



Where have all the doctoral students gone?

A high doctoral dropout rate is making the path to the Ph.D. bumpier than ever. Here's why.

Graduate schools are now wrestling with ways to keep their doctoral students enrolled long enough to get a degree. As many as half of the bright scholars who make it through the rigorous doctoral selection process are dropping out.

According to the Council of Graduate Schools (CGS), fifty to sixty percent of Ph. D. students are dropping out. Many studies suggest that women are dropping out more than men. Minorities leave at a higher rate than white students. Americans drop out more than international students.

A somewhat murky picture

It isn't clear whether the dropout rate has risen or fallen in recent years. No comprehensive national studies have been conducted on Ph.D. attrition. Nor is it clear that there should be a distinction between dropouts and "stop-outs" who leave their studies but return to them later.

"Many students actually leave their programs and come back," says Michael Nettles, senior vice president at Educational Testing Service and co-author of *Three Magic Letters: Getting to Ph.D.* "Some return in a few years, others after many years. They are completing their coursework and

leaving when they get to the point of writing a dissertation."

Claudia Mitchell-Kernan, vice chancellor of graduate studies at UCLA, thinks that doctoral completion rates are underestimated, because some students take so long to complete a degree. "Many of us are finding completion rates closer to 60 percent," she says.

"Most people who are going to get a degree will probably do it within 10 years. Five or six years ago, I took a look at 12-year cohorts. I discovered that 5 to 7 percent of the cohort graduated between years 10 and 12," Mitchell-Kernan adds.

To address the need for definitive data, CGS launched the Ph.D. Completion Project. Funds have been distributed to 21 U.S. and Canadian research universities to create intervention strategies and evaluate their impact. CGS is expected to release baseline data in December 2006.

What's driving doctoral dropout?

"There are many stories here. One story doesn't fit everybody," says Mitchell-Kernan. Students leave because they not able to keep up academically or develop a viable Ph.D. project. Some leave to care for family responsibilities. Some determine that the Ph.D. is not the best choice. Others are lured away from their studies by high-paying jobs.

But clearly, there are problems inherent in doctoral programs that push promising students out the door. "Highest on the list of why students leave is concern about funding," says Issac Colbert, dean for graduate students at Massachusetts Institute of Technology. "There's less attrition in the STEM fields—science, technology, engineering and math. Traditionally, those students are supported with research and teaching assistantships and fellowships because they're crucial to a lot of fundamental interests of national competitiveness."

Students-faculty interaction is also cited. "A mentor in a doctoral program is someone students emulate and go to with questions about their research. With effective mentors, stu-

dents are more likely to complete their studies," says Nettles of the Educational Testing Service.

Bad admissions selections are also cited. "Even in the best of circumstances, there's a bit of guesswork and wishful thinking going on here," says Colbert of MIT. "Doctoral success involves a level of creativity and an ability to define something novel that will be a substantive contribution. You can't measure those elements with the GRE or any standardized test."

MIT sponsors a summer internship for students from a variety of colleges. "We give them very structured research experiences. Our faculty can take a good look at them and have an opportunity to discover some talent," Colbert says.

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Unawareness is also cited. "I recently met with a graduate program director and department chair to discuss attrition during the last seven to ten years," says Scott Bass, dean of the graduate school at University of Maryland, Baltimore County. "At first they couldn't believe attrition was happening. So we had to get names and go through what happened to each student over that time."

Some professors argue that a high dropout rate separates wheat from chaff. It's no loss, they maintain, when students who can't measure up academically leave their programs. But most graduate school deans disagree. "There may be some chaff in that group," says Mitchell-Kernan, "But the larger story is that these are not people in academic difficulty."

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worries that America's technological superiority is slipping away, and to him the struggle is "asymmetric." The advantage lies with the enemy.

Meanwhile, Mahlik adds, "The last thing we want to do is roll onto a campus for the first time in the midst of a crisis. That just aggravates the culture clash. We want to be preemptive rather than reactive."

The extent of the problem

So just how exposed is American IP? Three years ago, the late Professor Cory Fine of the University of North Florida and I conducted a study of higher ed's intellectual property policies. Our conclusion was published in a 2003 issue of the *Journal of Intellectual Capital*. "Clearly, legitimate corporate concern should exist that financial investment in research is likely, in many cases, not protected beyond the standard university/corporate contract initiated between the funding sponsor and the principal investigator(s)."

In 2004 a Texas Tech University sci-

entist was convicted of mishandling bubonic plague and sentenced to two years in prison. He was also ordered to pay a \$15,000 fine and \$38,000 restitution to his institution. According to university spokesmen, the former chief of the Health Science Center's infectious diseases department, Dr. Thomas Butler, engaged in "shadow contracts" with drug companies without the school's knowledge.

In April of this year, two former post-docs admitted to stealing trade secrets in 2002 from Harvard Medical School's cell biology department. Jiangyu Zhu and Kayoko Kimbara were arrested in California after absconding with reagents used in the development of immunosuppressive drugs to control organ rejection. The criminal complaint says they also stole information about gene therapies for cardiovascular and nervous-system disorders. Their crime was "all in the family." The two are married. It is alleged that the couple sent three genes home to Japan to help a biomed

company develop antibodies. E-mail was their weapon of choice.

Last, but not least, note the lawsuit filed earlier this year by a bio-tech company against a scientist at the University of Connecticut. Sequoia Sciences' suit alleges that Dr. Thomas Wood violated a confidentiality agreement, involving a "biofilm inhibitor," when he spoke last July at a conference of the International Union of Microbiological Societies.

Many more of us may be drawn into a balancing act, tiptoeing a tightrope suspended over a sea of commercial secrets, national security and civil liberties. Attorney Kelly Tillery was absolutely on point when he professed concern about the ability of the FBI and higher education to walk a line between academic freedom and trade-secret counterintelligence.

In the words of Special Agent Jim Aherne of the FBI's Hamilton, New Jersey office, "There are only 10,000 FBI agents in the U.S. You have to be our eyes and ears." ■

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Fixing the problem

You don't need a Ph.D. to realize that doctoral programs will never have the completion rates of shorter graduate programs. Some dropouts are to be expected. Graduate school administrators are experimenting with interventions to retain students who have financial problems or lack social support or a mentor.

About 10 years ago, Washington University decided to provide the same financial support for graduate students in the humanities and social sciences as they did for those in the natural sciences. Every student was assured of a fellowship or teaching assistantship for six years.

Robert Thach, dean of the Graduate School of Arts and Sciences, reports that these measures have reduced attrition. "The completion rate is now very close to that of the biological and physical sciences," he says.

The University of Maryland is also

working on it. "We're sitting down at least once a year with graduate students, mentors, and other involved faculty members," says Bass. "We give each student a fair appraisal of how he or she is doing, where he stands, and what he needs to achieve. We are very clear about milestones."

How high are the stakes?

Many researchers and graduate administrators want to gather and share data about attrition. "We're collecting information from our graduates and surveying our matriculating students," says Mitchell-Kernan of UCLA. "We're asking these students about members of their cohort who may not have continued, and why that happened. If we believe that it has something to do with institutional factors, we talk with the department faculty and ask them if they can find ways to address the problem."

Concern is growing that doctoral

dropout may trigger a shortage of highly skilled professionals in the U.S. economy. Universities rely on talented doctoral graduates to replace high caliber faculty and researchers.

Daniel Denecke, director of best practices at Council of Graduate Schools, points out other business implications. Pfizer Corporation is a principal sponsor of the CGS Ph.D. Completion Project. "They funded the study because they see a talent pipeline issue in the STEM fields. By the time they were ready to recruit Ph.Ds, many of them hadn't finished, or were lured away by other employers at earlier stages."

MIT's Colbert points out that "other societies are calling their best and brightest back home. They're gearing up to compete in an arena that we held sway in for a century. They are learning from us. Perhaps they'll come up with something as effective or moreso than the American model." ■