Closing The Skills Gap

Biotech jobs are going begging because new Ph.D.s lack the industry experience that companies want.

By Linda Wang

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After years of belt-tightening, the biotechnology industry is starting to see signs of recovery. "Companies are definitely hiring," says Kerry Boehner, an executive recruiter at pharma and biotech recruiting firm KOB Solutions. "I'm extremely busy, and most recruiters I know are very busy."

Large numbers of newly minted Ph.D.s looking for jobs should provide no shortage of talent, yet employers say they can't find enough qualified candidates to fill their open positions. "The industry has reinvented itself," Boehner says. "Companies have very specific skill sets that they're looking for, and they're not willing to compromise. They're willing to wait until they find the ideal person."

New Ph.D.s are increasingly finding that their academic credentials are just not enough to get them a job, because companies are looking for candidates with industry experience, whether from an internship or full-time employment. "The reason industry experience has become more important is because there are more people out there looking for jobs," says Debbie S. Yaver, a director of R&D at Novozymes. "You somehow have to separate them, and one criterion is, 'Do they have some industrial experience?'"

But for many graduate students, getting industry experience can be difficult. "Most Ph.D. advisers don't want to let their graduate students out of the lab to do an internship once they've started their thesis research," says Joel I. Shulman, a career consultant for the American Chemical Society and an adjunct professor at the University of Cincinnati.

Yaver notes that typically only 10% of the résumés she receives from new Ph.D.s include industry experience; for some jobs, no applicants have industry experience.

Efforts to address the deficit in industry vary. Some graduate biotechnology programs, for example, require that students complete an industrial internship. And ACS has formed a committee to examine this issue and recommend strategies to improve graduate education that can be adopted by academic institutions.

The shortage of skilled workers in the biotech industry is emblematic of a broader skills gap problem that has developed in many other sectors, from nursing to information technology to advanced manufacturing. According to staffing firm ManpowerGroup's 2012 Talent Shortage Survey, released last month, 49% of U.S. employers reported experiencing difficulty filling positions that were critical to the mission of their organizations.
But it’s not just technical skills that companies need. They’re also seeking candidates with the right combination of soft skills for the job. Companies are looking for people who “have exceptional communication skills and the personality to work in a team,” Boehner says.

**Cubist Pharmaceuticals**, in Lexington, Mass., recently revised its hiring criteria to reflect its changing expectations. “We look for talent that not only has that key experience and the specific knowledge that most companies are looking for [but also] key competencies or personal attributes that are critical to where the organization is going from a strategic perspective,” says Debbie Durso-Bumpus, director of talent acquisition at Cubist. “I think because we look at it from four to five different perspectives, finding that right individual is a little tougher than if you were just to say, ‘Do they have the right experience and education to do the job?’”

The **Biotechnology Predoctoral Training Program**, supported by the National Institute of General Medical Sciences (NIGMS) at the National Institutes of Health, offers training grants to help graduate students gain both the industry experience and the soft skills necessary for success in an industrial career. NIGMS is currently funding biotechnology training programs at 21 academic institutions, and graduate students from various departments who are accepted into these programs are required to seek out and complete an industrial internship.

The internship gives students a realistic expectation of what’s required to work in industry, says Warren C. Jones, who recently retired as director of the NIGMS biotechnology training program. “The industrial mission is not what it is in academia,” he says. “It’s hard-nosed ‘Let’s get a product out the door’ kind of thinking. It’s not academic research where the end goal is a publication. So that kind of broadening of perspective is as much a part of the thinking behind our requirement as anything.”

In addition to doing a mandatory three- to six-month internship, students in the **biotechnology training program at Northwestern University** participate in a biotechnology research club, organize seminars where they invite industry speakers to talk about various aspects of biotechnology, and give poster presentations on their research. “The program exposes students to more than just biotechnology at the university,” says Lonnie D. Shea, director of Northwestern’s program.

The Designated Emphasis in Biotechnology (DEB) graduate program at the University of California, Davis, is an extension of its original NIH-NIGMS biotechnology training program, which was first funded in 1992. Students complete a mandatory three- to six-month industrial internship, take a core curriculum in bioethics and team science, participate in seminars led by industry scientists, learn about entrepreneurship, and tour biotech companies. Graduates of the program earn a special distinction on their diploma.

“The old model of education was to complete an apprenticeship and learn from the master,” says Judith A. Kjelstrom, director of the **UC Davis biotechnology program** and program manager of the DEB graduate program. “Universities drifted away from that model over the past 30 years to a model focused on didactic learning without offering on-the-job training. Our program addresses these shortcomings.”

UC Davis graduate Amanda J. Fischer completed a three-month internship at Novozymes while participating in the DEB program seven years ago. Fischer, who is now a senior scientist at Novozymes, says that interning for the company gave her a clearer understanding of what is needed to be successful in industry. “I realized that team building and building relationships are really critical in industry,” she says. “Also, in industry not all the questions need to be answered. You should focus your efforts where the outcome will lead to product innovations that can benefit the company.”

Now in a hiring capacity herself, Fischer is looking for candidates who have industry experience. Her biggest concern about candidates without industry experience is whether the environment will suit them and whether they’ll be happy “with the way the projects flow,” she says.

Biotechnology training programs such as the ones at Northwestern and UC Davis are invaluable but limited in how many Ph.D. students they can accept. The Northwestern program, for example, accepts just three students per year for two-year terms, and students are funded by an NIH-NIGMS training grant. The DEB program is larger, with 230 students currently enrolled and funding provided by NIH-NIGMS, the National Science Foundation, and other sources. For the program to grow further, Kjelstrom says she would need more companies to partner with the university to offer paid internships.

Meanwhile, ACS is also helping graduate students prepare for a career in industry. The ACS Graduate & Postdoctoral Scholars Office, for example, offers a two-day career development workshop designed to inform graduate students and postdocs about the various career options available to them. The “Preparing for Life after Graduate School” workshops are cosponsored by academic chemistry departments and answer questions such as, “What skills are needed to work in industry?”

In addition to this effort, ACS President Bassam Z. Shakhashiri has formed a Presidential Commission on Graduate Education to assess the state of graduate education and develop recommendations on how to better prepare students for their careers (C&EN, Nov. 21, 2011, page 40). The commission is soliciting input from graduate students, postdocs, and others and will issue a report later this year. The report will include recommendations that can be adopted or adapted by graduate education institutions, federal and state funding agencies, and business and industry. Comments can be sent to graduatecommission@acs.org.

It may take a while for improvements to be made to graduate education, Cincinnati’s Shulman says. Ultimately what’s needed, he says, are more academic-industrial partnerships to help students bridge the transition between academia and industry. “Establishing an ongoing relationship between universities and companies would be really helpful,” he says.

For now, it’s up to individuals to pursue the industrial training they need. “If I were advising graduate students on how to make themselves most employable by industry, I would say to find yourself an industrial internship while you’re in graduate school,” Shulman says. “Take a summer off, and even if it slows you down getting your Ph.D. by three months, the fact that you’ve seen
what goes on in industry is going to make you more attractive to a lot of companies."

Biotech companies such as Cubist offer paid internships to students working toward B.S., M.S., and Ph.D. degrees. This summer, Cubist will employ 40–50 interns for 10 weeks. The internship opportunities are listed on the company's website.

An internship isn't the only way to gain industry experience, however. Taking some time off between undergraduate and graduate school to work in industry can also be beneficial. Such candidates "would also rise to the top for me," Novozymes' Yaver says. "They have at least some perception of what the difference is between an industrial research setting and an academic setting."

Another way for recent Ph.D.s to gain some industry experience is to seek out an industrial postdoc or even a temporary position, Shulman says. Companies are increasingly looking for such short-term hires because they enable a firm to evaluate potential candidates to fill permanent positions, he notes.

For job seekers who don't have industrial experience, Durso-Bumpus suggests they focus their job search on larger companies that might have more resources to train new employees. "As a midsize organization, we prefer people who had been there and done that and could do it again," she says of Cubist. "Although as we continue to grow, we've actually gone to the market with more entry-level positions that we didn't necessarily have in the past."

But perhaps the most important thing job seekers can do to increase their chances of getting a job is to maintain a positive attitude. "There are lots of opportunities for the people who want them and are prepared to enter the world of industry and understand how it works," Durso-Bumpus says. "If you do your homework and you focus on your professional development, there will be opportunities for you."

Boehner, the recruiter, agrees. The economic situation is "really forcing scientists to come up a few notches," she says. "The competition is tough, but for those people who understand what has to get done to get a position, they're succeeding and getting multiple offers."

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Comments

Matthew Hartings, Assistant Professor, American University (06/15/2012 at 2:17 PM)

Linda,

I love that you are covering this topic. I think that it (training and educating and employing) is one of the most important issues facing the ACS and its members. This is also one of the issues where the ACS "should" be taking the lead. That means using its full power/influence to: question as many faculty/hiring managers/CEOs/students as it can and it means generating REAL data on the current hiring practices that includes who is getting hired and why they are being hired. If the ACS has any real influence at all, this is one place where our society should be focusing them.

In your article you quote an executive recruiter in biotech as saying "Companies have very specific skill sets that they're looking for, and they're not willing to compromise. They're willing to wait until they find the ideal person." This is a really important quote. It seems to hint that, in this difficult hiring environment, there are specific things that we educators can be doing to prepare our students for the workforce. As a faculty mentor, one of my primary objectives is to help the students in my department find meaningful employment. If there are specific steps that I can follow in order to get my students hired, I am going to do that! I personally know that this sentiment is shared by many of my faculty peers in both graduate and primarily undergraduate programs. We want what's best for our student charges. After reading this quote, though, there is no mention of ANY specific skills.

While I hoped that you would have pushed your interviewees more on this subject, it seems to be clear that corporations don't have any specific changes that they can request from academia. Or, more precisely, it appears that corporations and hiring managers have very precise requirements for individual jobs in which they demand applicants do have very specific skill sets and experience on a very narrow research topic. But, industry as a whole are not able to prescribe general changes that might correct for current deficiencies in chemical education. In other words, one corporation wants what is best for it, a second corporation also wants optimal applicants for its openings, and there is no real overlap between the training that either corporation wants.

There is absolutely nothing wrong with companies having divergent needs. This, in fact, is what we should expect from industry. What I, and many others, find issue with is the call to fix or change the entire chemical education system in order to deliver graduates who can fill very narrow specifications. If a hiring manager or CEO wants to say, "We are in an employers market. We can afford to wait until the perfect candidate comes along," that would be an acceptable portrayal of reality. But, instead, we see many quotes that state "we have job openings that no one is qualified to fill" where the only way to develop those precise qualifications is TO ALREADY HAVE WORKED IN THE EXACT POSITION THAT THE COMPANY IS HIRING. These statements coupled with other statements coming from industry leaders that mention "chemistry graduates need broader training" lead me to believe that corporations only want a broader base of applicants in which to find a specific, ideal candidate.

To an educator, faculty advisor, and member of the chemical education enterprise, this point of view is untenable. It shows only complaint with no real directions for changing chemical education or moving it forward.

Your post seems to indicate that some industrial experience is a plus in the current hiring environment. But, if we want to better help more of our students, chemistry faculty need to work with corporations to create more opportunities to gain this type of experience. (I do wonder, though, If more students had industrial experience, would we still be hearing calls for better prepared graduates. Cynically, I think that we would still hear that).

Personally, I feel that there are several things that chemistry faculty need to do better. We need to do a better job of both nurturing and very specifically assessing: creative thinking, teamwork, problem solving, and adaptability. These are aspects that many of us advisors try to get a feel for. We also assume that, just because we put students in a research environment, our students will develop these qualities. But, can we show that this is the case? Are there any ways to measure a student's capacity for these
qualities? This is, admittedly, a very difficult problem. But I think it is one worth pursuing. I also think that there are ways to introduce our students to industrial project styles and organization.

As I said at the start of this long comment, understanding the current hiring environment and better preparing our students for life in academia should be one of the top priorities for the ACS. We should be having more open conversations about these issues. Some recent examples of this are: George Whitesides advocating for changes in graduate education in discussions at the NSF (http://www.nap.edu/catalog.php?record_id=13407#.T9fx_FSwAik.twitter). In that same NSF report, Robert Bergman stating “I know it’s good for [industry] to have 100 people applying for one job. It’s not so good for us.” Derek Lowe describing important transitions in mindset on moving from an academic environment to an industrial research environment (http://pipeline.corante.com/archives/2012/06/08/lessons_for_a_new_medical_chemist.php). These and other anecdotes are very capably aggregated, introduced, and moderated on the blog chemjobber.blogspot.com. My hope is that we continue to have more conversations about this topic and, importantly, that these conversations are honest and open about what is expected and what is possible.

The field of chemistry has a wealth to offer our society. As current participants in this enterprise, it is our responsibility to ensure that our education accurately and effectively reflects the needs and direction of that enterprise.

» Reply

busdriver (06/18/2012 at 10:38 AM)
"We look for talent that not only has that key experience and the specific knowledge that most companies are looking for [but also] key competencies or personal attributes that are critical to where the organization is going from a strategic perspective, says Debbie Durso-Bumpus, director of talent acquisition at Cubist. I think because we look at it from four to five different perspectives, finding that right individual is a little tougher than if you were just to say, Do they have the right experience and education to do the job?"

What the @$#% does that mean????!!!
» Reply

Linda Wang (06/19/2012 at 4:18 PM)
Dear Matthew,

Thank you for your thoughtful post. I agree that more communication between academia and industry is needed to help better prepare graduate students for the workforce. How we get here is the big question.

You’ve hit on some of the skills that can be improved upon in graduate school: creative and critical thinking, teamwork, problem solving, and adaptability. You also mentioned Chemjobber. Within that blog, readers might be particularly interested in the discussion about what skills graduates might be missing: http://chemjobber.blogspot.com/2012/06/what-are-these-skills-that-new.html

ACS is collecting information about this issue and working on recommendations. I mentioned this in my article but wanted to reiterate that ideas and feedback can be sent to ACS at graduatecommission@acs.org. Thank you for continuing the dialogue.

Linda
» Reply

Yvonne Klaue (06/20/2012 at 12:49 PM)
Linda,

Thank you for your very interesting article. It summons what we see every day in our work here at the Keck Graduate Institute (KGI). There are few programs in which people can obtain skills and experiences necessary to transition from academia to industry. You mentioned some of them. Three years ago, we started a Professional Postdoctoral Masters (PPM) in Bioscience to give Ph.D. scientists and engineers an opportunity to gain those skills and experiences. We initiated the program because members of our advisory council who are from large to small Biotech and Pharma companies told us that although they would like to hire Ph.D.s from academia, those applying to their job positions lack a number of essential skills necessary when working in industry like team-work and financial acumen among others. Although in our nine-month program we don’t require an internship we give students the opportunity to work on industry sponsored team projects throughout their time here at KGI with the main focus on the Team Masters Project which is a year-long project for a biotech or Pharma company that combines technical and business aspects. Similar to internships, our industry partners tell us that this kind of experience, additional to their training in business strategy and marketing gives them a competitive advantage in today’s job market.

I believe academic institutions need to realize that in today’s job market it is crucial to train people for jobs outside of the ivory tower. I hope you’ll continue to monitor the situation.

» Reply

Linda Wang (06/21/2012 at 2:08 PM)
Dear Yvonne,

Thank you for sharing information about KGI’s Professional Postdoctoral Masters in Bioscience program. You offer a creative approach to exposing more graduate students to the industrial setting and the industrial mindset. I hope readers continue to share strategies like this that work, and I will continue to monitor the situation and report on new developments that I hear about.

Linda
» Reply

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