

# Mathematics Doctoral Programs, Then and Now

Forty years ago last fall I took the qualifying oral exams in my doctoral program. The format in place at the time, and apparently still in effect, required me to study a couple of topics, in my case class field theory and semi-simplicial sets, and then make a short presentation to the examining committee, followed by a direct examination by the committee. The Class Field Theory went fine, perhaps not surprising to me as I already intended to do a thesis in algebra, but the Semi-Simplicial Sets were another story. (I think my advisor intended for me to work on something about coherent functors, hopes that went unrealized.) I have a strong memory of writing on the blackboard deep, and confused, in the explanation of some point in that notationally complicated subject and turning around to face my committee to find all three of them slumped in their chairs chewing on the tips of their neckties.

That sartorial detail, of course, dates this story. Faculty today, of any gender, are far more likely to have on t-shirts than neckties, and certainly an entire committee would not be so formally attired. But that seems to be the only time-dependent detail: students answering questions on qualifying orals will still be found writing on classroom chalkboards, mostly with their backs to their examining committee, the latter listening with various degrees of attention and displacement behavior. And the same picture, with roles of student and faculty reversed, can describe the typical graduate mathematics course classroom anytime in the past four decades (or eight decades) equally well. The roles are not quite symmetric: the students will be more attentive and taking notes. But except for the obvious clues based on things like dress and hairstyles, and of course the progress in content, the physical structure of the graduate mathematics classroom seems remarkably stable.

One could say the same about the overall structural stability of graduate programs in mathematics. Classrooms and courses are only a part of such programs. Thesis research, which most would consider the dominant part, has, like all mathematics research, benefited enormously from things like email and online access to materials. But the basic format of thesis research hasn't changed much: the student works independently with periodic consultation and assessment from his/her advisor, until the latter determines that the former "has a thesis."

The third major component of graduate education, the informal internalization of professional lore that takes place in departmental coffee rooms, seminar question periods, and colloquium dinners, also seems not to have changed very much in the past four decades. This seems a bit unexpected, especially with the rise in recent years of the MySpace/Facebook type online communities. On the

other hand, recent years have seen the explicit recognition of the importance of this informal part of graduate education. One of the conclusions of the Carnegie Initiative on the Doctorate, for example, in the words of Initiative Consulting Scholar and Stanford Associate Vice Provost for Graduate Education Chris Golde, is that "the purpose of doctoral education is to prepare stewards of the discipline," which includes being a part of the relevant intellectual community.

Most issues of the *Notices* contain articles in which history, including personal history, and other narrative forms, such as the apocryphal anecdote, can help graduate students, indeed all mathematicians, meet the "duty of disciplinary stewards [to be] aware of the shoulders on which they stand," to quote Chris Golde again. Some authors are shy about including this sort of history or reflection in their *Notices* submissions, and of course it's possible to overdo this kind of writing. But they and we should also keep in mind that this is a serious contribution to the third component of doctoral education, and, among the publications of the American Mathematical Society, one that the *Notices* is perhaps best equipped to make.

The *Notices* has also been engaged in making contributions to graduate education in mathematics through a series of articles about how to enter the mathematics profession. This ongoing series, under the direction of Associate Editor Lisa Traynor has so far included articles about how to: conduct a job search (October 2006), write a teaching statement (December 2006), apply for a research grant (October 2007), and submit a first article for publication (December 2007). Graduate students, and their professors, might want to make note of these four articles as a sort of guidebook to the postgraduate mathematical career. Expect to see additional articles in this series, in 2008 and beyond.

—Andy Magid