Update: 2012 and Beyond

Table of Contents

(1) Preface to the eBook edition

(2) Chapter 16: Recent changes in higher education that can impact your preparation for an academic career

(3) Helpful Internet links for Chapters 1-15.

(1) Preface to the eBook edition

In the Fall of 2011 IEEE press approached me about coming out with an eBook version of the 1997 print version of Tomorrow's Professor: Preparing for Academic Careers in Science and Engineering. The original book was still selling well and much of the information in it remained valid and they thought an eBook version would have an even wider appeal, particularly to those living outside North America where it could be downloaded electronically. They also thought there was possibly a large number of undergraduate students in foreign countries applying to U.S. schools for graduate work who wanted to consider an academic career after completion of a Ph.D. or postdoc. Many of these students might benefit from having an eBook copy for reading prior to coming to America.

I agreed with the above, but felt that, while much of the original material did indeed still apply, there had been enough changes in higher education in the last 15 years that impact professorship preparation that I would want to add a substantial addendum chapter dealing with these developments. This new chapter, Recent changes in higher education that can impact your preparation for an academic career, appears below.

Of course one of the most profound changes in higher education during the last 15 years have been the ubiquity of the Internet and all the “content” links that are available from a variety of sources on every topic imaginable. Yet, it is this very plethora of information that makes it difficult to know where to look for information that can really be helpful. To assist you in this regard, I have added a series of Helpful Links sections throughout this new chapter. I have also created additional Helpful Links sections for each of the 15 original chapters and they appear in item (3) below. Of course these links are only a small fraction of what is available on the Internet but they are the ones I believe you will find particularly useful.

During the last 15 years I have taught over 100 seminars and workshops in North America on one or more topics in this book and have corresponded in detail with close to 400 graduate students, postdocs, and faculty at all kinds of academic institutions in the
United States and abroad. My main activity, however, has been with the Tomorrow's Professor eNewsletter that started as an outgrowth of the first edition of this book.

The eNewsletter, "desktop faculty development, 100 times a year," is a twice weekly, 1,000 to 2,000 word set of postings on higher education sent electronically to over 45,000 subscribers at more than 700 academic institutions in over 100 countries around the world. By March 2012 there had been over 1,200 postings and a number of these have provided background material for the new addendum in this book. All past postings are archived in key-word searchable form at: [http://www.stanford.edu/dept/CTL/Tomprof/index.shtml]. The goals of the eNewsletter are to provide: (1) provocative and practical material on current issues and problems in higher education, (2) insights on how to prepare for, find, and succeed at academic careers in academia, and (3) a forum for the sharing of the latest ideas on ways to improve teaching and learning.

Postings fall into one of five categories:

(1) Tomorrow’s Academy
(2) Tomorrow’s Graduate Students and Postdocs
(3) Tomorrow’s Academic Careers
(4) Tomorrow’s Teaching and Learning
(5) Tomorrow’s Research

The majority of the eNewsletter postings consist of excerpts chosen by me from books and journals provided on a complimentary basis by a number of higher education publishers. The *quid pro quo* in this arrangement is that full attribution is given in each posting along with the publisher’s URL. Almost 50 journals, magazines, and publishers provide material for the eNewsletter.

You can subscribe to the free Tomorrow's Professor eNewsletter by going to: https://mailman.stanford.edu/mailman/listinfo/tomorrows-professor

I would also love to hear from you on how useful you find these new materials. I can be reached at reis@stanford.edu

Regards,

Rick Reis
May 2012

(2) Chapter 16

Recent changes in higher education that can impact your preparation for an academic career
As noted in the preface to this eBook edition, much of the material in the original 1997 print version remains valid today. However, a number of significant developments have occurred in higher education over the past 15 years. This addendum is written to address many of them with implications for the preparation of academic career. These higher education changes include:

1. Severe and persistent institutional and government (state or federal) budget constraints that show no sign of abating in the coming decade
2. A significant growth of non-tenured faculty positions at all types of institutions
3. An increase in interdisciplinary research activity among both junior and senior faculty
4. University-industry partnerships and the opportunities and cautions they present for junior faculty
5. The expansion of social media and other forms of information technology and their use in teaching and research
6. The growth of online education
7. New developments with respect to teaching and learning
8. A continuing increase in foreign-born Ph.D. students and postdocs studying in the United States who aspire to become professors at American universities
9. An increased attention to community colleges and the opportunities they might provide for Ph.D.s and postdocs, and
10. A growing interest in non-academic careers among a number of Ph.D students and postdocs and what this means for higher education training.

We will look at each of these developments below with an emphasis on how to better help you prepare for, find, and succeed at an academic career in science and engineering.

**(1) Severe and Persistent Budget Constraints**

Even prior to the acute economic downturn that began in 2008, many public and private institutions of higher education were struggling economically. In the 1997 version of this book I wrote about how many public colleges and universities had gone from "publicly supported to publicly assisted." Now the refrain has continued to "publicly encouraged to publicly located." In the last few years the situation has continued to deteriorate and it shows little sign of abating in the coming decade. The impact has been particularly severe at public institutions, which, with 80 percent of all college students, has forced, among other things, many students to borrow heavily to pay for their education or work 30+ hours per week, something that is not likely to allow full immersion in learning. Indeed, the total student debt after graduation now exceeds $1 trillion. [1, 2]

Some of these budget problems are of higher education’s own making and are a result of overspending on infrastructure, excessive hiring during good times, and poor investment decisions. However, most of the problems are due to reduced state and federal aid brought on by the financial difficulties that began in 2008 and continue to this day.
Some education leaders and politicians have gone so far as to question if the basic higher education financial model of increasing tuition, residential life, small classes, rigid schedules, reliance on adjunct faculty, merging of departments, or the complete elimination of programs, and limited course offerings is sustainable in the long run. [3] Over the last few years we have seen the introduction of alternative models offering degrees completely through online courses taken by students at a distance. One example is the Western Governor's University, an accredited university offering online bachelor's and master's degree programs to over 25,000 students via 700 full-time faculty. [4] Other institutions take that model even farther, to a global scale, such as the Penn State World Campus, a virtual campus of Penn State University. [5]

While these alternative models serve an important niche, they haven't caught on (yet) on a large scale and so we are left with the more traditional institutions, many with aging infrastructures, fewer course offerings, larger classes, limited enrollment, longer time to graduation, more part-time and temporary instructors, and limited tenure track positions. At the same time, demands for accountability and increased efficiency are on the rise and the number of students interested in a college education is expected to increase by 13 percent in the next decade to almost 20 million. [6,7]

There was a time, a decade or more ago, when a full-time undergraduate at a public university could expect to complete a bachelor's degree in four, or at most five, years but for most such students today this is not the case. Many of the needed courses are oversubscribed with priority going to seniors and athletes. According to the U.S. Department of Education, in 2007-08, only 44 percent of students had graduated from college within four years of enrollment and only 78 percent of undergraduates had attained a degree or certificate within six years. [8]

Because of the above factors, as well as rising tuition costs, many students are seeking to take some of their lower division courses at less expensive community colleges putting similar pressures on these two-year institutions. In the fall of 2011, 20 percent of community college students said they had trouble enrolling in the courses they needed to complete their degree or certificate. [9]

Many of these two-year institutions, which used to cater not only to full-time students, but to part-time "adults" who wanted to take enrichment courses, are now finding that they have to deny enrollment to anyone who already has a college degree.

The impact of these budget constraints on your preparation for academic careers will be addressed in each of the sections that follow.

HELPFUL LINKS

* Austerity Budgets, Fiscal Squeezes, and Territorial Obligations: the End of an Era?
(2) Significant Growth of Non-Tenure Track Positions

The *sine qua non* of academic careers for over a hundred years has been the tenure track position leading in about six years to tenure and promotion from assistant to associate professor and then to life-time employment at a particular institution. Tenured faculty serve on academic councils and other governing committees and are the pool from which department chairs, deans, provosts, and presidents are drawn.

By having a system that encourages longevity, which tenure clearly does, the institution benefits from the reduced costs associated with not having formal annual reviews (as found in industry) and in having senior people available for administrative, governance, and mentoring responsibilities. Additional financial advantages of tenure for the institution become clear when we remember that tenure is a benefit just like health care and vacation time. Tenure, or more accurately the promise of it, is part of the total compensation package that candidates negotiate at the time of employment, and if the university did not provide its faculty with the security of tenure, it would probably have to compensate them with a higher salary.

It is also the case that in these difficult budgetary times employees everywhere become more risk averse and show a greater willingness to accept excessive or inappropriate demands from management. This is true in higher education as well, making tenure protection all the more important.

For these and other reasons, tenure is not going away. However, the number of new tenure track positions at all higher education institutions across the United States is decreasing significantly. In 1975, almost 57 percent of faculty were tenured or on the tenure track, yet today that percentage has been almost cut in half, and the percentage of new non-tenure track faculty has gone from 43.2 percent to 68.8 percent. [10, 11]
that phrases such as fixed-term, limited-term, contract, and contingent, are often used in place of "non-tenure track," but they all mean essentially the same thing.

The main reason for the increase in non-tenure track positions is the budget constraints referred to above. In spite of the financial advantages to the institutions of having at least some tenured faculty, when it comes to adding new faculty, having a significant number enter off the tenure track can result in significant savings to the college or university. Paid sabbaticals, research and travel budgets, housing assistance and so on are rarely offered to non-tenure track faculty. Thus, new non-tenure track faculty, as opposed to those already in the system, are often significantly less expensive, some averaging about half as much per credit hour of teaching as their tenure track counterparts. [10]

Hiring non-tenure track faculty also gives the institution more flexibility in meeting supply and demand shifts in student interests. Other motives, as noted by Gross, might include "temporarily replacing tenure track faculty on leave, the use of 'adjuncts' who bring special knowledge and experience into the academy, the expanding need for 'remedial' education, and the employment of a partner in a dual career recruitment." [10] Of course there are also negative impacts on the academic culture from having such a large number of non-permanent faculty. These include such things as a loss of community, lack of shared sacrifice, and the difficulty of creating a long term vision. However, in these financial times many institutions are willing to pay this price.

No matter the reasons, the reality is that today there are simply far more graduate students and postdocs seeking tenure track positions than there are such positions and there is every reason to believe that the same situation will continue throughout the coming decade. Some graduate students and postdocs will certainly want to pursue tenure track positions and they should be encouraged to do so, hopefully using some of the techniques and approaches outlined in this book. Yet, while the benefits of becoming a tenured professor are obvious, they do come at a price, and one that may not be worth the cost for some segments of the graduate student and postdoc population seeking academic positions. Furthermore, there are, believe it or not, some real benefits to not seeking a tenure track position.

What might you gain by not being on the tenure track? One way to answer this question is to consider the other things you could do if you were not worrying about getting tenure, such as spending more time teaching, doing research at your own pace, whether faster or slower, exploring options at other academic institutions, taking advantages of long-term opportunities in other countries, considering possibilities outside academia concurrent with your faculty position such as other part-time employment, consulting for you and your partner, and doing more things with your family and friends. With the strong emphasis today on research, even at many master's and liberal-arts colleges, being free from such pressures to concentrate on teaching might be a real plus.

In particular, non-tenure track options have advantages for graduate students and postdocs who aren't sure if they want an academic career and would like to try it out without the full-time, intense probationary period that the tenure track requires, although
going from a non-tenure track position to a tenure track position later on may be difficult. It also offers those individuals, especially in science and engineering fields, the opportunity to work part-time while continuing with full-time employment in industry or government with the eventual possibility of full-time academic positions.

Stanford University, for example, has a non-tenured faculty category called "teaching professor." One such professor teaches a number of classes ranging from small sophomore seminars to large introductory lectures of up to 500 students in his specialty, environmental sciences. With a reappointment every five years, he has been doing so full-time for the last 20 years.

In another case, also at Stanford, a professor teaches two specialized courses in a field called "smart product design" while also being employed half-time locally at one of the best product design firms in the country. His wife is a full-time tenured professor at Stanford. They would both have liked tenured positions, but finding them at the same institution is difficult for any academic couple. Their willingness not to insist on this path led to an excellent academic and industrial combination for him, and it gave her a full-time career at a prestigious university.

The same situation can also apply to research. In this case, however, it is important that you make sure that your non-tenure track position gives you the authority to serve as a Principal Investigator (PI) which allows you to author proposals, receive external funding, and supervise graduate students and postdocs. Often such appointments come with titles like Research Professor, or Senior Research Scientist. An inorganic chemist I know, after a very successful career in government, went to the University of California, Los Angeles as a senior research scientist. In such a role she was able to direct research and supervise graduate students without the service and teaching responsibilities associated with tenured faculty members.

It also turns out that tenure can actually limit your freedom of personal choices, particularly if both you and your partner are academics -- something far more common today than just a few years ago. As an associate professor of psychology at the University of Chicago put it to me a few years ago: "My wife and I both just got tenure in our respective departments. We're glad, but now we are really trapped. Now we can't go anywhere!"

Yes, you can always walk away from a tenured position. Yet, after the investment you and your partner put into getting it, that would be very difficult to do and more often than not you would stay where you are. This is particularly true when you realize that even for successfully tenured faculty members the likelihood that as a couple you can leave one institution and both find tenured positions at another one is quite low.

There is also the notion that if you have tenure you are more likely not to do things that will make you more attractive to other academic institutions or to industry. After all, if you can't be fired, why put in the effort to stay at the cutting edge in your field? Most
tenured faculty do in fact keep up with their teaching and research, and in fact excel in later stages, but we all know of several situations where that is not the case. [11]

According to Tower, there are three kinds of Ph.D. and postdoc candidates who prefer non-tenure track jobs. They are: (1) The strategists, those who are willing to trade tenure track for a better location, more prestigious institution, opportunities for spouses and quality of life, (2) The pragmatists, those who need a job now and can't wait for the unlikely possibility of a tenure track job later, and (3) The nonconformists, those who just like the freedom to work at their own pace, to switch employers as needed, and who are simply not impressed with the idea of tenure. Tower goes on to point out that in some cases you can actually negotiate a higher salary - as a trade-off against benefits - than if you were on the tenure track. For still others, a non-tenure track position is a way to prove to themselves - without the clock running – that their qualifications will improve for a tenure track position that may open up at a later date although as noted above this is not a sure thing at all.[12]

The strategies for applying for non-tenure track positions are essentially the same as those outlined in this book for tenure track jobs. The differences are that: (1) if you take such applications seriously the likelihood of being successful goes up considerably over those many others who will treat the effort as a throw-away afterthought or a “backup plan”, (2) your chances of success increase simply because there are so many more such positions than tenure track positions and, (3) your bargaining position goes up if you have an accompanying spouse being considered for a tenure track position since such couples are greatly sought after by institutions and thus you can be more assertive in raising questions and issues that will be important to you.

What specific factors should you pay attention to in non-tenure track negotiations?

According to Porac there are several considerations to at least raise in your negotiations. [13] Since you are likely to have a large, often undergraduate, teaching commitment, you should see if you can reduce the number of different classes you teach and thereby reduce your class preparation time. This will be particularly important in your first year when you will be doing all you can to be successful. In addition, be sure to check on possible teaching assistant help. Also, see if you can arrange to not teach classes on certain days, T/Th or MWF for example, since this will free you up for other activities.

Find out as much as you can about how your teaching will be evaluated and use this information in your course planning. You also want to find out about other aspects of the support you will need to be a successful tenure candidate. Are there resources to guide junior faculty along the path to tenure, what are they and are they effective: does the institution have faculty support programs or services to provide resources and training in teaching (e.g., pedagogy, instructional technology, curriculum development), does the department or school have a mechanism for young faculty to be mentored by more senior ones in similar disciplines, whether in academic or non-academic aspects of faculty life. This may be particularly important for women faculty in disciplines where they are a minority, or at institutions where there is a premium placed on acceptance by the
department faculty. If your tenure decision will entail a review of your research productivity, as it usually does, you would want to know if you will have research budget and what the customary practice is as far as allocating research dollars at the institution. For example, particularly in science and engineering, are you expected to generate all of your research dollars through external funding or if there are means within the institution to support your research program financially, at least in the early years of your position. The former means that you will be making significant effort writing and submitting grant proposals in order to generate the necessary resources for you to kick-off a research program, while the latter can jump-start that process with internal competition to worry about. The same applies to research assistants; who pays for them?

You will certainly want to know the length of your contract and how you will be evaluated for possible renewal. You need to find out who will make the decision regarding the renegotiation of your contract. As Porac notes, "at some universities contract renewal decisions regarding limited term faculty are made solely by the department chair while at others it is the decision of a committee. You should know whether you must please only one colleague or a committee of colleagues." [13]

Naturally, you will want to know if there is a possibility that your non-tenure track position could be converted to a tenure track appointment. You are not likely to get a firm answer to this question, certainly not one that is binding, and in any case you can be sure that a public search will take place for the position. Your familiarity to your colleagues will have both pluses and minuses in this regard so it is best not to count on such a conversion in your planning.

Finally, remember, a poor, for whatever the reasons, tenure track offer may not be as good as a better non-tenure track offer, at least at the beginning of your academic career. For many potential academics this is an option well worth considering.

HELPFUL LINKS

* Is the Tenure Path the Best Route for You?

* Negotiating the Non-Tenure Track
  http://chronicle.com/article/Negotiating-the-Non-Tenure-/45495

* Overexposed? The Questionable Life of a Science Professor
  http://scientopia.org/blogs/science-professor/tag/non-tenure-track/

* Variations on the Theme of Academic Careers: The Non-tenure Track Position

* Why Hire Non-Tenure-Track Faculty?
Growth of Interdisciplinary Research Programs

The emergence of interdisciplinary research was mentioned in the 1997 print version of this book and the phenomenon has grown significantly over the last 15 years to the point where at virtually all research universities it has become the norm. As philosopher of science Karl Popper noted “We are not students of some subject matter, but students of problems. And problems may cut right across the borders of any subject matter or discipline.” [14]

Terms such as "interdisciplinary," “cross-disciplinary,” “trans-disciplinary,” and "multi-disciplinary," are often used interchangeably even though they may have slightly different meanings. Here we will use the term "interdisciplinary" and for our purposes the following definition put forth by the Massachusetts Institute of Technology faculty is appropriate:

"Interdisciplinary research is the investigation of questions that require assumptions, methods, and tools from fields or disciplines that are traditionally distinct and not formally connected." [15]

Examples of such research carried out at various universities include:

- The effect of natural sunlight and air quality on building architecture and technology as well as human physiology with faculty from architecture, civil engineering, and the biological sciences - Massachusetts Institute of Technology.

- The diversity and complexity of biological networks involving faculty from such fields as systems biology, complex adaptive systems, and bioinformatics - University of Michigan.

- Interdisciplinary watershed studies involving faculty in environmental geology, biology, sociology and economics - University of California, Los Angeles.

- Interdisciplinary research in astrobiology involving faculty from astronomy, planetary sciences, chemistry, geology, and biological sciences - University of Arizona.

- Interdisciplinary research in cardiometabolic diseases involving faculty from nutritional science, physical therapy, exercise physiology, community health and sustainability, and work environment – University of Massachusetts, Lowell.

Go to any university website home page and put "interdisciplinary research" into the search bar and a host of examples will present themselves. Many of these universities have set up specific interdisciplinary research centers to support such work. Examples include:
The key challenge for any faculty member is how to bring one’s existing expertise to bear on a larger interdisciplinary problem without having to become an expert in one or more other fields. The idea is to maintain one’s sub-disciplinary specialty while finding ways to use it to contribute to the larger problem at hand.

But such an approach comes with risks as well, particularly for not yet tenured junior faculty. Where do such faculty publish the results of their work when there are not that many interdisciplinary journals and when people outside their specialty are not qualified to judge what they have done? How do colleagues in their own department evaluate their work when it is done in collaboration with those outside their fields? Does interdisciplinary work give you double the chance of success or mean not being taken seriously by any of the disciplines you work in?

Disciplinary jargon and cultural differences among disciplines can also be a problem as can be the perception, inaccurate I believe, among some researchers that interdisciplinary science is second-rate and thus more difficult to get funded. [16]

In response to these issues several schools have set up programs to assist junior faculty. For example, UCLA’s medical school has an interdisciplinary program to help beginning professors "develop the skills necessary to succeed as academicians in the health professions and to become effective mentors for students and fellows." [17]

In the fall of 2007, the University of Michigan announced plans to hire 100 junior faculty committed to doing interdisciplinary teaching and research. The five-year, $30 million initiative is designed to "build upon U-M’s strengths in scholarship that cuts across academic disciplines, while also improving connections between students and faculty."[18]

It may well be that the best advice is to avoid major involvement in interdisciplinary research until you have developed the needed strength in your disciplinary specialty (and have tenure). However, as an applicant for a starting academic position you need to show that you are aware of some of the kinds of interdisciplinary research going on to which you might eventually contribute at your current institution and at the institution to which you are applying. It helps to indicate how you might eventually fit into one or more of these efforts by sharing your expertise, resources, and insights. Doing so gives an indication that you can think beyond your Ph.D./postdoc research and see the broader contribution you might make, i.e., the "breadth on top of depth," strategy outlined in Chapter 4, by paying attention to the work of others going on around you. It also shows
that you appreciate the personal satisfaction and growth that exposure to other ideas can bring to you and to your discipline.

HELPFUL HINTS

* “Institutionalizing” Interdisciplinary Research

* Interdisciplinary Research
  http://www.cse.msu.edu/?Pg=19&Col=2

* Interdisciplinary Research and Teaching
  http://serc.carleton.edu/departments/future/interdisciplinary.html

* Making the Expedition a Success: Managing Interdisciplinary Projects and Teams

* Tenure Across Borders: Making Explicit the Requirements for Tenure-Based Interdisciplinary Research
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1130

(4) University-industry Partnerships

A phenomenon which began over 30 years ago but which has accelerated significantly in the last decade and a half is that of university-industry partnerships. I can’t think of any major research university that doesn’t have several of these arrangements in place. I have personally directed two such research center partnerships at Stanford University, one in microelectronics and one in manufacturing. There is often a considerable overlap here between university-industry research centers and the multidisciplinary centers referred to in (3) above. In many cases they are one in the same. Here is just a small sample of the hundreds of such enterprises:

- Center for Advanced Infrastructure and Transportation – Rutgers University
- Center for Molecular Innovation and Drug Discovery – Northwestern University
- Leaders for Manufacturing (LFM) – Massachusetts Institute of Technology
- Medical Robotics Technology Center (MRTC) – Carnegie Mellon University
- Oregon Nanoscience and Microtechnologies Institute (ONAMI) – University of Oregon

Such partnerships can be particularly useful to professors and students in engineering and science. The main benefits to faculty and their students are: (1) seed research funding that can provide facilities and equipment as well as fellowship support and faculty salary off-sets, (2) real-world testing of ideas supported by data that can only be provided by industry, and (3) student offers of semester and summer internships, and in many cases
full-time employment after graduation. Industry benefits by having an early look at basic research that may be relevant to their applied activities and to a general assist with technology transfer to society as a whole.

While the benefits can be quite significant there are cautions that faculty, particularly untenured assistant professors, need to consider. The main concerns are those of conflict of interest and conflict of commitment.

Conflict on interest occurs when the research done under funding of a corporation, which is after all seeking a private benefit, limits or otherwise constrains the work that a faculty member would chose to do. This would be particularly true if the faculty member also had a financial interest in the company and would be even more suspect if his or her graduate students were working on such research.

However, I know of no university that does not have highly developed and exhaustively tested policies that strongly mitigate such conflicts. All research carried out through these arrangements must be made public often in the form of research publications. In certain cases the sponsoring company can have early access to the research perhaps by having a scientist or engineer on campus for an extended period of time, but the work must ultimately be open to anyone. Nevertheless, faculty who are just starting out need to check their institution’s policies in these areas carefully before entering into such arrangements.

A second kind of conflict is that of commitment where a faculty member may be spending an excessive amount of time, particularly as a consultant, on privately sponsored research using university facilities. Most universities have policies covering such arrangements often allowing faculty to do outside consulting up to one day per week. The benefits to the faculty in terms of knowledge gained and potential post graduation opportunities for their graduate students and postdocs can be seen as outweighing the loss in time devoted to “regular” university business.

Fortunately for junior faculty, consulting opportunities are rare because they are usually not yet expert enough in their fields to be paid significant amounts of money for their advice. This is all to the good because these faculty should be spending most of their professional time on activities that will lead to their success and promotion to associate professor and not to activities that take away from such endeavors. Still, sometimes these opportunities will present themselves to junior faculty and they should think carefully about the costs as well as the benefits before proceeding.

In spite of all the above cautions applicants for academic positions in the sciences and engineering can strengthen their CV’s if they are able to show that they have interacted with industry professionals as graduate students or postdocs and that they are open to further possibilities in this regard at a later date.
(5) The Presence of Social Media and Information Technology in Everyday Life

The penetration of information technology (IT) into all corners of higher education is a major phenomenon of the last 15 years. Information technology is ubiquitous in all administrative and management functions of colleges and universities just as it is throughout government and industry, but its major impacts have been in teaching and in research.

In the classroom we have seen the introduction of a host of high-tech devices such as laptops, smart phones, iPods, electronic tablets, clickers, lecture capture, Blackboard, and so on, and their accompanying social media communications software such as Facebook, Twitter, LinkedIn, Wikis, You Tube, Podcasts, iTunes, and Skype, all connected via "the cloud," i.e., large server farms scattered around the country and the world. [19]

These devices can be used to access information from the web in real-time during class sessions and can also make possible instant feedback to professors of their students' understanding projected on screens for everyone to see. Teachers can pose all types of questions to students (multiple-choice, true-false, free response, and image-based) and review responses instantaneously to assess understanding and stimulate discussion. [20]

Students routinely hand in homework online and have it graded and returned in the same fashion, all the time having their written work checked by plagiarism detection software. Having reached the tipping point with eBooks, it is now possible to get almost all textbooks and other reading material in portable form with hyperlinks to other online material just like the eBook version of this text. Almost every important topic has several online discussion blogs going at any given time.
Through the open source courseware movement championed initially by the William and Flora Hewlett Foundation and the Massachusetts Institute of Technology, many university courses are currently available for free or at little cost all over the world. It is now possible, in engineering and science in particular, for students at schools across the world to work jointly on projects augmented through inexpensive, or even free, video conferencing systems like Skype.

Research is the other area where IT has had a significant impact in higher education. Almost every discipline now has at least one online journal and probably several blogs and related websites. There was a time when online journals were considered below the standards of their print counterparts but this is no longer the case. [21]

Another way in which research is impacted by IT is in the online collaboration it makes possible among researchers at different locations, just as it does with teaching and student collaboration. Tools such as Dropbox, Google Docs, Mendeley, and lab management resources such as LabLife are just a few examples of the tools now available to researchers.

Virtual, or digital, libraries are one more development to emerge from the Internet and its supporting technologies. Essentially all newly written material is produced electronically and with improved scanning technologies it won’t be long before large amounts of archival material will be available this way as well. With such libraries digital content can be stored locally, or accessed remotely via computer networks, and even cell phones, from anywhere in the world.

An additional development, one that is expected to expand greatly in the next decade, is the ability to remotely operate laboratory instruments and equipment at one institution from a site at another institution. For example, faculty, graduate students, and postdocs at other universities can rent time at, and actually operate equipment in, the clean room at Stanford University’s Center for Integrated Systems.

What does all this mean for you as an applicant for an academic position? First, it means that you need to show that you are aware of these developments and trends in teaching and research and that you would be able to incorporate them as appropriate into your work as a professor. Obviously you have to be selective and discerning here and show that you are not just jumping on a bandwagon. However, if you have actually had experiences with one or more of these approaches in your graduate student/postdoc teaching and research then by all means let the search committee know about them and in the process share what you liked and didn't like and why.

A second way your knowledge and experience with IT will show up is in the interview process itself. Increasingly Skype, or other teleconferencing systems, interviews have replaced the search committee telephone interviews sandwiched between the submission of the cover letter and CV and the, hopefully, campus visit. Skype, a free software program in its basic form allows you to see and hear on your computer screen someone else with the same set-up anywhere in the world. At any given time, day or night, over
seven million people are using the system. Skype requires a computer, an Internet
collection, a microphone, speaker and webcam (camera). Most newer laptops and
desktops come with the last three items built in but they can also be purchased separately
for under $50.00. It is even possible now to Skype on a smart phone.

The first thing to remember about such interviews is that they are in fact serious
undertakings that you need to prepare for with considerable care. Most likely you will be
in your home or office during the interview and while it may seem odd to dress up in
such familiar locations, you need to do so. You need an uncluttered background and a
situation where you will not be interrupted by barking dogs, laptop-climbing cats, crying
babies, a reliable Internet connection and ringing telephones. You might, instead,
consider reserving a quiet room at your local library for this purpose.

Another way Skype-type interviews differ from ones with friends and family is that they
often involve several people in a room on the other end and thus everyone you see is
farther away and smaller. It is also important to remember to look into the camera on
your computer and not into the faces you see on the screen, which is the natural tendency.

With Skype you can record both the video and audio portion of the interview with an
additional program called Call Recorder. If you can't access this service then at least you
can record the audio portion with your cell phone or similar device. Reviewing these
recordings afterwards can be very helpful.

Another way social media is impacting the field is feedback, i.e. posting research ideas
online. Also, there are blogs to help communicate your science to the broader public.
Even just having a very well kept and manicured website is crucial these days for a
research group. It’s the first thing somebody looks for when they see a name they don’t
know giving a talk that sounds interesting at a conference or colloquium.

HELPFUL HINTS

* Association for Social Media in Higher Education
   http://www.socialmediahighered.com/

* Clickers in the Large Classroom: Current Research and Best-Practice Tips
   http://www.lifescied.org/content/6/1/9.short

* How Skype is Changing the Interview Process

* Skype Interview Tips
   http://www.career.gatech.edu/plugins/content/index.php?id=95

* The University of Wherever
   http://www.nytimes.com/2011/10/03/opinion/the-university-of-
   wherever.html?pagewanted=1&_r=1&hp
(6) Growth of Online Education

Another phenomenon related in some ways to the expansion of social media and information technology referred to in Section (5) above, but predating it by several years, is the distant education movement and its subsequent evolution into online education.

Distance education has been around for several decades. One of its pioneers was Stanford University with the development in the 1960’s of videotaped class lectures that were mailed to local Silicon Valley companies where employees watched the tapes, did the homework, and took supervised tests that were then sent back to Stanford. These employee/students were then granted credit, and in many cases complete master’s degrees, upon successful completion of the necessary requirements. An enhancement of the process, called Tutored Video Instruction, was developed by James Gibbons of Stanford where employees who had taken the course previously were trained to act as tutors to their company colleagues.

Another form of distance education that has been around for a long time and that was initially developed by community colleges, is the televising of course lectures (Telecourses), often through local public television stations. I taught such a course in astronomy for 25 years starting in the early 1980’s.

However, what we know now as online education took off in the late 1990’s with the development of the Internet and the accompanying high speed streaming of audio and video in real time to be viewed live or at a later date.

Indeed, of the over 400 books I have received from publishers in the last 15 years for excerpting on the Tomorrow’s Professor eNewsletter, the single most frequent topic has been online education. A recent Pew Survey showed that nearly half of those who have graduated college in the last decade have taken at least one course online. [22] Online enrollments are growing at over four times the pace of on-campus enrollments and this trend is expected to continue for at least another decade. [23] "Responding to rising demand" was cited as the top issue confronting online education over the next two to three years by administrators. [24]

It is now possible to receive graduate certificates and even complete degrees online without ever having set foot on a college campus. For several years Stanford University has awarded master's degrees in computer sciences, electrical engineering, management sciences and engineering, and even mechanical engineering entirely online. I personally know of individuals in Japan, Singapore and Sweden who proudly display their degrees from Stanford on their office walls and who in fact have never even been to the United States let alone the Stanford campus near Palo Alto, California.
Some faculty have resisted this movement believing that their discussion-based and/or laboratory courses are just not amenable to such approaches although even here changes are underway. Linda Jeschofnig and Peter Jeschofnig in their book, Teaching Lab Science Courses Online: Resources for Best Practices, Tools, and Technology, argue persuasively that, “lab science courses can be successfully taught 100% online.” [25]

To be sure online teaching presents its own special challenges in terms of how best to interact with students and monitor their progress, how to guard against plagiarism, how to find and use the best assessment tools and so on. However, for every one of these problems and several others not mentioned numerous approaches have been developed to effectively address them as noted in the Helpful Links section below.

The expansion of online courses and degree programs has led to the open courseware movement referred to in the previous section. Ten years ago in a game-changing move, MIT offered essentially all its online courses for free on the Internet making them available to any individual or institution anywhere in the world. Schools were free to use as is or modify the course content with the aid of their own instructors. At the time MIT did not offer credit for the courses or any support from faculty or administrators.

However, recently MIT announced a new online learning initiative called MITx that goes a step further and allows people to obtain a certificate of achievement. The program, “aims to let thousands of online learners take laboratory-intensive courses, while assessing their ability to work through complex problems, complete projects, and write cogently about various concepts, says Anant Agarwal, the director of MIT’s Computer Science and Artificial Intelligence Laboratory. [26] Note that the credential is not from MIT but rather from MITx, which will exist as a nonprofit apart from the university.

Massively Open Online Courses, or MOOCs, are now springing up at elite colleges across the United States. Recently Stanford professors offered to give a certifying letter with their cumulative grade and class rank to those who took their interactive open course in artificial intelligence. Princeton, Penn and Michigan, among others, have now joined this chorus of institutions and other universities are sure to follow with their own open source courseware programs.

What impact does all this have on demand for faculty? While we are still a long way off, if ever, from the online "calculus teacher for the nation" some schools, particularly with budget constraints, will be looking to give credit for some courses not taught with their faculty and available to them at much less cost. A move in this direction would reduce the demand for future faculty. On the other hand Grand Canyon University in Phoenix, Arizona, recently offered its 98 online faculty full-time positions with standard benefit packages. [27]

More importantly, what does all this mean for you as a prospective higher education faculty? As with social media section above it is important, at a minimum, for you to be aware of these online education developments. It would be even better if you have experienced some of these courses as a student and can describe what you see as their
strengths and weaknesses. Going one step further would be your having served as a teaching assistant in such a course or even better as an instructor. Again, the main point is to demonstrate that teaching is something you have been thinking about and preparing for over a period of time rather than something you are learning about just prior to applying for an academic position.

HELPFUL LINKS

* Myths of Online Education

* Finds That Online Education Beats the Classroom

* Ten Best Practices for Teaching Online
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1091

* The Digital Revolution and Higher Education

* The Future of Online Education
  http://www.educause.edu/EDUCAUSE+Quarterly/EDUCAUSEQuarterlyMagazineVolume/TheFutureofOnlineTeachingandLearning/157426

(7) New Developments with Respect to Teaching and Learning

A lot has happened with respect to teaching and learning in the last 15 years. Indeed, of the over 1,150 Tomorrow's Professor eNewsletter postings, 474 or 41 percent are in the Tomorrow's Teaching and Learning category. Some of these developments represent quite new approaches while others are significant improvements on earlier efforts.

Several developments in learning theory have taken place over the last few decades, the main one being in constructivism, which proposes that knowledge is “constructed” individually in a person’s mind. According to this view: "Individuals have their own mental framework which is a function of their beliefs, past experiences and knowledge. When a person comes across new information, he understands and assimilates it in the context of his existing mental structures thereby constructing new knowledge. Hence, learning is seen as a process of internal negotiation of meaning." [28]

Another prominent development has been in the area of what is called Teaching and Learning styles. According to this view students have different preferred learning styles such as auditory, visual, verbal, tactile, global, analytic, and so on, whereas most faculty teach in only one style, verbal, lecture.
Some have questioned whether it makes sense to try and match teaching and learning styles since this won't happen in "real life" but being aware of the differing ways that students process information and how at times your teaching is at odds with these styles is important. [29]

Below is a list of the major new or improved upon developments in teaching and learning over the last 15 year with a short description of their main approaches. There is not uniform agreement on the efficacy of some of these methods but they have, nevertheless, become quite common in many higher education settings. If, from these brief descriptions, something catches your fancy check out the references and HELPFUL HINTS listings or just Google the topic to learn more.

* **Active/Engaged Learning** - is, according to Paulson and Faust, "Anything that students do in a classroom other than merely passively listening to an instructor's lecture. This includes everything from listening practices which help the students to absorb what they hear, to short writing exercises in which students react to lecture material, to complex group exercises in which students apply course material to 'real life' situations and/or to new problems." [30] A well know example of active learning is the "One Minute Paper" in which students take out a blank sheet of paper and take just a few minutes to answer a question posed by the instructor. With this approach all students in the lecture are required to actively engage in the material rather than just those few who may be called on by the lecturer.

* **Collaborative Learning** - is a subset of Active Learning and involves a variety of approaches in education that involve joint intellectual effort by students or students and teachers. [31] It is essentially group learning in which two or more people learn from each other by asking questions, building on each other's knowledge, and solving common problems. They may of course go outside the group for new knowledge and ideas but these ideas are then brought back to the group for discussion and evaluation.

* **Cooperative Learning** - is still yet another subset of Active Learning in which students work together in teams but in this case "the instructor and the students are placed on an equal footing working together in, for example, designing assignments, choosing texts, and presenting material to the class." [30]

* **Self-regulated learning** - refers to self-directed and self-motivated activities that are essential to success in college age students. According to Zimmerman, "Self-regulation of learning refers to learners' beliefs about their capability to engage in appropriate actions, thoughts, feelings, and behaviors in order to pursue valuable academic goals while self-monitoring and self-reflecting on their progress toward goal completion." [32]

* **Peer Instruction or Peer Assisted Learning** - was pioneered by Eric Mazur of Harvard University and "involves students in their own learning during lecture and focuses their attention on underlying concepts." [33] In one example of this approach students are given a few minutes to think about and discuss questions posed in the lecture
and then a few more minutes to break up into small groups to collaborate on reaching an agreement on the correct answer.

* **Blended Learning** – is an approach that combines face-to-face classroom activities with online or computer mediated activities. For example, instead of a traditional class meeting three times a week, the class may actually meet just one hour a week with other activities moved online. In another variation all the lectures themselves would be placed online and classroom time would be used for discussion, problem solving and so on.

* **Problem-based Learning** - is student centered learning in which the teacher poses multifaceted, complex, yet real-world problems or cases for students to work on. According to Duch, Groh, and Allen such approaches are used to, "motivate students to identify and research the concepts and principles they need to know to work through problems. Students work in small learning teams, bringing together collective skills at acquiring, communication, and integrating information." [34]

* **Project-based Learning** - is the use, often in engineering courses, of in-depth and rigorous classroom projects to facilitate learning and assess student competence. According to Wikipedia, "project-based learning emphasizes learning activities that are long-term, interdisciplinary and student-centered. Unlike traditional, teacher-led classroom activities, students often must organize their own work and manage their own time in a project-based class." [35]

Project-based instruction differs from traditional inquiry by its emphasis on students' collaborative or individual artifact construction to represent what is being learned. Students can spend the entire length of the project involved or come in and out as they see fit.

All of the above approaches can be examined in more detail under the umbrella concept of the Scholarship of Teaching and Learning. This landmark idea developed by Ernest Boyer at the Carnegie Foundation for the Advancement of teaching in the early 1990's was introduced in Chapter 2 of this book. It is important to remember that this form of scholarship is not synonymous with excellent teaching. Rather it is "integrating the experience of teaching with the scholarship of research. It is the ongoing and cumulative intellectual inquiry, through systematic observations and ongoing investigations by faculty, into the nature of learning and the impact of teaching on it." [36] As noted on the Carnegie web page, “The scholarship of teaching and learning is rigorous and thoughtful investigation of student learning, with the results made available for public review and use beyond a local setting. It is first and foremost a commitment to the improvement of student learning, made possible through individual and collective knowledge-building." [37].

While no faculty member, and certainly not one just starting out, can be expected to be familiar with all of these new developments, it does help if as an applicant for a starting position you are: (1) aware of the significant activity in this regard and that it hasn't just been the same lecture approaches with an overlay of new information technology, and (2)
you have identified a few possible approaches that you have seen, experienced, or would just like to try out once you get off the ground as a new professor.

HELPFUL LINKS

* Resources on Problem-based Learning
  http://www.ukcle.ac.uk/resources/teaching-and-learning-practices/resources/

* The Rise of the New Groupthink
  http://www.nytimes.com/2012/01/15/opinion/sunday/the-rise-of-the-new-groupthink.html?_r=1&scp=1&sq=groupthink&st=cse

* Twelve Active Learning Strategies

* Types of Self-Regulated Learning – An Ontology
  http://stellacentral.com/?p=186

* Using Learning Assistants to Support Peer Instruction with Classroom Response Systems (“Clickers”)
  http://serc.carleton.edu/sp/library/learning_assistants/examples/example1.html

(8) Continuing Increases in Foreign-born Ph.D. Students and Postdocs Studying in the United States Who Aspire to Become Professors at American Universities

There were 723,277 international students attending U.S. institutions in 2010. [38] American graduate school enrollment of foreign students grew by 8 percent in the fall of 2011, mostly because of students from China and India. [39] Furthermore, the number of foreign-born Ph.D. students and postdocs studying in the United States who would like to stay in America as professors continues to increase. In fact, according to the Survey of Earned Doctorates, the increase in PhDs awarded in the US in some disciplines is solely attributed to the increase in foreign student enrollments. Likewise, foreign postdocs make up the majority (nearly 60%) of all postdocs in the US (National Postdoctoral Association). While there are certainly some foreign students and postdocs who have intended all along to return to their home countries either as starting professors or as professionals employed in some other capacity, and others who would like to stay in the United States but not in academia, this number is small compared to those who at least want to explore seriously the American university academic path. Likewise, advocacy groups, like NAFSA: Association of International Educators, actively lobbies in Washington DC to legislate fast-track options for those foreign individuals to become permanent residents of the US, something that those individuals, and many institutions, wish to see happen as a matter of recruitment and retention of talent, particularly for students who were educated and received their advanced degrees at US universities.
These individuals will be competing in an already difficult job market against Americans who bring certain advantages that many of them do not have. On the other hand, foreign-born and foreign-educated undergraduates now in the United States as graduate students and postdocs have their own positive attributes to bring to the job search competition.

Most American educated graduate students and postdocs have very good, to excellent, English speaking (although not necessarily writing) skills, a knowledge of the U.S. undergraduate experience, and a cultural familiarity with other Americans.

Foreign educated graduate students and postdocs on the other hand bring with them an international undergraduate experience, in most cases an expertise in at least one language other than English, and a worldly perspective lacking in many students whose time has been spent exclusively in the United States save for a few short visits outside the country. In fact a recent study from the *Journal of Higher Education* has shown that foreign-born professors in the United States who received their undergraduate degrees from abroad are more productive in terms of publications than their U.S. born peers. [40]

It is also important for foreign graduate students and postdocs to remember that they don't have to out compete their American counterparts in terms of the English language, American culture, and familiarity with U.S. undergraduate institutions. They do have to demonstrate an adequate competency in these areas. Then, they will be competing equally on all the other factors we are discussing in this book while also bringing to the table their unique traits mentioned above. If leveraged appropriately, this can add significantly to the competitiveness of a foreign-born candidate

As a foreign graduate student or postdoc who wants to be competitive you have to do two things:

(1) develop your English language skills, including idiomatic, conversational and fluency skills, and raise your cultural awareness and knowledge of the American undergraduate education to a sufficient level, and

(2) emphasize, and be able to articulate effectively and appropriately your foreign/international experience and its relevance.

With respect to (1) the best advice I can give you is to get out of the laboratory - on a regular basis - and take advantage of programs your institution has to help you improve your English writing and speaking skills. Yes, I understand that completing your research is your, and your advisor’s, highest priority, but it is not the only task that will count in finding an academic position. It is not enough to have great publications as that will be expected. It is the things that seem on the margin that will make the difference in terms of your competitiveness.

Here is just a small example of the types of programs available on most campuses to help foreign graduate students and postdocs:
Quick Bytes, a Stanford University lunch program that focuses on important topics relevant to the professional development of graduate students such as communication, interpersonal skills, and personal development.

Monthly professional Etiquette Luncheons - University of North Carolina at Chapel Hill

A biweekly seminar series where graduate students and postdocs give 20-minute "chalk talk" presentations on their research - University of Texas at Austin, and

Periodic research symposia involving 350-word written abstracts followed by 10-minute talks - University of Washington, Seattle.

In addition, as a foreign graduate student or postdoc you need to seek out venues such as seminars, conferences, and undergraduate classes where you can speak in public; you will only get better and more confident when you do. You may even benefit from non-academic opportunities to practice your presentation and rhetorical skills, in semi-formal settings, by joining or even starting a Toastmaster’s Club on your campus. Also, be sure to consider having your talks videotaped – even with a simple smart phone – for review later on.

As is the case with native speakers of English, writing as much as possible and having your work reviewed by others is critical. As the saying goes, everyone needs an editor. It is simply the only way to improve, there really is no shortcut. That can be done by peers, friends or your mentors and advisors. Be careful of services that are willing - for a fee - to take your rough drafts and turn them into finished products. Everyone benefits from some outside editorial help but relying too much on it fails to give you the experience you need to raise the quality of your writing. A good editor will give you feedback that you can learn from rather than just “fix” your written piece.

Finally, with regard to the home country experiences that you bring with you to the United States, remember that in American institutions you will have considerable interaction with undergraduate, graduate, postdoc and professorial colleagues who were not born in the United States and your shared background in this regard can be a real advantage.

HELPFUL LINKS

* Advertising Requirements for Academic Jobs Filled by Foreign Nationals

* College 101 for Non-Native Speakers

* How U.S. Colleges are Making Foreign Students Feel at Home
(9) Career Opportunities for Ph.D.s and Postdocs at Community Colleges

Traditionally Ph.D.s and postdocs have not considered community college positions because of the perceived lower prestige, little or no research opportunities, higher teaching commitments, less selective students, and so on. However, for some Ph.D.s and postdocs, teaching at a community college may just be the right ticket to a satisfying and rewarding faculty career. We will look at why this might be so in a minute but first let's consider some relevant facts and statistics.

In the United States, 22 percent of all higher education faculty and 21 percent of all higher education students are at two-year community colleges. There are 1,600 such institutions, including branch campuses. Most faculty at community colleges have master's degrees; however, 20 percent have Ph.D.s and that percentage is increasing. [41]. Between 1990 and 2010 student enrollment in community colleges increased by 65 percent and degrees and certificates awarded increased by 127 percent. [42]

As of Fall 2010, there were 8.4 million community college students. There was a 1% drop in enrollment to about 8.3 million from fall 2010 to fall 2011 but the number still represents an increase of 22 percent since 2007, a surge resulting from the recession and the total numbers are expect to increase again in the coming decade. [43, 44]

While faculty increases have not kept up with enrollment increases (due to budget constraints that many new community college positions are part-time) total faculty at two-year institutions is projected to increase significantly in the next 10 years.

The traditional mission of community colleges has been to offer lower division courses leading to an associate in arts (AA) degree followed by transfer to a four-year institution, and to prepare for vocational careers that are not part of a 4-year institution. Offering lower division courses is still the primary role of such colleges, and indeed, as costs at four-year institutions continue to rise significantly, more students who could qualify for admissions to such places right out of high school are choosing to live at home and attend a much less expensive two-year institution nearby. Community colleges also offer training and certificates in occupational fields such as nursing, electronics, office administration, emergency medical technician, and so on. Many of these courses are offered at night or on weekends for adults working full-time or changing careers. Increasingly, many community colleges are finding that they need to also provide
remedial courses for a significant number of students who are not yet qualified to take college-level classes. In short, community college students widely range in age, life experiences and varying degree of academic preparation.

Given the difficult job market for Ph.D.s and postdocs at four-year institutions, a number of universities are responding by offering special training and even certificates for their graduate students who want to consider community college faculty positions. (Some are even doing so for those interested in teaching at private high schools.) These graduate institutions are realizing that the preparation required to be competitive within a community college application is quite different than what is required at a research or even four-year liberal arts institution. [45]

The University of Texas, among others, has a community college training program for Ph.D.s interested in this track. According to Rick Cherwitz, a UT associate dean of graduate studies, "the goal is to give doctoral students skills to keep them competitive in an evolving job market." [45].

Temple University has a Teaching in Higher Education Certificate Program where graduate students "can earn the certificate to enhance their knowledge of how people learn, develop best teaching practices and improve their career prospects". [46]

What are some of the motivations behind Ph.D.s and postdocs who teach at a community college? Dave Marasco, a materials science Ph.D. from Northwestern University, teaches physics at Foothill Community College in Los Altos Hills, California. He notes that as a Ph.D. student he basically did experimental work 24 hours per day, seven days per week, which he loved although he wasn't sure how long he could keep up that pace. However, he noticed that after his advisor got tenure, the advisor spent less and less time in the laboratory and more and more time raising money. This didn't appeal at all to Marasco. As he put it, "I was looking for the magic window between being in the laboratory but having to worry about tenure and not being in the lab and having to raise money." He didn't see much of a window and since he really enjoyed teaching, he looked for a way to make a living doing just that and a community college provided the opportunity.

Sarah Parikh is also at Foothill College where she teaches physics and engineering courses. She has a Ph.D. in mechanical engineering from nearby Stanford University. As Parikh puts it, "I was always taking notes in class on how I would teach the subject to kindergartners or to explain complicated material in a way that others could understand." This led her to consider a liberal arts or community college where teaching was key. As she further noted, "I realized that at institutions where research exists, it usually becomes dominant and teaching is always secondary and I didn't want that for myself."

It is important to keep in mind, however, as Michaeleen Lee, a chemistry professor at Bucks County Community College in Newtown, Pennsylvania, notes "Teaching at a community college is not lecturing; it's more hands-on, more office hours, more individual tutoring. You have to do a lot more work as a teacher, because students are not nearly as prepared." [47]
Indeed, understanding the many realities of academic life at a two-year college with teaching commitments of five courses a semester, no research assistants, little administrative support, no teaching assistants, and minuscule travel budgets, is important. Furthermore, most community college departments have a limited set of offerings since they are small and only cover lower division courses. This means that in your career you may end up teaching the same course over and over for many years, say, introductory mechanics 50 or more times. Some people run into “burnout” in such circumstances while others seem to find a way to modify, if not the course material itself, the way to present it. Of course conducting scholarship in teaching and learning is an exciting and never-ending challenge in itself.

At community colleges all the grading and evaluation is done by the professors themselves. As Marasco notes, "It isn't just about delivering the content, all of the work of evaluation also falls upon our shoulders as well." Also, particularly in small community colleges, administrative responsibilities and expectations around service can be relatively large compared to other types of institutions.

There is also a distinction to be made between tenure track faculty and adjuncts who teach part-time, sometimes indefinitely. These part-time positions can be fine if they are a supplement to another full-time activity such as being a graduate student or postdoc or working full-time in government or industry, but it can be quite taxing if it is your only source of income. Most adjuncts get paid by the classroom contact hour and in order to accumulate an acceptable salary such "road scholars" often have to travel to two or more community colleges teaching part-time in each one.

The main thing to keep in mind is that the sole focus at community colleges is in teaching and learning and in this sense it is different from liberal arts schools and state colleges where some kind of research/scholarship is expected. Certainly there is a role for the "scholarship of teaching and learning" in community colleges but if you do such work it will almost certainly have to be based on what takes place in your classroom.

What do you need to do and know before applying for community college positions?

Above all you need to be able to show that you have investigated community colleges prior to applying for a position and that your decision to apply is a high priority. The competition is such that you will have no chance if you give the impression that teaching at a two-year college is a "plan B" priority for you. You can start by visiting local community colleges and talking with deans, department chairs, and other faculty and with other students as well. Ask if you can visit a class or two as an observer. You have to convince the hiring committee that you are someone they want to see in front of a classroom.

To help make this case, Parikh, of Foothill Community College took education classes at Stanford while a graduate student and made it a point to serve as a teaching assistant lower-division classes not just upper division or graduate courses.
Next, consider a part-time adjunct position for 1-2 semesters to see if this is something you would really like and want to do. If you are willing to teach a class early in the morning, in the evening, or on Saturdays, your chances of getting the opportunity will go up. Having such experience of course greatly improves your application for a full-time position (see below).

It is important to check on community college credential requirements as they vary among schools. Your Ph.D. will be more than enough to qualify you as a subject matter expert but there may be other things such as state and district credential requirements that you need to meet. Also, keep an eye out for community college job fairs where you can get much of this information in one place at one time.

Another step is for you to learn something about distance learning and online teaching as these approaches are a big component of instruction at many community colleges. Indeed, as noted earlier, much of the pioneering work in distance education has come from two-year institutions that saw early its economic potential.

As Marasco points out: "Not only should candidates get as much classroom experience as possible while graduate students and postdocs, but they should try out innovative pedagogy. One of the things that will be asked at your interview is if your teaching has involved anything beyond the typical lecture. If the answer is yes, then I'll want to know what you found that worked, and what didn't work, and why. We want to hire people who are thinking about how to be the best teacher they can be."

Fé Brittain at Pima County Community College in Arizona suggests that you consider taking courses in "second language acquisition and in course assessment and teaching methodology to prepare yourself for teaching, not just for lecturing." [48]

It is important to recognize that student diversity is a big component of most community colleges and that you need to understand why this is important. It is not just a matter of having students of different races and ethnicities, economic status, or the first in their family to go to college. It is about the fact that many of your students have been told they don't belong in college and that you are aware of this and that you can find ways to encourage and support them.

What does it take to get the job offer you will want and accept?

Keep in mind that there are several steps when you apply for any job, and that the purpose of each step except the last is to get you to the next step, not the job itself. In each step you need to provide certain concentrated amounts of information, but not everything needed for a final decision. For example, your cover letter and CV are designed to get you a first interview that more often than not will be by telephone or video via Skype. (See section 5 above for do’s and don’ts of tele-interviews.) The Skype interview is designed to lead to a campus visit invitation. The campus visit is designed to get you an offer but usually not until after you follow up the visit with further information
such as thank you notes, specific material requested, and the like. Once you have an offer then it is a matter of negotiation to get to the “win-win.” All of the above points have been covered earlier in this book in Chapter 9, but now we want to focus on the uniqueness of a community college application.

Teaching experience needs to be the first thing on your CV where you describe what you taught, to whom, and how. Enthusiasm is really important in a community college faculty applicant; the search committee needs to see that you are excited about teaching. You need to be prepared to be asked to teach a class or a section of a class.

Some schools may even ask you to give a short demonstration, for example, explaining how a particular device such as a toy or a plastic model of a heart works. The key here is to think of the committee as your students and to not spend the time saying what you would do if you had more time, but rather making your explanation complete in and of itself.

Rob Jenkins, an associate professor of English and director of the Writers Institute at Georgia Perimeter College, advises not to talk too much during your interview, i.e., remember where you are and don't talk very much about your dissertation research, don't patronize your interviewers, and don't drop names of prominent people in your field whom you've met at conferences. He goes on to say, "Don't ramble on about all the millions of dollars your university invests in your discipline. Resist the urge to make lofty pronouncements about your specialty, assuming that because committee members are just community-college professors, they don't know as much about the field as you do. (Hint: Many of them do.)" [49]

Finally, there are two great ways to keep up with the issues facing community colleges as well as all of higher education. The first is through a free subscription to the Inside Higher Ed daily posting to which you can subscribe at: http://www.insidehighered.com/. The second approach is to subscribe to the daily online postings from the Chronicle of Higher Education that also contains a community college section. You can try a six-month digital paid subscription by going to: https://www.pubservice.com/Subnew1page.aspx?PC=HE&PK=MHEWH1.

HELPFUL LINKS

* A Community College Teaching Career
  http://www.mla.org/commcollege_teachcare

* Can I Teach at a Community College?
  http://chronicle.com/article/Can-I-Teach-at-a-Community/124528/

* Interviewing at a Two-year College
  http://chronicle.com/article/Interviewing-at-a-Two-Year-/44744/

* Two-Year College Interview Questions
(10) Non-Academic Careers for Ph.D.s and Postdocs

In October, 2010, the American Historical Association released a statement arguing that non-faculty career paths inside and outside academia be no longer classified as "alternative" because of the “lower Plan B” status that such a classification implies. [50]

Since then many other organizations have argued that this advice should apply to all fields including those in science and engineering. [48] Indeed, an important new study, “Improving Graduate Education to Support a Branching Career Pipeline: Recommendations, based on a survey of doctoral students in the basic biomedical sciences,” shows that interest in non-academic, non-research careers is increasing among Ph.D. and postdocs in the life sciences and additional evidence supports this trend across science and engineering. [51]

Progress with respect to the above is being made on two fronts: (1) Shifting the academic culture to embrace the “branching” science career pipeline, and (2) integrating a broader approach to career development into the graduate curriculum. There is even a specific website, "The Versatile Ph.D." [http://versatilePh.D..com/] that provides a great deal of information for graduate students in most fields who are exploring careers outside of higher education.

Earlier in this Update we looked at opportunities for Ph.D.s and postdocs who were interested in, or at least open to, non-tenure track academic positions at four-year institutions where they would still teach and in most cases still do research. Many of these positions would be full-time term appointments of 1-5 years that may or may not be renewed.

Immediately above we looked at community college possibilities for Ph.D.s and postdocs who wanted to teach full or part-time but where there would be no research expectations or even opportunities.

In this final section we examine opportunities for Ph.D.s and postdocs outside teaching and research but still in academia, and also at opportunities outside academia altogether.

In the first case, we are talking about administrators, student service providers, center directors, and a host of other staff positions where a doctorate has cachet and other advantages but which are not on the academic track.
Even when we hold student and faculty numbers constant, we find that there has been a significant increase in non-faculty professionals, most with doctorates of one kind or another, in important support roles at most colleges and universities. Many of these professionals are taking on some of the duties previously provided by faculty. One large factor contributing to this increase is the expanding array of legal and statutory compliance requirements. Another aspect is the greater cost of doing research as frontiers are pushed back, leading to increases in the cost of elaborate equipment and laboratory facilities, as well as the greater reporting and grant-writing requirements.

Here are three examples of such professional positions:

- Government Technical Point of Contact, Automotive Research Center, University of Michigan, Peter Schihl, Ph.D., P.E., engineering
- Associate Vice-Provost for Entrepreneurship, University of Arkansas, Carol A. Reeves, Ph.D., management science
- Managing Director, Global Climate and Energy Project, Stanford University, Richard Sassoon, Ph.D., physical chemistry

These examples also reflect the rise in “professional” staff in Universities. Advisors, staff researchers, program and center directors, deans and so on, are such job titles of individuals who have PhDs or other advanced degrees and are, by choice or circumstance, in academic non-faculty career paths, distinguishing themselves as a group that is distinct from administrative staff and from faculty, the two traditional groups on campuses.

In the second case, we are talking about Ph.D.s and postdocs who seek research positions outside academia in government or industry. In such situations a Ph.D. may well be required. Some of the research can be quite basic, particularly at government laboratories, but in most cases it is more applied with emphasis on the D in R&D. Often a person who starts as a researcher in these organizations will move to a more senior position as a director or manager. Three examples are:

- Planetary Protection Officer, NASA, Cassie Conley, Ph.D., biology
- Chief Technical Officer, QuantumScape, Tim Holm, Ph.D., physics
- Senior Research Engineer, Pacific Northwest National Laboratory, Whitney G. Colella, Ph.D., mechanical engineering

The third case involves Ph.D.s who seek positions outside academia in non-research positions such as science policy analysis, science writing, and financial management. In other words much like the first case only outside academia. Here are three examples:

- Editor, Science Careers, Science Magazine, Jim Austin, Ph.D., physics
- AAAS Science and Technology Policy Fellow, Melanie Roberts, Ph.D. neurobiology and behavior
A central theme of this book has been the "Three-Pronged Preparation Strategy," outlined in Chapter 4 involving the Breadth On Top of Depth, Next Stage, and Multiple Option approaches. Let us explore this last approach in the context of non-academic positions in a bit more detail.

As noted above, there is a much greater awareness of the need and desire to consider non-teaching/research careers for Ph.D.s and postdocs and so it should be easier to gain acceptance for considering these options from your Ph.D. advisor/postdoc supervisor as well as student and postdoc colleagues. One way to help with this task is to seek out information on past graduate students and postdocs who came from either your current advisor/supervisor or from his/her colleagues, and who have gone on to successful careers outside academia. Indeed, the collection of such information from your department or perhaps your entire institution may already be happening and so it would be good to check with your career counseling center, graduate studies or postdoctoral affairs office.

Another approach is to look around your current institution for individuals with doctorates who are the staff, not on the academic track, and ask for time to meet with them to find out more about what they do and how they came to their particular position. In my experience these individuals will be more than happy to talk with you. You can also contact individuals outside of academia requesting an informational interview to find out more about their position.

Finally, start collecting a database of public figures who have doctorates and who are doing non-academic things that you might be interested in doing. Pay attention to journalistic article authors who put Ph.D. after their names and make a note to investigate them further via the Internet. Find out how they got to where they were and if there is an opportunity to meet them, approach them and seek their advice.

The main message here is that you need to start identifying possibilities and examples well before you finish your Ph.D. or postdoc and not wait until the last few months. This is a theme repeated over and over throughout this book. Some activities simply can't be compressed into a few weeks or even months because they depend on responses of others that may not share your urgency. Your antenna needs to be tuned to these other possibilities early on so you won't miss at least identifying individuals who cross your awareness either through the media or visits to your institutions. You can always follow-up later with detailed inquiries but only if you have taken note of these people throughout your time as a graduate student and postdoc.

**HELPFUL LINKS**

* Best Places to Work in Industry – 2011 survey
  [http://the-scientist.com/2011/05/01/best-places-to-work-industry-2011/]
REFERENCES


[4] Western Governors University website. http://www.wgu.edu/?&gclid=CO6DgJKQxKwCFQVlhodQ08QrQ

[5] We are Penn State World Campus. http://www.worldcampus.psu.edu/


[10] Gross, John, and Goldenberg, Edie, N., Contingent Faculty and Student Learning, Peer Review, Fall 2002, Volume 5, Number 1.


[17] Interdisciplinary Academic Advancement Seminar for Junior Faculty Interested in Aging Research at the David Geffen School of Medicine at the University of California, Los Angeles. Geriatrics Recruitment Resources. [http://www.geriatricsrecruitment.org/ManualTwo/AcadAdvancement](http://www.geriatricsrecruitment.org/ManualTwo/AcadAdvancement)


[27] Fain, P. (December 5, 2011.) Adjunct Promotion at a For-Profit. http://www.insidehighered.com/news/2011/12/05/grand-canyon-u-hires-adjuncts-full-time-online-faculty#ixzz1h8FfklxA


[33] Mazur Group education website at:
http://www.physics.umd.edu/perg/role/PIProbs/

[34] Barbara J. Duch, Susan E. Groh, and Deborah E. Allen in the book, The Power of Problem-Based Learning A Practical "How To" for Teaching Undergraduate Courses in Any Discipline


[37] The Carnegie Foundation for the Advancement of Teaching
http://www.carnegiefoundation.org/


(3) Helpful Internet links for Chapters 1-15.

PART I Setting the Stage

Chapter 1. The Academic Enterprise
Chapter 2. Science and Engineering in Higher Education

* American Society for Engineering Education
  http://www.asee.org/

* Engineering Education: Journal of the Higher Education Academy Engineering Subject Centre
  http://www.engsc.ac.uk/journal/index.php/ee/about

* Science Education for Everyone: Why and What?
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=887

* Why Science [and engineering] Majors Change Their Minds (It’s Just So Darn Hard)

* Women in Science and Engineering

Chapter 3. New Challenges for the Professorate

* Academic Advising in the New Global Century
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=878
* Interdisciplinary Teaching and Learning
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=858

* Maintaining Senior Faculty Productivity
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=802

* Preparing Future Faculty and Multiple Forms of Scholarship
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=737

* The Accountability Movement: Its Role, Opportunities, and Meaning for Chairs
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=924

PART II Preparing for an Academic Career

Chapter 4. Your Professional Preparation Strategy

* Academic Careers websites - MIT Career Development Center
http://www.mit.edu/~career/graduate/academiccareers.html

* Courting connections
http://www.nature.com/naturejobs/science/articles/10.1038/nj7361-479a

* Preparing for an Academic Careers in the Earth Sciences (and other fields)
http://serc.carleton.edu/NAGTWorkshops/careerprep/index.html

* Paving the Way: New Approaches to Helping Minority Graduate Students in Science and Engineering.
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=625

* Preparing Graduate Students For Their Scholarly Lives
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=647

Chapter 5. Research as a Graduate Student and Postdoc

* Aiming for Excellence in the Dissertation

* Demystifying Dissertation Writing
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=986

Getting the Most Out of a Research Conference
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1030

* Preparing your Research Statement
http://homepages.math.uic.edu/~hurder/getajob/research.html

Write Before You're Ready: First Steps to Avoiding Writer's Block
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=936

Chapter 6. Teaching Experiences prior to Becoming a Professor

* Finding Teaching Experiences During Your Postdoc
http://www.the-aps.org/careers/careers1/mentor/postdocteach.htm

* How To Get All-Important Teaching Experience
http://chronicle.com/article/How-To-Get-All-Important-Te/46358/

* Teaching certificate programs for Ph.D. students

* The Need for Both Teaching and Research in the Postdoc Fellowship
http://prof-doc.net/?p=1780

* Writing a Statement of Teaching Philosophy for the Academic Job Search
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=998

PART III Finding and Getting the Best Possible Academic Position

Chapter 7. Identifying the Possibilities

* Career Insights: Timetable and checklist for the academic job search
http://www.imdiversity.com/villages/Channels/grad_school/articles/grad_duke_academic_jobs.asp

* Higher Ed Jobs
http://www.higheredjobs.com/

* Programs for Graduate Students Preparing for Academic Careers
http://teachingcenter.wustl.edu/graduate-students/academic-careers

* The Academic Job Search and the Internet
http://chronicle.com/article/The-Academic-Job-Search-and/64861/

* Tips for a Massive Academic Job Search
http://people.mills.edu/spertus/job-search/job.html
Chapter 8. Applying for Positions

* Academic - Job Search Documents

* Dressing for success in your academic job interview
  http://www.insidehighered.com/advice/2011/10/14/essay_on_how_to_buy_interview_clothing_without_spending_a_lot_of_money

* Hiring from the Institution's Point of View
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=942

* Talking Yourself Up - How to Score Points During an Interview and What to do After it's Over
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=977

* Too Nice to Land a Job - The Role of Certain Words in Cover Letters
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1062

Chapter 9. Getting the Results You Want

* Interviewing Strategies That Search Committees and Chairs Need to Know
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1052

* Joining Your Department and Discipline - Negotiating Tips
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1097

* Negotiating Tactics for Women

* Tips on negotiating your first academic job
  http://www.leighthompson.com/tips/first_academic_job.htm

* Tips on Preparing for the all Important Academic Job Talk

PART IV Looking Ahead to You First Years on the Job – Advice From the Field

Chapter 10. Insights on Time Management
* Realities of Dual Careers  

* Seven Tips for Dealing with Email Addiction  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=783

* The Dangers of Taking on Too Much Service Work  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1102

* Tips on How to Plan for Taking Time Off as a New Mother or Father  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1093

* Tips on Time Management and the Writing of e-mails  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1066

**Chapter 11. Insights on Teaching and Learning**

* Preparing a Teaching Portfolio  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1076

* Teaching and Learning Insights  
http://insights.engr.wisc.edu/

* Teaching and Learning Together in Higher Education  
http://teachingandlearningtogether.blogs.brynmawr.edu/

* The Ten Worst Teaching Mistakes and How to Avoid Them  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=961

* Thoughts on Teaching Outside Your Area of Expertise  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1022

**Chapter 12. Insights on Research**

* Making the Case for Resources in Difficult Times  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1095

* Responding to Journal Decisions  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=939

* Ten Simple Rules To Combine Teaching and Research  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=948

* The Link Between Teaching and Research Part I
Chapter 13. Insights on Professional Responsibility

* Academic Integrity & Cheating
  http://weber.ucsd.edu/~dkjordan/resources/cheat.html

* Avoiding Misconduct in Your Scientific Research

* Conduct and Misconduct in Science
  http://www.physics.ohio-state.edu/~wilkins/onepage/conduct.html

* Management for Beginners - So You're a Principal Investigator - Now What?

* Scientific Fraud, Not New, Not Rare, But Also Not Common
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=705

Chapter 14. Insights on Tenure

* How to Succeed in the Academy: A Chair's Advice to Junior Faculty
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=976

* Practical Advice on How to Deal with Committee Service Expectations in Your Pre-tenure Years.
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=980

* Stop Trying To Get Tenure and Start Trying To Enjoy Yourself
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=923

* What They Don't Teach You in Grad School - Part III
  http://www.icspah.org/news/1028graduate_school_donot.htm

* Why Professors Have Tenure and Business People Don't
  http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=106&search=why%20professors%20have%20tenure

Chapter 15. Insight on Academia: Needed Changes
* Help New Faculty Become Oriented  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=866

* Married Profs Sound Off on Dual Academic Career Hiring  

* Rejecting the Academic Fast Track  

* The Family-Friendly Campus in the 21st Century  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1012

* The Need for More Explicit Guidelines in the Hiring of Faculty Spouses/Partners  
http://cgi.stanford.edu/~dept-ctl/cgi-bin/tomprof/posting.php?ID=1049&search=need%20for%20more%20explicit