National Center for Women & Information Technology
P R O M I S I N G   P R A C T I C E S

How Do You Support Completion of Graduate Degrees and Engender Commitment to a Research Career?
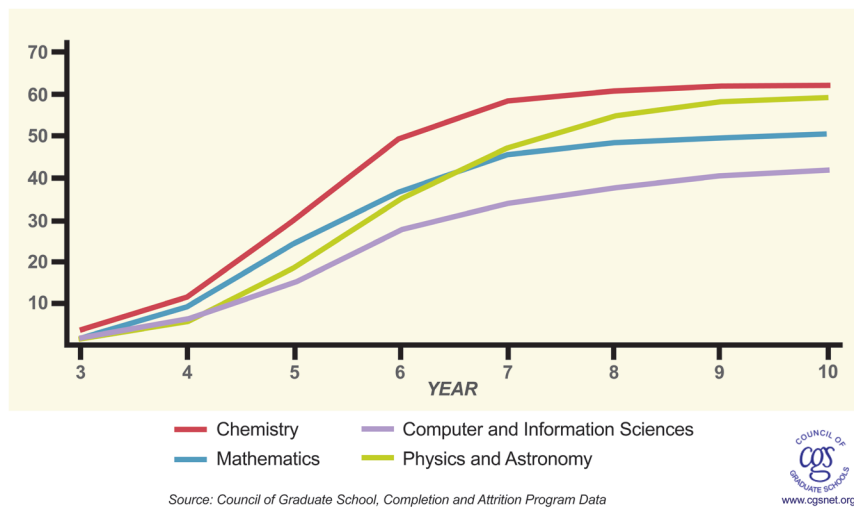
◼ DOCTORAL ATTRITION: HIGH, EXPENSIVE

Until they see the data, many departments don't realize their rate of graduate attrition. Recent data released by the Council for Graduate Studies PhD Completion project shows that mathematics and physical sciences, the category in which they place computer science, had the highest attrition rate of all doctoral programs for three cohorts beginning in the 1990s. In Computer and Information Sciences, only about 28% of PhD students had completed their degrees by the sixth year (see Graph); only about 13% more complete by the end of the tenth year. The later the loss of a student, the larger the loss to the department, the advisor, and to the field.

Cumulative Completion Rates for Cohorts Beginning in 1992-1993, 1993-1994, and 1994-1995, for Mathematics & Physical Science Disciplines at Five or More Programs, by Year since Entering Doctoral Study

Chemistry — Mathematics — Computer and Information Sciences — Physics and Astronomy

Source: Council of Graduate School, Completion and Attrition Program Data

DEPARTMENTAL ACCOUNTABILITY FOR KEY FACTORS LEADS TO DOCTORAL COMPLETION

Advisors interested in building and maintaining the intellectual tradition of their field know that training future experts—graduate students—is the means of accomplishing this goal. Building the legacy requires viewing graduate students as junior colleagues and ushering them into the field, ensuring that they build the research, teaching, and professional skills of a successful future knowledge producer. Graduate development is decentralized, varying by department, discipline, and advisor. But departments can ensure that expectations for performance and milestone completion are clear; implement and act on substantive monitoring systems for both student and advisor; enforce written policies for both students and faculty; engender graduate integration into an intellectual community; and provide credible resources for supporting advisors in improving their advising efforts.

Admission of a graduate student is an investment in a knowledge producer and a junior colleague. Graduate students who simply don't have the ability are most likely to leave in the first year (accounting for one-third of all attrition). But when graduate students leave after the first year, a department loses not only the funding paid to that graduate student, but also the opportunity cost of space in classes and labs, a member of a research community, the resources put into mentoring and teaching, and possibly, the loss to other institutions. Likewise, graduate students lose self-esteem, as well as time and resources invested.

◼ WHO LEAVES? WHO FINISHES?

Studies show that some students have mismatched expectations of graduate school. Without regard to expectations, however, Lovitts and Nelson (2000) found that women and underrepresented minority graduate students are more likely to leave their programs than men, and they leave with high grade point averages. Ulku-Steiner, Kurtz-Costes, and Kinlaw (2000) found that both male and female doctoral students in male-dominated programs had lower academic self-concept and commitment to career than did students in gender-balanced programs, but women's academic self-concept and commitment to career was lower than men's in either male-dominated or gender-balanced programs. Students most likely to complete their graduate studies are those who are viewed as junior colleagues in a positive relationship with their advisors and who are well integrated into their department's or lab's intellectual community.

RESOURCES

Council of Graduate Schools PhD Completion Project: http://www.phdcompletion.org
Golde, C. G. & Walker, G. E. (Eds.) (2006) *Envisioning the Future of Doctoral Education: Preparing Stewards of the Discipline - Carnegie Essays on the Doctorate.* Jossey-Bass Publishers.
Lovitts, B. E., & Nelson, C. (2000). The hidden crisis in graduate education: Attrition from Ph.D. programs. *Academe.*
Nettles, M., & Millett, C. (2006). *Three magic letters: Getting to PhD.* Baltimore: The Johns Hopkins University Press.
Ulku-Steiner, B., Kurtz-Costes, B., & Kinlaw, C. R. (2000). Doctoral student experiences in gender-balanced and male-dominated graduate programs. *Journal of Educational Psychology.*

Advisor as Steward of the Discipline (Case Study 1)
Engendering Commitment to a Research Career

🎓 **Graduate**

Research shows that a relationship with an advisor is critical for graduate completion. A negative relationship can lead to attrition from the program or choice of a non-research career. Two female computer science PhD students at a large, public research university talk about their relationships with their advisors.

■ ADVISOR 1: USHERING A JUNIOR COLLEAGUE INTO THE DISCIPLINE

"The experience here is very dependent on your advisor and also by whether you're the advisor's favorite," says this fifth-year student, holding her baby. "I have a really good relationship with my advisor. We meet once a week. We see each other frequently. He gives me suggestions. We write papers together. It's collaborative. We don't tend to go to conferences together, but he introduces me to visitors, suggests which workshops I should participate in, and has been helpful with my job hunt. He talked to me about who should be on my committee. I'm very lucky."

INSTITUTIONALIZING COMMITMENT TO A RESEARCH CAREER REQUIRES MUCH MORE THAN A GOOD STUDENT

Student Ability, Motivation

Departmental Structures

Assessment (e.g., annual graduate survey); monitoring of student achievements; safety nets (e.g., advisor leaves), information and policies; faculty mission and countability; shared office space and events that permit integration into intellectual community, supportive relationships with peers

Advisor Commitment to Steward of the Discipline

Routine meetings (regular check-ups, such as monthly meetings, annual reviews; regular guidance on research choices and thesis progress); smoothing the student's integration into the intellectual community; clear requirements and strategies; mentors on navigating the political/social aspects of the department and career paths

■ ADVISOR 2: INSENSITIVE TO JUNIOR COLLEAGUE

"I meet with my advisor all the time. Every time we meet, he comes up with new ideas of things I can work on. It's like working with someone with ADD and Alzheimers, who changes his mind constantly about what's important. He's very famous and gets a lot of money for new projects. Whenever I talk to him, he manipulates me into working on his newest idea. I don't really know which grant I'm funded from." She adds, "I didn't choose him. One day, my original advisor and I had a meeting with another professor and a grad student from the same country as my advisor. The professor asked me to say what I was working on. Based on this, the two professors arbitrarily swapped me and the other student. Suddenly I had a new advisor – in fact, two bosses, because both of them were now telling me what to do and both were unhappy."

This very articulate woman has a lot to say, and she continues. "He has also done inappropriate things. For example, although I've been ready to do my prelims for more than a year, he told me that I can do my prelims when my boyfriend does. When I told him that was inappropriate, he gave me a lecture on why I should be married and how to behave once I am. Unfortunately, there's no policy on when grads prelim and he told me that if I publish one more paper I could. So I published another peer-reviewed paper and he told me I wasn't ready. He's not held accountable to what he says. I recently received a message from the anonymous graduate committee that oversees my progress saying that I should defend my prelims by summer, but I can't defend prelims I am not allowed to take. So I guessed who one of the reviewers was and told her about my dilemma. She said they hadn't been updated about my situation, since my advisor has not attended any of the meetings about me, even though he is supposed to. He doesn't play by the rules."

"Luckily, I've found an army of people who will give me advice, but I just avoid my advisor at this point. I have no interest in being in an environment like this again. I plan to go to a teaching university. I'll finish, but in spite of, not because of, my advisor."

RESOURCES

The National Academy Press makes the following guide available free: Adviser, Teacher, Role Model, Friend: On Being A Mentor To Students In Science And Engineering http://www.nap.edu/openbook.php?record_id=5789

NCWIT offers practices for increasing and benefiting from gender diversity in IT at the K-12, undergraduate, graduate, and career levels.

This case study describes a research-inspired practice that may need further evaluation. Try it, and let us know your results.

ncwit.org **Author | Lecia Barker**
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