

- For three hours of credit, a student would participate in the same pre-semester activities as the incoming graduate students, four full-day meetings on topics essential to classroom experience, with 10-25 pages of reading per day. For the remainder of the semester, a one-hour meeting each week is used to discuss the week's reading (20-25 pages). Then, they take primary responsibility for teaching their own lab-practicum session. Their performance in class is observed. In the beginning, observations are used to provide feedback. The results of the observations as the semester progresses do factor in to the course grade. This full workshop is only held in the fall at our institution, so it takes careful planning on the part of the advisers to make sure students who may want to take the course in the spring have the opportunity to participate. Graduate teaching assistants coming into our institution in the spring semester are not allowed to teach in one of the reformed courses unless they have already had this or similar extensive preparation. For those students, the preparation workshop takes place the following fall. Our institution has a number of upper-division lab-based courses that require grading and technical support, giving us appropriate alternative assignments.
- It is best if the faculty member supervising the PHYS 400V internship is actually teaching the course of which the internship is a part, or working in close collaboration with the instructor of the course. Then, much of the discussion of pedagogical issues associated with the teaching internship is covered in the weekly teaching assistant preparatory meetings for the course. Preparing for and holding the weekly meeting to discuss the readings does add a time commitment to the supervising faculty member. At some institutions instruction for this course, which sometimes has as many as five undergraduates, could count as part of the teaching load. A small "cheat" is to only officially offer the course in the spring semester, whether the students do their internship in the fall or the spring, allowing the enrollment to be large enough to count as a class. At UA this is still impractical, as small (<14) classes for undergraduates are recognized as service, and not counted toward the teaching load. However, this is in part made up for by the fact that the graduate student, who would normally teach the lab being used for course credit by the undergraduate, can spend that time primarily grading or proofreading course materials. The TA is available as needed for the LA, but relieves some of the grading load associated with the course on the instructor. Our experience is that very early on, the TA often feels unnecessary in the course, as the LAs bring so much enthusiasm, and often talent!
- Some LAs have asked for the opportunity to take the instructor role in one of our two big weekly discussion sessions that go with the course (officially, they are lectures). We choose a topic several weeks in advance. They bring in their discussion outline, reading quiz questions, end of class summary quiz questions, and examples for review at least a week in advance. The careful preparation that has gone into these in every case is amazing. My own course notes contain several cases of such student work. Then, the instructor sits in on the student's lesson, to provide assistance if needed, but to allow an opportunity for helpful discussion afterwards to allow the student to become an even better instructor. This is amazingly useful if it can be scheduled for a day following a trip or

proposal deadline for the instructor, when he or she would be less than at best anyway.

- Sometimes our undergrads who get truly serious about teaching will take a graduate level course: Internship in College or University Teaching, PHYS 574V. The internship is a supervised experience in an organizational setting for students interested in education. We consider the internship as an important part of the preparation of a competent professional in the field. Research clearly shows that learning a subject does not adequately prepare one to teach it. Our learning assistants get excellent teaching evaluations from their students. They also often report a significant improvement in their own understanding of the material they are presenting.
- Students who go on to graduate programs at other institutions often communicate with us about their teaching assignments, and how much more effective they feel they can be based on their experiences in such a supportive atmosphere. Students who have done this internship and gone on to graduate school have been successful in their studies. Some students, including a few engineers, decided that the teaching was what most interested them, and this has been a rich pool for recruiting future high school teachers.
- While the mentoring associated with such an endeavor is not trivial, it is well worth it to a department and an institution (and, frankly beyond that!) These students go out into whatever career they are going to pursue with a much better appreciation of how to communicate science. It is easy as a faculty member to forget just how far out we are on the tail of the normal distribution academically, and that most students don't think like we do. Building the awareness of how to successfully facilitate learning is vitally important if we are going to improve teacher preparation, impacting not just the preparation of the future teachers, but the future teachers of teachers!