Postdoc Academic Chat #2

YOUR PROFESSIONAL PREPARATION STRATEGY

Substance Alone is Not Enough

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Hartley Conference Room of the Mitchell Earth Sciences Building
[http://pangea.stanford.edu/about/map.php].

READINGS

Devising a workable preparation strategy, the need for self-promotion as a postdoc, and staying ahead of your competition.

(1) The Three-Pronged Preparation Strategy

(2) The Need for Self-Promotion in Scientific Careers

(3) Staying Ahead of Your Competition

(1) The Three-Pronged Preparation Strategy*

Richard Reis

A strategy, or overall plan, for achieving your goals is necessary because you have limited time, energy, and material resources. The plan should be flexible enough to allow you to explore different possibilities and at the same time prevent you from running into too many dead ends. It should also allow you to assess progress toward your goals and to make necessary adjustments along the way. A good strategy gives you a feeling of

accomplishment as well as a reference point during your journey, often at times when you need it the most. Also, as noted in Part I, fundamental changes are taking place in academia with respect to teaching, research and other forms of scholarship. Having a strategy that helps prepare you for these changes can be particularly valuable.

The strategy proposed here has three components: (1) Breadth-On-Top-Of-Depth; (2) Next-Stage; and (3) Multiple-Option. Each approach complements the other and all can be carried out simultaneously during your graduate student and postdoc periods. Let's take a look at each of these approaches in detail.

Breadth-On-Top-Of-Depth

In the Breadth-On-Top-Of-Depth approach, you seek to place your developing expertise in a broad context. By doing so you are better able to see connections between your work and that of others, to make a more compelling case for your own contribution, and to be able to develop related areas of depth should the situation call for it.

One way to look at the concept is to imagine a capital "T." Here, depth is represented by the stem of the "T" and breadth by the cross bar. The first thing to understand about this concept is what it is not. Breadth-On-Top-Of-Depth does not mean breadth in place of depth, nor does it mean breadth over depth in the sense that breadth is more important than depth. Breadth-On-Top-Of-Depth means breadth in addition to depth. Developing depth, be it in a research area, another form of scholarship, or the teaching of a particular course, is essential to academic success. You need to be known for something, and that something needs to be both important and unique. The last thing you want to be is "a mile wide and an inch deep." However, there are at least three good reasons for developing breadth in addition to depth. First, by increasing your knowledge and exposure to related areas, you create the possibility of developing additional areas of expertise; "drilling multiple holes," as one faculty member put it. Second, by knowing what's going on in related areas you increase the opportunities for collaboration in ways that can enhance your own scholarship. Finally, by placing your work in a larger context, you give it greater meaning and make it more compelling to a larger audience, which in turn makes it easier to justify and support.

As we will see in the next two chapters, the concept of Breadth-On-Top-Of-Depth applies to all areas of research and teaching, not just to the choice of a specific research topic. By way of illustration, consider your choice of a research advisor. As we will see in Chapter 5, no matter who you end up "choosing" as your advisor, this one person will have strengths and limitations with respect to managerial style, knowledge of the field, and contacts with industry and government. In seeking Breadth-On-Top-Of-Depth you will want to identify "complementary" advisors, one or more of whom may be in industry or at another institution. These additional advisors can make up for deficiencies always found in any single advisor. Also, by choosing to work with complementary advisors, you broaden your experience and your exposure to opportunities that would otherwise not be possible.

Next-Stage

In the Next-Stage approach, you think ahead, look ahead, and to some degree act ahead of the stage you (and your future competition) are currently occupying. By doing so, you not only demonstrate your willingness to assume the role of the position you are seeking, but also your readiness to do so. Just as most of the best graduate students began taking graduate courses and/or conducting research as college seniors, you need to begin doing some of the things professors do while you are still a graduate student and postdoc. Today it is not enough to be outstanding in your current job, you must also demonstrate that you can be successful in the next job for which you want to apply by actually performing in advance some of the activities and responsibilities that are part of that job.

Below are some areas in which demonstrating this "next-stage" competence would be important. As we will see in the next two chapters, no one expects you to demonstrate all of them. However, doing at least some of them will distinguish you from most of your competition, and within limits, the more you can do the better.

Research - In addition to having identified a dissertation or a postdoc research project that is compelling as opposed to just interesting, look for ways to engage in cross-disciplinary and multidisciplinary activities with faculty and students from other areas or departments.

Technical reviewing - Find opportunities, both formal and informal, often for you to review papers, grants, and proposals written by others.

Proposal writing - In addition to reviewing the proposals of others and contributing sections to your advisor's proposals, write your own proposals and grant applications for research that you want to do as a professor.

Supervision of other students - As you advance in your development as a graduate student or postdoc, find ways to play a more formal role in the supervision of other students, both undergraduate and graduate.

Publishing - Coauthorship is fine, but make sure you publish at least one article in which you are the first author.

Presentations at conferences - Establish a record of giving technical presentations at conferences in which faculty and industrial researchers are present.

Relations with industry - Visit various research sites and give technical presentations, use equipment, samples, and other industry resources in your research, conduct joint investigations, publish with industrial collaborators, and consider internships and other forms of employment with industry or government laboratories.

Teaching. - Plan to acquire at least some experiences beyond those of a typical TA, such as giving lectures, covering sections of a class or even taking full responsibility for a course.

The key steps in the Next-Stage approach are to ask questions (think ahead), make observations (look ahead), and acquire experiences (act ahead) by putting yourself in the right places at the right times and tuning your antenna to the gathering of the right information. You can do this in a variety of settings, such as classrooms, laboratories, faculty offices, staff meetings, seminars (particularly with guest speakers from other schools), professional conferences, private discussions with students and faculty, and during visits to industrial and government R&D facilities. In all cases, the key question is: Am I likely to encounter this situation as a professor, or future industrial scientist or engineer, and if so, what can I learn from it that will help to better prepare me for such a role?

The Next-Stage approach involves actively seeking experiences that you are likely to encounter in the future and we will look at a number of them in greater detail in Chapters 5 and 6.

Multiple-Option:

In the Multiple-Option approach, you prepare concurrently for possible careers in academia, government and industry. There are four reasons why you should consider doing so:

(1) At this point you probably don't know enough about all the things you can do with a Ph.D. to zero in exclusively on any one of them.

(2) By preparing for more than one possibility you significantly increase your chances of professional employment after your graduation or postdoctoral experience.

(3) By doing things that will make you more attractive to industry and government you will, paradoxically, make yourself more attractive to academia. This increased attraction occurs because most colleges and universities want science and engineering faculty who can interact effectively with the other two sectors.

(4) A corollary to (2) and (3), is that with the increase in part-time faculty positions, an industry/government career option can allow you to accept such part-time teaching while keeping open the possibilities of long-term academic positions at a later date.

While most beginning graduate students have little accurate knowledge of what it is like to work in the various employment sectors, many have preset ideas that prevent them from considering options that might be quite beneficial. By exploring multiple options and not making up your mind too soon, you avoid the mistake of not pursing an academic career when, if you had additional information, you would have chosen to do so. You also avoid the reverse: choosing to pursue an academic career when, if you had additional information, you would have decided otherwise.

As someone considering an academic career, you have a particular advantage. You have seen your future profession in action throughout your undergraduate and graduate study. However, what you've seen is only a portion of the professional life of a faculty member, and one purpose of the three-pronged strategy is to help you learn as much as possible about the rest before making a final decision.

In describing the rewards of an academic career, Ray Landis, dean of engineering and technology at California State University, Los Angeles, sent a survey to the nation's engineering deans asking this question: "If you were to talk with one of your best undergraduate students, what would you tell

him or her are the rewards of a faculty career?" The responses, ranked in order of their frequency, were:

(1) Joys of teaching/Rewards of working with students

(2) Freedom/Flexibility

(3) Work environment

(4) Rewards of research

(5) Variety of work

(6) Financial rewards

(7) Lifelong learning

(8) Job security [18]

It would have been interesting had Landis also asked the deans what they thought were the least rewarding aspects of a faculty career.

Richard Bube, former chairman of the materials science and engineering department at Stanford University thinks that much of the above is pure myth. As he puts it:

> An idealized view of a career as an engineering or science professor at a major research university involves quickly earning tenure, spending time helping young minds develop, and measuring personal success by the maturation of one's students. One participates in a community dedicated to truth and does research in its pursuit, studying problems of personal interest. Safe in an 'Ivory Tower,' one has time to think and be absorbed by scholarly pursuits, enjoying the chance to work one-on-one with students. [19]

Even though Bube's comments apply to research universities, and Landis' results cover a broader spectrum of schools, the two contrasting views raises important questions about what is real and what is rhetoric in statements about the life of science and engineering professors.

Similar misunderstandings can apply to positions in government and industry. In some fields, such as computer science, electrical engineering,

chemistry, geology and certain areas of biology, there is a history of Ph.D.'s accepting positions outside academia, and consequently a greater understanding of what these positions are like. In other science and engineering fields industry positions are much less common and attitudes about such options reflect this lack of experience. As William Jaco, of the American Mathematical Society, notes: "It is important to change the traditional view that the only job worth having is in academia. The culture of the science and math community considers anything short of academic employment a failure. We have to change that." [20]

As one industrial research manager recently observed:

> Most recent graduates, particularly those who have not summer-interned, do not have the foggiest idea of what industrial research is all about. Some even think that using or developing technology to do something useful is not research and if it is a product that makes a profit, is even slightly dishonorable. [21]

However, Ph.D.'s are increasingly finding employment outside universities and more and more are in types of positions that they had not expected to occupy.

With the Multiple-Option approach, you are encouraged to gain a variety of skills applicable to many sectors of Ph.D. employment. According to the Committee on Science, Engineering and Public Policy report, this greater versatility can be promoted on two levels:

> On the academic level, students should be discouraged from over-specializing. Those planning research careers should be grounded in the broad fundamentals of their fields and be familiar with several subfields. Such breadth might be much harder to gain after graduation.

> On the level of career skills, there is value in experiences that supply skills desired by both academic and nonacademic employers, especially the ability to communicate complex ideas to nonspecialists and the ability to work well in teams. Off-campus internships in industry or government can lead to additional skills and exposure to authentic job situations. [23]

As noted earlier, one advantage of the Multiple-Option approach is that by making yourself attractive to industry, you simultaneously make yourself more attractive to many academic institutions. At first this dual attraction may seem counterintuitive. How can industry with its focus on shorter-term applied research be compared with academia and its focus on longer-term theoretical understandings? In spite of the tensions created by such differences, industry and academia need each other more than ever. Having faculty with a knowledge of industry who can work at the intersections of these domains is becoming more, not less, attractive to academic institutions, including many at the Research I and II levels.

* From Chapter Four: Your professional preparation strategy, in the book Tomorrow's Professor: Preparing for Academic Careers in Science and Engineering, by Richard M. Reis, 1997, IEEE Press.

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(2) The Need for Self-Promotion in Scientific Careers

RICHARD M. REIS

"I spend 60 per cent of my time doing the best damn job I know how to do. I spend 20 per cent of my time making sure everyone knows what a good job I am doing. And I spend the remaining 20 per cent of my time looking around for an even better job." -- A physicist at Lawrence Berkeley National Laboratory.

You can argue with the percentages, but don't ignore the message. As a professional, you want to believe your "good deeds" are all that is needed to advance in your scientific career, but this is just not the way the world works. If you want credit for your accomplishments, you need to find ways to promote yourself.

Promoting yourself doesn't have to mean shameless glad-handing, appearing on The Oprah Winfrey Show, or becoming what a recent opinion article in The Chronicle of Higher Education called a "publicity intellectual." Indeed, such efforts are usually counterproductive, particularly in the sciences. The last thing you want to be is all show and no substance. Yet, while there is no substitute for substance, that alone is not enough. You need to let others know what you have done, which, in a nutshell, is what we mean by self-promotion.

The key to promoting yourself is to explain to others what you have done in ways that are also helpful to them. For maximum effect, you also need to employ multiple channels to get the word out about your activities. Doing so puts everyone in a win-win situation.

Let's look at how this strategy might work in three key areas: publishing, scientific conferences, and sabbaticals.

Don't just publish, republish

Publishing, particularly in reviewed journals, is the most time-honored and recognized way to let others know of your accomplishments. As Peter J. Feibelman, author of A Ph.D. Is Not Enough: A Guide to Survival in Science (Perseus Press, 1994), puts it:

"To succeed, you must make your talents well known and widely appreciated. Publishing provides you with an important way to accomplish that. Your papers, available in libraries around the world, represent not only your product but also your résumé. Compelling, thoughtful, well-written articles are a timeless advertisement for yourself."

Yet, with over 60,000 different scientific journals published each year, only a small number of people in your specialty will read your articles. To make the best use of your prized publications you need to republish them to a wider audience of "nearby colleagues."

Such colleagues are people not in your line of sight, but still in your field of vision -- people you want to influence, such as the colleague down the hall, your department chair, your dean, and other professionals in industry and at other academic institutions. Because these people are not in your specialty, they are going to need some help in appreciating what you have done.

A chemistry professor at Stanford regularly assigns her Ph.D. students the task of summarizing her publications, which are often jointly written by the students, in ways that can be understood by beginning undergraduate chemistry majors. Explaining one's work to non-specialists is an important learning experience for her students.

She then distributes the summaries to her undergraduates, but also sends them, along with the original article, to her nearby colleagues. By doing so

she gets the benefit of explaining her work to a broader audience while also maintaining her scholarly credibility via her original peer-reviewed article.

Conferences: capturing what is really going on

Since you already attend professional conferences, why not use them as a way to promote yourself by sharing with others what you have learned? Conferences are ideal places to find out what is hot in your field, observe various debates and controversies, meet interesting people, make contact for future interactions, and, in general, participate in the milieu of your field.

Yet, as most conference attendees know, the action lies not in the talks themselves, which are usually available later as conference proceedings, but in the hallways, at dinners, and in informal seminars. The nuggets gleaned from these events are almost never publicly shared.

I know a geophysics professor who has his graduate students and postdocs at such meetings take notes during question-and-answer sessions, and record other engaging events and conversations. The students like the role of news hounds, which often leads them to interesting future contacts.

While taking care not to spread rumors or gossip, the professor and his graduate students then produce a much sought-after electronic newsletter e-mailed to colleagues around the world. Bringing his name, and those of his students, to the attention of other scientists through a valuable service such as a newsletter is another example of a win-win situation.

A sabbatical worth noting

When Lance Glasser was denied tenure at the Massachusetts Institute of Technology in the late 1980s he decided to spend 18 months at the Hitachi Central Research Laboratories in Japan. He left for Asia with his wife and two children, without having a job to return to in the United States. Here is how he solved that problem:

"About once a quarter, I would write a 10-15 page 'newsletter' and send it to people I knew back in the United States. I sent it to about 30 or so people, and I'm sure it got passed around quite a bit as well. The newsletter had a twofold purpose: to document the interesting things I was doing and finding out about, and to keep me in front of people who might need my services when I came back to the United States."

Glasser, now vice-president for Advanced Programs at KLA Instruments in Santa Clara, Cal., credits his newsletter with helping him land a position as the director of the Electronics Technology Office of the Defense Advanced Research Projects Agency (DARPA) upon his return from Japan.

Keeping people informed about your work, even while out of their sight, is a key principle behind self-promotion.

The above examples are just a few of the many ways you can help yourself while also helping others -- the key to self-promotion. In future columns I will explore this theme in greater detail by looking at how it can help you at all stages of your professional development.

(3) Staying Ahead of Your Competition

RICHARD REIS

As you go from one stage to the next, the role you play changes. As a student I was expected to excel in a specific subject, and I was judged by my individual contribution. As a postdoc I was expected to be more of a team player, to contribute to the researchers around me and review their papers, as well as run a complete project and write my own proposals. As a professor things changed again, and now I have a dozen balls in the air.

Given all of this, I strongly recommend that as a graduate student you do some of the work of a postdoc and as a postdoc you do some of the work of a professor. Not only does it make things easier when you get to the next stage, it also separates you from the rest of your competition.

-- Guy Blaylock, assistant professor of physics, University of Massachusetts at Amherst

Mr. Blaylock's advice is the key to getting a leg up on your competition for academic positions in science.

It used to be that if you excelled in your current role, (undergraduate, graduate student, postdoc, beginning professor), you got your chance at the next step up the ladder. Given the current supply-and-demand situation in science, this is no longer the case.

Now, to move up you must demonstrate that you can be successful in the next job for which you want to apply by actually performing in advance some of the activities and responsibilities that are part of that job. In doing so you not only demonstrate your willingness to assume the position you are seeking, but also your readiness to do so.

Such activities are part of what I call the "next stage" approach to preparing for a scientific career. Let's see how it might work for Ph.D. students and postdocs in three areas: teaching, proposal writing, and supervising other researchers.

Teaching

The benefits of acquiring teaching experiences prior to becoming a professor include:

* Clarifying in your own mind that teaching is what you really want to do.

* Helping you prepare for your first teaching assignment as a professor.

* Giving you a significant leg up on your competition in your search for an academic position.

But, not all teaching experiences have the same value. The more responsibility you have and the more your experiences are like those of actual professors, the better.

As biology professor Martin Ramirez notes: "Everybody does T.A.-ships. The important question is: Who taught in summer school, at a local community college, or as a sabbatical replacement? It's these teaching experiences that will help get you the professorship you want."

The right teaching experiences can also help you get a job in industry. As one biology Ph.D. student put it: "I found invariably I was asked about my teaching skills by industrial interviewers such as large chemical or pharmaceutical companies, as well as by potential academic employers. I think my teaching experience shows that I am able to communicate. This is very important in any field you'll be in and in any kind of job setting, academic or industrial. If you're a very technical person, you still need to communicate to the marketing people in your company about what you're doing, and what it's good for."

Proposal Writing

Michael Reed, an associate professor of electrical engineering at Carnegie Mellon University, says that young researchers should get as much experience as they can writing grant proposals: "If I had my life to do over again, I would have written half a dozen proposals before I got my Ph.D., instead of just contributing to one or two. Once you have a faculty position, chasing dollars is the No. 1 activity. The more experience you bring to it, the better off you will be. Use your research advisor to help you learn to write proposals, before you start sending things in blind to funding agencies."

Writing proposals is not just for those heading for Research I universities. No matter what type of position you take, be it at a baccalaureate, master's, doctoral, or research institution, or even a research position in government or industry, you will soon have to start writing proposals. If you want support from an internal or external agency, equipment for research or course development, a fellowship for your graduate student, or even just permission to perform a procedure, you must first write a proposal.

The time to start acquiring such experiences is as a graduate student and postdoc, when the cost of failure is not as high and you can get help from colleagues with more experience. Such proposals, which are usually offshoots or extensions of faculty research already receiving support, have the advantage of being different, yet not too radical or risky -- an approach that funding agencies usually favor.

Supervising other researchers

As a professor you will certainly be supervising the work of others, whether they are undergraduates doing independent-study projects, master's students doing theses, Ph.D. students doing dissertations, or, in some cases, postdocs managing projects of their own. As you advance, you should find ways to play a more formal role in the supervision of other students, both undergraduate and graduate.

Elizabeth Drotleff, a Ph.D. student in chemistry at the University of California at Santa Cruz, began supervising undergraduates as well as another graduate student in the second year of her studies. As Drotleff explains it:

"Overseeing less-experienced members of the group has initially been very difficult, especially because of the problem of learning how to manage my time. Not only am I responsible for myself -- my research, preparation for seminar presentations, and reading the literature -- but I'm also partly responsible for keeping these people busy and interested in their own chemistry as well as teaching them laboratory techniques and safety.

"There's a lot more to pay attention to than I thought, but with the help of my postdoc and faculty supervisor I'm learning to handle many things. Overall, I feel very fortunate to have this experience before I acquire a postdoc position or a job."

The above areas are just three of the many domains to which you can apply the next-stage strategy. In your research, look for ways to engage in cross-disciplinary and multidisciplinary activities with faculty members and students from other areas or departments. You can also look for opportunities to review papers, grants, and proposals written by others.

Finally, don't ignore relationships with industry, even if you are set on an academic career. Indeed, experiences with industry can make you even more attractive to universities, since obtaining industry support for academic research is becoming much more common, particularly in the sciences.

Take some time to visit various research sites and give technical presentations on your work. Consider using equipment, samples, and other industry resources in your research. Also, consider conducting joint investigations with industrial collaborators as well as internships and other employment with industry or government laboratories.

Employing the next-stage approach involves being proactive about seeking experiences -- at all stages of your professional life. Doing so not only helps to prepare you for your next role, it distinguishes you from others who do not demonstrate this important insight.