effective People* by Stephen R. Covey (1990).

- Ways to improve PowerPoint presentations:
  - Use SIMPLE animation (like "appear") to bring in one point at a time when you are actually talking about it (not before).
  - Do not use full sentences on your slide; write everything shorthand, as you'd expect your student's notes to read.
  - Never put a slide up (photo, graphs, or words) that you are not ready to talk about. If using a photo as a transitional slide, at least tell the students what it is before launching into a preamble. This prevents them from wondering, "What **is** that?" as you to talk to them.
  - Make sure your font is simple (sans serif) and at least 20 pt. For instance, Arial is easier to read from a distance than Times New Roman.
- Use the board in conjunction with PowerPoint:

        - For example, show vocabulary words in PowerPoint, but write the actual definition on the board.
        - For life cycles and other diagrams, work through the details of life cycles on the board, using simplified, easily copied drawings. Then use PowerPoint to present a final, full-color version.
        - Remember, when you write (or draw) on the board, most students can keep up with the pace of your writing. This virtually eliminates the dreaded and disruptive, "Can you go back to the last slide?" question.
    - Be animated! Enthusiasm is ok! You are on stage!
    - Students love photos. Photos of organisms and places make a big difference in increasing student enthusiasm. See below for some tips on resources.
    - Get feedback on your teaching effectiveness as you teach:
        - Ask your department chair to watch you teach and give you feedback. This is especially important if you'll be applying for jobs and need a reference for your teaching.
        - Some schools offer a service in which specially trained students sit in on the class and give you feedback on your lecturing. Teaching assistants can also give you invaluable information on your lecture style and the corresponding comprehension of your students.
    - Watch your colleagues teach (especially the ones that are well liked).
- Teaching Tools
    - The best lecture is a good, captivating story, with a clear message. It is always a good idea to outline exactly what you want students to get from a lecture in the beginning of your lecture, even if the lecture is one long story from start to finish.
    - Adobe Acrobat (the program you pay for, not download free) allows you to copy figures/photographs out of pdf files (i.e., new, exciting full-color research from *Science* or *Nature*). A small golden key symbol indicates the document is locked and you may not be able to copy figures (or text), but some files allow you to turn this security feature off. Be sure to indicate the source for each figure on your slides as an example of proper citation format and policy.
    - Always keep track of the references you used to construct a lecture, either at the end of the PowerPoint presentation, or in a "notes" file. You'll be happy you did when you revise or review the lecture later.
    - You can reduce paper waste by saving teaching materials in electronic format: pdfs of source articles, lecture notes with relevant references, photos, etc. We suggest archiving your files on a CD after each term is finished.
- Distill your messages!
    - Beware that it is really, really tempting to dump a huge amount of information on the students (because you know there is so much to learn!) but you must resist! Use a **message box** (**Fig. 2**) to figure out your main points and stick with them. Don't be afraid to drop a lecture or two and use the time for good discussions or active learning instead (see below).
    - A "question of the day" presented at the end of lecture is a useful method to challenge students to use what they learned in lecture that day. You can have them turn in the question the next lecture for credit (also a way to monitor who is showing up in class) or use a few of the questions as exam materials. In either case, you can start the next lecture by bringing up the question and working with the class to figure out the (an) answer—a good informal way to start lectures that gets everyone thinking and involved and provides a bridge between class periods.

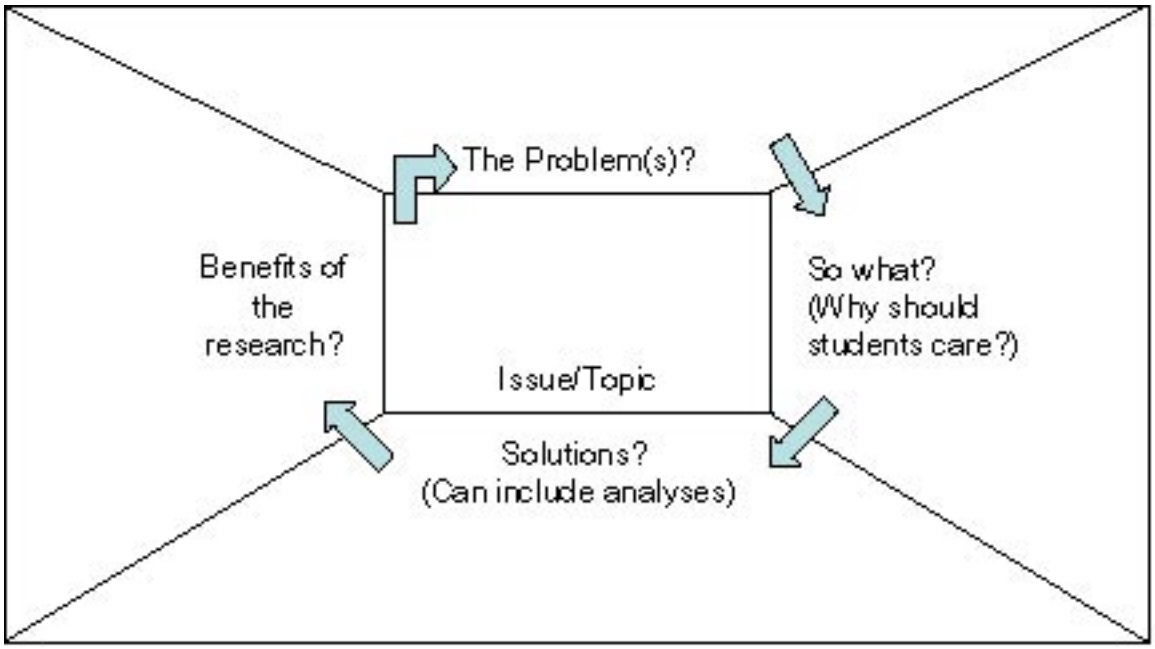

Fig. 2. The message box is an excellent method for pinpointing your take-home message in lectures, or in research. Begin by succinctly stating the issue or topic of your lecture. Then consider what the problems are related to this issue, and why students should care. What are the solutions to this issue? How can we benefit from understanding this issue? Be specific and logical. Adapted from materials from SeaWeb.

- Be approachable!
  - If you don't know the answer immediately, tell the student that it's a great question, but you don't know at the moment, and that you would be happy to find out. But ask the student to contact **you** for more information, so you don't have to remember to get back to that student along with everything else you have to do.
  - Encourage questions in class. Ask colleagues for advice on soliciting student participation in class; they have a wealth of experience and a diversity of solutions! For example, you can stage a series of your own innocuous questions for students just so they can hear their own voices in class, such as "Has anyone ever seen >insert interesting phenomenon or organism<?"
  - Set specific times for office hours: students know when they can definitely find you, and you protect the uninterrupted time necessary to concentrate on other responsibilities. Requiring students to come to your office hours in the beginning of the term (to discuss a term project or receive their first exam) will break the ice and make it easier for them to return on their own later in the term.

- Information sources:
  - Use Google.com/Images to search for photos to use in lectures. It is not clear what the legality is behind this, but cite the web page and photographer (if available) and only use the images for educational purposes. To download the photo, right-click on the photo on the web page you want, and select "Save as." Create a digital photo library classified by subject.
  - Build a good personal library of texts, compelling articles, and your own digital photos for quick

reference when making lectures. The more photos and stories you use, the better the students will remember your main points. Your school may have personal development funds you can use for purchasing texts and specialized subject books that your library may not have. Having multiple textbooks allows you to judge which to use in class, and you can introduce figures and examples not used in the students' text. Other texts provide a fast way for you to find multiple examples of the same phenomenon to show your students, when a primary literature search is not possible.

- Creating handouts
    - Pass out lecture outlines that follow your PowerPoint lectures. To easily outline a PowerPoint lecture, put PowerPoint into outline view, copy the text, and paste into a word-processing program. Paste into your document as unformatted text or the default. Then copy graphs and figures directly out of PowerPoint and into the document. In Microsoft Word, paste PowerPoint figures in as a picture using paste special (not as a PowerPoint object). Be sure to format the resulting "picture" as "in front of text" (Go to format/picture/layout/"In front of text") so it is easy to reposition the figure.
    - Use the handout to outline the lecture, highlight main points, and provide places for students to fill in extra notes, write out definitions, and draw on figures. Do not put as much wording on your handout as you have in your slides. They must WRITE for themselves.

3) Learning situations other than lectures (often much more enjoyable and memorable for all involved)

- **Discussions**
    - Ways to make discussions successful:
        - **A good discussion requires as much preparation as a lecture**; don't use a discussion when you don't have time to put a lecture together.
        - Break your class into small groups (you may want to pre-assign these groups to speed the process). Mix the groups up from discussion to discussion.
        - Have the students prepare for the discussion by reading materials or doing research before class. Insure the preparation is done by requiring students to turn in a written summary that includes their opinions on the topic.
        - Use good topics such as current or controversial issues, or issues to which the students can easily relate. Issues that affect their family or hometown are often useful. You might also ask the students to suggest topics.
        - Another form of discussion is to have students take sides, but again, the more work your do organizing before the discussion, the better it will go. Do **your** homework.
        - Be prepared to devote your entire class period to the discussion if possible. Good discussions take time.
- **Student teachers**: Another way to give yourself a little breathing room is to allow students in your course to do some of the teaching. However, you'll need to work with the students to make sure things go well and the class period is worth everyone's time, so you should dedicate some time to working with the students before they present. I'd suggest an initial meeting to discuss their topic, and a final meeting to check for glaring mistakes, etc. Be sure to give the students a good model of what will be expected of them. Student teaching gives students ownership of the course and helps with public speaking and confidence building.
- **Guest speakers**: still another way to break up the monotony of the lecture course is to bring in new and exciting guest speakers. Old friends from graduate school are a great asset, as are mature, well-advanced graduate students. Encourage your guest speakers to talk about their own work, show interesting photos, movie clips, and lots of enthusiasm.
- **Case studies**: As another approach to learning, many teachers use case studies to get the point across in a nonlecture way. Be sure you are clear on the take-home message. Check out these web sites for some examples:

    - ‹http://ublib.buffalo.edu/libraries/projects/cases/ubcase.htm› (K.A.W. has used the ecological footprint case study by Phil Camill—the students loved it.)
    - ‹http://www.forest-trends.org/resources/type_casestudies.htm›
    - ‹http://www.rainshadow.org/Cycles%20of%20Learning/personal%20energy%20use.htm›
    - Use current events such as articles in *Science* or *Nature*, newspapers, and recently published journal articles to make your topic relevant. There are also many list-serves that post relevant current news (e.g., for ecology, try the ECOLOG list-serve through ESA).
- **Field trips:** Include a handout with questions students will need to turn in to keep the students focused. Give them other ways to report back (photos, poster session, etc). In our opinion, the best field trips incorporate inquiry-based learning (see below) or generate data that can be used later for writing scientific papers.
- **Inquiry-based learning:** It works the students through the scientific process from discovery (observation and accident) to inquiry, during which the student designs experiments to test hypotheses that arise from the discovery phase. Many teachers are using this approach for labs (and classrooms) rather than the "canned" labs of old. Inquiry-based learning is something to look into if you don't already do it. Lots of information on the web.
- **Poster sessions:** A great way to show off your student's work and let the department know what your class has been doing. Rather than having students sit at their posters while you walk around and interview each group, assign each person a set of posters that they must visit and evaluate over the course of the poster session. Leave it to the student groups to be sure they have a representative present at their poster at all times. Pre-made evaluation forms, plus preassigned posters, are a must. This scheme makes 2 hours go by very quickly. Food and drink also help tremendously.
- **Service learning:** This is a great twist on the old term-paper standby. In this case, the idea is that each student, or group of students, does research or some other activity that also functions to help an organization or cause. The end goal is to have a product that can be shared with others. In an environmental studies course K.A.W. taught, students interviewed potential users of a proposed light rail project and wrote to the congressman and local newspapers with their findings; another student created a web site for a caving group interested in preserving a group of caves; another group of students investigated food waste in local eateries, and still another group wrote an environmentally based kids story and then read it to preschoolers. A poster session at the end of the term allowed students to share their work with classmates and faculty and friends. This is a great way to do outreach with the help of your students and gives them a purpose to their learning. Once again, the more preparation on your part (such as making initial contact with local nongovernmental organizations), the better things go.
- Always encourage the use of primary literature (not just web sites!!).

4) Evaluations

- Of your students:
    - Grading: you must articulate a grading policy when you make your syllabus. How are points allocated to each assignment and exam? Students will challenge you if you deviate from this policy. Several questions to ask yourself about your grading policy before students ask you in class:
        - What are the cut-off percentages for "A," "B," and "C," and do they change from exam to exam?
        - Do you offer any means for students to "make up" exams or assignments, and what are the rules to do so?
        - Do you offer "extra credit" and how?
    - Above and beyond the final exam, consider using a simple quiz during the first lecture to evaluate the level of basic understanding that your students have before you proceed. Or use the quiz to

demonstrate what the students probably do not know, then give them the quiz at the end of the term to see what they've learned.

- Of your teaching:
  - Conduct informal **mid-term evaluations** with your students, so you can improve your teaching before it's too late. This is also a chance to ask your own evaluation questions, like: "Of the two different assignment types, which do you learn the most from?" or "Is the speed of the lectures good for you?" or "What has been your favorite lecture thus far and why?" and so on. Be sure to ask you students to offer constructive criticism, and keep in mind the limitations of the situation. These evaluations really help. If nothing else, the students feel as though they've had a chance to contribute to the direction of the class.
  - Add your own questions onto your department's end-of-term evaluations, especially if you've tried a new technique or format for your course.
  - Evaluating the dreaded student evaluations: keep in mind that it is very difficult to please everyone and it's difficult not to take evaluations personally. A good course evaluation might mean that 90 percent of the students love you, and 10 percent dislike you. If it's more like 50:50, or 20:80, you probably need to improve your teaching style or effort.

Other resources: We suggest perusing journals such as the *Journal for College Science Teaching* for some more details of many of the subjects we've raised in this article. For instance, Druger (2000) presents more thoughts on exams and grading; Yuretich (2003) discusses ways to encourage critical thinking through modifications of lecture style and content. The web may also provide good guidance; for instance, the web site ‹http://www.unl.edu/gradstud/GSAP/101things.html› contains a great list of things to do in the first few weeks of class.

Finally, a comment on sustenance. Get to know other new professors or sabbatical replacement professors early and keep in touch even when things get absolutely crazy. Get a beer, coffee, or cookie even if you have only a half hour before you have to go back to work. You'll need the opportunity to discuss successes, and failures, with someone in the same position as you. Venting to your department chair, especially if you'll need a recommendation in the future, may be politically unwise.

Good luck and enjoy!

Acknowledgments

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