

## The Science-Mentoring Paradox: Teaching and Learning to Experiment

Apprenticeship is the only way to learn and impart a creative trade. Scientific research is such a trade, and it poses a challenge to mentor and mentee alike: Neither can succeed without the cooperation of the other. It is impossible to teach independence and the courage to be original to a student who is not willing to take risks. Thus, like the ancient practice of apprenticeship or good parenting, the mentor-mentee contract has aspects that can leave both parties feeling it is a contract with the devil. Here, I discuss the issues on both sides of the mentor-mentee relationship with the hope of providing some ground rules or at least food for thought.

At some stage of training, a graduate student or postdoctoral fellow will inevitably feel that the rug has been rudely extracted from underfoot. This often occurs after formal coursework has stopped, and the remaining requirement is the nebulous prospect of performing a successful research project. But it can certainly occur at any time, even to the most independent student. Figuring out how to succeed at research requires the same skills as doing the project itself: experimentation and observation. Active examples of strategy will be evident from observing more senior members of the laboratory, and the savvy student should evaluate which styles and approaches are most personally suitable (and not suitable) from among many different styles and approaches that are successful. Leaving some of this responsibility to the student has the advantage of reinforcing skills of observation. But it requires routine lab meetings where research is presented and critiqued, and establishing those is a key responsibility of the lab

**Figuring out how to succeed at research requires the same skills as doing the project itself: experimentation and observation.**

head and mentor. For junior members of a laboratory, the senior members can be the most valuable role models. Similarly, for junior faculty members, senior faculty should be considered a valuable source of both positive and negative examples. It is the mentees' responsibility to seek advice from those whom they feel will be most helpful. And, conversely, it is the responsibility of the senior members of labs and departments to respond thoughtfully and constructively to such advances and requests for help.

A good scientific mentor does a disservice to a student by giving too much supervision. If the rug-removal syndrome strikes at the postdoctoral stage, it means that the graduate supervisor did not fulfill an important mentoring responsibility. However, while doing science is all about taking risks, calculated risk-taking behavior can be taught and learned. Like that of a good parent, the mentor's role is to impart survival skills, so striking the balance between coddling and throwing into the deep end is key. Too much emphasis on mentorship gives the impression that a program can be prescribed and followed, which is completely contradictory to the nature of the scientific enterprise. This being said, what are the most successful combinations of mentorship and menteeship?

### Advice to the Mentee

- Apply observational skills to the professional as well as scientific side of your work.
- Seek advice from colleagues at all stages ahead of you.



**Like that of a good parent, the mentor's role is to impart survival skills, so striking the balance between coddling and throwing into the deep end is key.**

- Be appreciative of advice and willing to accept it or at least consider it seriously.
- Evaluate behavior of colleagues at all stages ahead of you.
- Remember that there is no single prescribed pathway for success; there is room for individuality.

### Advice to the Mentor

- Create a lab or department environment where junior members can interact with senior members.
- Offer help but don't go overboard on explicit instructions.
- Ask the mentee what he or she thinks the next step should be, rather than prescribing the next step.
- Be available and gracious about responding to specific requests for help or advice.
- In dispensing advice, consider the mentee's individual needs and capabilities. (Corollary: Different advice may be appropriate for different individuals at the same career stage.)

### Advice to Both

Learn to approach career matters in the same way you approach lab work, by contemplating the wisdom in this excerpt from Cole Porter's song "Experiment" (1933), and follow Eve's

example regardless of your gender: Don't be afraid to reach high in your pursuit of science!

You all have learned reliance  
 On the sacred teachings of science,  
 So I hope, through life, you never will decline  
 In spite of philistine  
 Defiance  
 To do what all good scientists do.  
 Experiment.

The apple on the top of the tree  
 Is never too high to achieve,  
 So take an example from Eve,  
 Experiment.  
 Be curious,  
 Though interfering friends may frown.  
 Get furious  
 At each attempt to hold you down.  
 If this advice you always employ  
 The future can offer you infinite joy  
 And merriment,  
 Experiment  
 And you'll see. ■

—Frances M. Brodsky  
 University of California, San Francisco

### Acknowledgment

The author thanks Inke Nätbke for editorial comments and suggestions.

# Buy 3, Get 1 FREE!

## NEW **accu-jet® pro** motorized pipette controller!

The successor to the popular **accu-jet®** pipette controller.

- **New sculpted grip** – no hard edges; comfort for small and large hands
- **Continuously variable speed** – touch-sensitive speed adjustment
- **New range dial** – set an upper speed limit for critical operations
- **Power management** – 8 hours on one charge, with warning LED
- **Instrument protection features** – check valve, filter and vapor exhaust
- **Simple soft blow-out** – protects cell pellets

For a limited time, we'll even mail you a **FREE accu-jet® pro** when you buy three from leading lab dealers. Available in forest green, dark blue, magenta and royal blue accents.



**BRANDTECH**  
 SCIENTIFIC, INC.

Toll Free (888) 522-2726  
 Product & promotion details at [www.brandtech.com/ajp](http://www.brandtech.com/ajp)

