



PostDocs Learn to Manage Others

For scientists who are hired based on the data they have generated themselves, learning to supervise staff, students and postdoctoral fellows may be overwhelming. How do junior scientists learn to trust someone else's work as much as their own? How do they stimulate the necessary persistence and long term commitment to the intellectual focus of the lab by their trainees?

Six-hundred postdoctoral fellows were invited to design and post research opportunities for undergraduate students with the expectation that a dramatic expansion of research opportunities for undergraduates, with benefits to the entire research community, would quickly ensue.

Instead, postdoctoral fellows were reluctant to mentor undergraduate students without advance preparation. They had many specific questions about how to get started, and sought advice about issues that were likely to arise as work progressed. They were leery of an open-ended time commitment without assurance that their investment would be beneficial to their work, the goals of their laboratories, and to the undergraduates. To attempt to address these valid concerns, an undergraduate mentoring workshop was designed to which postdoctoral fellows and graduate students in Biology and in the School of Medicine were invited to participate.

Prior to the workshop, participants submitted questions and suggestions. A panel discussion and small group discussions of a scenario were used to provide specific advice and to encourage participants to reflect on their own experiences, comparing their approaches to others. The panel

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consisted of an Assistant Professor, a postdoctoral fellow, a graduate student, and the meeting organizers, all of whom had successfully supervised undergraduates. The panelists discussed why undergraduate mentoring is an important way to "learn to be the boss", and the pleasure of watching students succeed. Panelists also addressed the dangers of expecting too much and of tailoring the project to a student's strengths. For example, it is important to know the student's class schedule before designing a project that requires daily presence in the lab.

The example scenario (see page 22) demonstrates how to get started as a mentor, how to trust an undergraduate student's data, and how to draw the line between independence and direct supervision. The participants' answers to the three questions fell into three general categories described below.

- 1. The mentor should establish a connection with the student and what s/he knows already.*

In addition to questions about the student's background, interest, motivation to seek out a particular research experience, and overall career aspirations that can help shape the relationship, the mentor needs to insure that a common vocabulary exists. A mentor should never ask a question that can be answered with yes or no. Questions should be phrased so that the student has to provide an explanation upon

which the mentor can expand. One way to get started is to assign relevant reading from a textbook that the student has already used, discuss the information in light of the goals of the laboratory, and only then suggest additional reading from the primary literature.

- 2. The mentor should help the student make*

practical connections to the work.

Clarifying expectations is critical. For example, start by asking students to take notes of all conversations. Give them a tour of the lab, introduce them to co-workers, and explain whom they should consult for advice and under what circumstances. Lab safety measures need to be explained in detail, and lab “habits” surrounding dress, music, food, phone calls should be described. Demonstrate the procedures, explain the importance of any valuable reagents, and insist that the students be supervised the first time they do anything. This is one essential key to trusting some-

one else’s data. Another essential element is the student’s lab notebook. Take the time to demonstrate good record-keeping, and review the student’s notes frequently, especially at the beginning. Students quickly learn to delight in appropriate controls and data that are easily understandable.

3. *The mentor should help the student make lasting intellectual connections to the work.*

Workshop participants were split on how to accomplish this. For some, beginning with the broadest implications and working down to the specifics was essential. For others, this resulted in hopeless confusion

Scenario

Participants:

Chris, a postdoctoral fellow

Terry, a new undergraduate student

The First Day

Chris: Hi Terry, welcome to the Pilgram lab. I was really glad when you responded to my posting in the database. I’m hoping to finish off an analysis of these 300 tetrads that involves a marker we can detect using PCR. Do you know what PCR is? (Answer: Yes or No)

Terry: Yes, we did PCR reactions in my biochemistry lab.

Chris: Great, so this part will be familiar. Why don’t you watch me set up these 20 reactions and then you can get started on the rest. Oh, and here are two papers which you can read that describe this pathway which has made the Pilgram lab famous. Let me know if you have any questions about them.

(*Terry follows Chris around for the rest of the afternoon. The next day, Terry is the first to arrive at the lab, and waits outside the locked door for Chris. Terry is wearing shorts, running shoes, and listening to a portable CD player. Chris and Terry go over the plan for the day, and Chris explains that Terry needs to spend some time at the microscope that morning. Terry says that’s fine, and remembers what to do. Terry starts to set up 20 PCR reactions, stops to answer a phone call, looks around for the Taq polymerase that Chris used the day before and can’t find it. Terry then decides that another tube labeled super-pricey Taq would probably work just as well.*)

The Next Day:

Chris: So Terry, how did the PCR go yesterday? Why don’t you get your notebook so we can discuss your results?

Terry: Oh, the PCR didn’t work, so I’m going to set it up again.

Chris: Well, why don’t you get your notebook so we can troubleshoot together?

Terry: Oh, when I couldn’t see anything on the gel, I threw it away. And I was so upset that I decided to go running instead of writing up the experiment, so I haven’t started my notebook yet.

Questions:

1. List 5 things that should be discussed when you first begin to supervise an undergraduate.
2. What are the advantages and disadvantages of Chris demonstrating the method to Terry and then allowing Terry to do the experiments unobserved?
3. What things could Chris do to help Terry develop an intellectual involvement in the Pilgram lab and a sustained commitment to the research project?

and intimidation. They suggested that beginning with approaches to small parts of the problem is far more effective. The effectiveness of either approach seems to depend on the student. In order for the mentor to know which approach works best, the student must ask questions. If students are reluctant to ask questions, the mentor can simply require them to do so.

There is an increasing focus on undergraduate research experiences, at research universities and at liberal arts colleges. The number of summer programs in which students are paid to travel to academic or industrial campuses and participate in a research-intensive environment are also numerous. Workshops such as this one will benefit both the mentors and the students. By hearing a variety of responses to the questions that inevitably arise, mentors can more easily develop a consistent style based on conscious choices made in advance, rather than on a series of trial and error judgments made on

the spot. In addition, mentors with successful experiences are more likely to supervise additional undergraduate students. Advance planning to guarantee a positive research experience also benefits the undergraduates, for whom a productive research experience can lead to life-altering choices. Finally, faculty can learn from their younger colleagues about these central mentoring issues, since learning to "be the boss" is a rewarding, ongoing process.

For more information about the University of North Carolina Office of Undergraduate Research, see (www.unc.edu/depts/our). ■

—Patricia J. Pukkila, Director of the Office of Undergraduate Research (OUR) and Sharon L. Milgram, Director of the PostDoctoral Initiative (PDI), University of North Carolina at Chapel Hill, for the Women in Cell Biology Committee.

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