Published in the Fall 98 edition of *Teaching Concerns*

Hoopless Jumping:
Liberating learning with non-credit labs

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Many common teaching methods seem to have roots in animal training. To get the cat to jump through the hoop, you first get him to walk through the hoop. Give him a treat, and hold the hoop an inch off the ground: another treat, another inch, and so on until the cat can fly or is ready to graduate. In that metaphor, teaching involves the handling of the hoop and the treats: the challenges and incentives we use to motivate students, and many discussions of teaching techniques focus on their skillful manipulation.

A few years ago, I accidentally discovered something very important. When students are first learning to jump, the hoops and treats can be big distractions. The treats can become such a focus that students trip over the hoop, fall on their faces, and forget about jumping all together. Here's what I mean. I was teaching a lab session of a small graduate class that involved calculations and problem solving. The students would do assigned problems where they could work in groups and have me or a teaching assistant available for questions. We would collect the problems at the end of the session and grade them. One day, near the end of the semester when we were all busy and harried, the end of the lab came and I announced that I wouldn't collect the problems that day, since everyone had clearly worked so hard. The students were grateful and relieved, as was my TA, who was spared the chore of grading. People had worked, learned, and felt good about it; that was all I cared about.

From then on, I no longer collected lab problems in that course and discovered that students came and did them anyway, working every bit as hard as before. No hoops, no treats, but they still jumped. Stunning. Eliminating credit completely changed the nature of teaching, learning and interaction, both among students and between student and teacher. There are two basic reasons:

- *When there's no credit, there is no point in copying.* When students work in groups, there are always leaders and followers, but when credit is removed, the followers focus on learning the material rather than getting an answer on the page that will satisfy the grader.

- *When there's no credit, the teacher can freely discuss solutions in full.* When discussion sessions in science and engineering courses address homework problems, the teacher is often limited to giving hints and pointers without revealing how to solve the problem, since the problem will later be collected for credit. This game of pedagogic peek-a-boo can be frustrating for both teachers and students, but disappears when the problems are not for credit.

After doing this for a few years and applying it in a larger undergraduate course, I learned something simple yet surprising: in the early stages of learning, credit can be more an obstacle than an incentive. Removing it allows much freer communication and focus on learning, not to mention the real practical benefit of increasing student learning without increasing resources required for grading.

Of course, ultimately there has to be a payoff. Students can learn that jumping is fun with or without a hoop, but eventually they want their treats. The payoff is simple: the problems done in lab are similar to credit-based homework problems assigned later. The lab session is essentially a dry-run rehearsal for the credit problems. The most difficult aspect of problem solving for many students is simply getting started. With the lab arrangement, they are learning to get started in a setting where there are other students to consult and a teaching assistant close at hand. In addition, in the lab session, students receive a complete solution that serves as an example to get started on the credit problem. Even though there is no credit for the work done in lab, there are clear benefits to attending, and most students do attend and work hard.

Given the legions of students (and teachers) who fixate on grades and credit, it may be surprising that non-credit problems would work at all, but it shouldn't be. Learning is the best motivation, and in hoopless jumping, learning is clearly the only thing to gain.
