"I, personally, have developed a wonderful relationship with my advisor. She has the skills and motivation to be a great personal and professional guide for me. Many students have not had this opportunity. ➤ Simply put, if there is anything else you think you might enjoy doing, DO NOT go into a doctoral program. The job market is awful. ➤ As far as I can tell, the key to success in graduate school is stubbornness. I have seen many talented people decide that they were no longer interested in the program. A little tenacity will go a long way. ➤ Choose graduate school for the right reasons—because you love to research and wish to teach in the field that you will enter. Since it is incredibly glutted already, realize that you may never get a job in your field. Find ways of keeping yourself fully informed of both the stated and unstated requirements of the program. Have a life outside of the program. Take it one year at a time, and don't feel like a failure if you decide to get out. ➤ Be absolutely sure you love your field enough to give up time, money, effort, and sweat...if you're not 100% certain, do something else for a while. It's a wonderful, exhilarating, horrible, frustrating process; you'll be poor for years, you'll work like a dog, your advisor will probably kick your ego around a bit, so if you're not passionate about your field you'll probably have a hard time. On the other hand, it can be a great experience. I'm glad I did it, but I can't say it's been easy. ➤ There is a big difference between what you expect and what you get. ➤ Be sure to cultivate supportive friends who will help you survive struggles with procrastination, guilt, panic, fear, and discouragement, and who will help you have fun too! ➤ It's not a continuation of college. You'll take longer than you think. You'll be poorer than you think. Realism in place of idealism will serve you best in making decisions along the way. ➤ Prepare yourself for an enormous commitment of both time and money. ➤ Only do it if you're serious. Choose a program that is both rigorous and humane. ➤ I very much enjoy my work and education but was not prepared for the tight job market and the strains and pressures that would create. I'm not sure I would do anything differently but I think my program could have taken some of that pressure off by providing more information on alternative careers. I'm not sure that long-time professors are equipped to do that and I'm not sure they should be. ➤ My career goals remain the same. My perception of how long it will take to attain those goals has changed and, I believe, become more realistic. ➤ Take time off before starting graduate school. I worked for three years before going back, and I feel like that experience made me less anxious to rush through. Don't put your life on hold just because you are in school. Graduate school lasts way too long for that. ➤ Successful completion of a doctoral program consists not only of intellectual capacity but also emotional stamina. ➤ As a chronic over-achiever, I was unprepared for how insecure I would feel as a first-year graduate student. I have since learned that the experience is nearly universal. Some acknowledgement of this, some preparation for how different graduate school would be, may have helped me. ➤ I would recommend that you learn everything you can about the program you're interested in and about the professors with whom you will work. Also, know that it will be a difficult 5-7 years of your life, with little time to devote to other things. Knowing all that, I highly recommend graduate school to those who are willing to put in the work and the time. It is worth it in the end!"

BY CHRIS M. GOLDE AND TIMOTHY M. DORE

JANUARY

2001

At Cross Purposes: What the experiences of today's doctoral students reveal about doctoral education.

A SURVEY INITIATED BY THE PEW CHARITABLE TRUSTS

Arizona State University
Brown University
Duke University
Florida State University
Harvard University
Indiana University
Marquette University
North Carolina State University
Northwestern University
Princeton University
Rutgers University
Stanford University
Syracuse University
University of California, Los Angeles
University of California, San Diego
University of California, Davis
University of Cincinnati
University of Colorado at Boulder
University of Kentucky
University of Minnesota
University of Nebraska-Lincoln
University of New Hampshire
University of Pennsylvania
University of Texas at Austin
University of Washington
University of Wisconsin-Madison
University of Wisconsin-Milwaukee
Compact for Faculty Diversity:
New England Board of Higher Education
Southern Regional Education Board
Western Interstate Commission for Higher Education

The universities

The disciplines

- Art History
- Philosophy
- English
- History
- Sociology
- Psychology (non-clinical)
- Ecology
- Molecular/Cellular Biology
- Chemistry
- Geology
- Mathematics

Does American doctoral education serve current needs?

American doctoral education has evolved over the twentieth century, often in response to circumstances and priorities that had already changed. Accordingly, doctoral education has been the subject of many criticisms, calls for change and reform initiatives. This attention has come from both within and outside academia. Faculty, administrators, leaders of professional associations and higher education organizations, as well as leaders of business and industry, have posed questions about the traditional emphases and practices of doctoral education.

Through the 1990s, these concerns were voiced in a number of reports and conferences about whether and how doctoral education should change even more. These criticisms were prompted by frustrations from several quarters:

- A smaller academic job market does not nearly employ the supply of new Ph.D.s. This is the result of fewer tenure-track job openings and steadily increasing production of new Ph.D.s.
- Overly specialized research training leaves future faculty ill-equipped to perform other faculty roles, especially teaching. Improving teaching is a pressing need in light of attention to improving the quality of undergraduate education.
- Business, industry, government, and the non-profit sectors need intelligent, skilled employees. Yet Ph.D. holders often struggle to make the transition out of the academy and into the workforce.

These reports represent the views of higher education organizations and their leaders, including the National Academy of Sciences, the National Science Board, the Association of American Universities, and a number of professional associations. Although they looked broadly at the educational system, none took the point of view of students as their starting point.

Looking at doctoral education through the eyes of students provides a different vantage point. Since the students are on the receiving end of doctoral education, their experiences help us to see how the system is truly functioning–what is working and what is not.

The Survey on Doctoral Education and Career Preparation provides such data. It is a national survey of doctoral students with results that present a snapshot of the experiences of today's arts and sciences doctoral students.

The survey was designed to answer the following questions:

- Why are doctoral students pursuing the Ph.D.?
- How effective are doctoral programs at preparing students for the wide range of careers they pursue, both in and out of the academy?
- How effective are doctoral programs at preparing students to be faculty members?
- Do students understand what doctoral study entails before they enroll and once they begin their studies?
- Do students understand what is expected of them during their programs and how to adequately meet those expectations?
- Are the day-to-day processes of doctoral programs sufficiently clear so that students can concentrate on developing knowledge and skills?

Specifically, the goal was to pinpoint the aspects of doctoral education that are working well and those in need of attention. This report describes the tensions within the system—the points at which the purposes of doctoral education are not being well served by the processes that are in place, or where the educational needs of students are not well served by the assumed purposes and inherited processes. Through careful analysis, some practical solutions were revealed. There are concrete steps that many people can take to bring the purposes and processes into alignment.

How the survey was executed

Students in 11 arts and sciences disciplines, from 27 universities and one cross-institutional program (the Compact for Faculty Diversity) were surveyed. The survey was administered in the summer and fall of 1999 to a sample of currently enrolled doctoral students in their third year and above. These students were asked to take the survey since they would be integrated into their programs; would have thought about their careers; and were likely to complete their degrees. Overall, 4,114 students responded to the survey—a 42.3% response rate. Additional detail about the students can be found in the Appendix.

Findings

What we learned may not be entirely surprising because our findings confirm many of the concerns that have been raised in the last 10 years. However, our data provide detailed, confirmatory evidence of particular tension points.

We found that:

- The training doctoral students receive is not what they want, nor does it prepare them for the jobs they take.
- Many students do not clearly understand what doctoral study entails, how the process works and how to navigate it effectively.

Using this report

This report is offered to pinpoint change that is reasonable and attainable. In that spirit, the reader is encouraged to keep the following questions in mind:

- What aspects of doctoral education ought to change, and in what ways?
- What changes would better prepare students for faculty careers as well as for career paths outside of the academy?
- Who can take responsibility for introducing and institutionalizing change?

To illustrate the findings, some tables are included. Additional data tables are available on the web at www.phd-survey.org. Also, throughout the report, this icon W-1 indicates that supporting data can be found on the project web site. The quotations on the cover and throughout the body of the report are from the students' responses to open-ended questions asked on the survey. A list of reports, books, and other resources is included at the end of the report.

FOUR

The training doctoral students receive is not what they want, nor does it prepare them for the jobs they take.

American doctoral education has developed over the last century into a system that encompasses a relatively small but widely diverse group of academic programs and departments that graduate more than 40,000 students each year in many disciplines.

Two common assumptions about purpose and process underlie most doctoral programs. First, the Ph.D. is assumed to be a research degree, and its primary purpose is teaching junior scholars to conduct sound, rigorous research. Second, the operating model is one of apprenticeship. Typically, students work under the tutelage of their advisors, learning the intricacies of research, and becoming increasingly independent scholars.

Within this framework there is, of course, considerable variation among disciplines. Students in some fields begin to conduct supervised research their first term and see their advisor nearly every day. They conduct research in laboratories, with teams of students, faculty, and postdoctoral fellows. In other fields, each scholar works in isolation, and students meet with their advisors infrequently. Consequently, the experiences of students across disciplines vary. Further, the experiences of students within the same program may vary as well.

Despite the differences in disciplinary approaches and day-to-day conduct of research, all of these programs are part of a larger system. Students' experiences can help us to see the consequences—perhaps unintentional—of the system's structure. Students are uniquely situated to articulate the implicit messages of policies and practices.

The data from this study show that in today's doctoral programs, there is a three-way mismatch between student goals, training and actual careers.

Despite a decade of attention, the mismatch between the purpose of doctoral education, aspirations of the students, and the realities of their careers—within and outside academia—continues. Doctoral students persist in pursuing careers as faculty members, and graduate programs persist in preparing them for careers at research universities, despite the well-publicized paucity of academic jobs and efforts to diversify the options available for doctorate-holders. The result: Students are not well prepared to assume the faculty positions that are available, nor do they have a clear concept of their suitability for work outside of research.

What do doctoral students want?

Students want faculty careers

Most doctoral students in the traditional arts and sciences are primarily interested in a faculty career. Although the decreasing number of tenure-track academic positions has been amply documented and discussed by the media, professional associations, and graduate student activists, this is the career students want.

In response to the question "Are you interested in a faculty job at any point in the future?," 63.0% of respondents answered "yes" and another 24.1% said "maybe." Interest varies by discipline, from a high of 88.7% in philosophy to a low of 36.3% in chemistry. Students in the humanities, history, and mathematics have the strongest interest in becoming faculty members. Students in the disciplines with strong connections to industry are the least interested in faculty careers.

We saw similar results when we asked students about their immediate career interests and desires. Nearly half the students said that they were "definitely" interested in becoming a professor (47.9%), and over a third (37.3%) said "possibly."

Students also believe that these goals are realistic. In fact, more students believe that a faculty career is realistic than are interested in it. Nearly half believe that becoming a faculty member is "definitely" realistic (48.2%), and nearly as many see it as "possibly" realistic (43.1%). Students in sociology (62.2%), math (59.2%), and art history (56.4%) are most likely to perceive faculty careers to be realistic. Chemistry (40.4%), geology (38.6%), and molecular biology (36.1%) students are least likely to see a faculty career as realistic.

Moreover, students also reported that their level of interest in faculty careers has changed since they enrolled. Although we did not follow students over time, we asked them to think back to the start of their programs and recall whether their interest in a faculty career had increased, decreased or stayed the same. A third (35.4%) said that their interest had declined, but another fifth (21.1%) reported that their interest had increased. Unmistakably, the vast majority of students enter a doctoral program with a faculty career in mind.

> "To be honest, nothing has changed. I have always planned to be a university professor and have no doubt that it will happen." Art history student

Table 1:

Proportion of Students Interested in a Faculty Career

	Considering at any Point*	Current Interest**	Realistic Possibility**
TOTAL	63.0%	47.9%	48.2%
Philosophy	88.7%	76.1%	52.2%
History	81.2	70.4	51.5
English	79.7	66.5	42.7
Mathematics	75.0	57.1	59.2
Art History	72.7	59.8	56.4
Sociology	70.2	55.7	62.2
Ecology	66.1	45.3	45.9
Geology	58.0	37.9	38.6
Psychology	52.6	37.4	54.5
Molecular Biology	42.9	26.5	36.1
Chemistry	36.3	19.8	40.4
Other	60.7	47.4	71.9

N = 4114

* % saying "yes." Other choices were "perhaps" and "no."
** % saying "definitely." Other choices were "possibly" and "not at all."

Can anything dissuade them?

Doctoral students' high level of interest and belief in the possibility of a faculty career persists even though the number of Ph.D.s granted far exceeds the available tenure track positions and there are other career options. Assuming that doctoral students, like most people, consider a range of options and hold several possibilities in their minds as they plan their futures, we asked students to assess their "current interest in and desire for" each of 11 career options. Once again, the students' persistent preference for faculty careers is worth attention. Although students also reported interest in research-related jobs, and reported increased interest in such positions, this interest is clearly secondary to faculty careers.

> "Holing up in a Ph.D. program in the humanities is the perfect way to insulate yourself from alternative career opportunities. Faculty members in my program acknowledge that there is a job shortage and make this clear to incoming students, but do precious little else to encourage students to consider just what else they might be good for outside the ivory tower. I wish I had done more to prepare myself for alternatives outside of college/university teaching." English student

Table 2:

Level of Interest in Various Career Options

	Current Interest	Change in Interest Since Start of Program	
	Definitely	Increased	Declined
University professor	47.9%	21.1%	35.4%
Research in private sector	15.4	39.8	10.3
Work independently (consultant, writer)	13.0	39.4	5.9
Research in non-profit or government	11.7	34.8	6.5
Research in a university	9.9	20.1	19.2
Manager in private sector	6.4	23.5	8.6
Start own business	5.9	23.2	7.6
Manager in a non-profit or government	5.1	20.4	7.3
Non-college teaching	4.9	20.9	17.3
College administrator	3.3	19.9	11.7
Not be employed for pay	1.9	8.9	9.1

N = 4114

Why are students so attracted to faculty careers?

Students are motivated in their career aspirations by a love of teaching, enjoyment of research, and interest in doing service–the three traditional components of faculty work. They find college campuses appealing places to work and appreciate the lifestyle of faculty. In short, they are enthused by an idealized vision of the life of faculty.

That said, there are aspects of faculty life that give them pause. Some are concerned about the job market and the conditions of faculty work: the problematic nature of the tenure process, onerous workload expectations, difficulty of obtaining research funding, and low salaries.

Table 3:

Factors Influencing the Decision to Pursue a Faculty Career

Factor	More Interested	No Effect	Less Interested
Attractors: Factors *positively* influencing decision to pursue faculty career			
Enjoyment of teaching	83.2%	12.4%	4.4%
Working on college campus	79.9	19.2	0.9
Enjoyment of research	72.1	19.6	8.3
Lifestyles of faculty	59.5	30.1	10.4
Encouragement I received from faculty	47.3	44.2	8.4
Enjoyment of service	40.6	54.6	4.7
Exposure to other careers	31.9	51.8	16.3
Barriers: Factors *negatively* influencing decision to pursue faculty career			
Tenure and promotion process	3.5%	47.8%	48.6%
Academic job market in my field	8.5	48.9	42.5
Work load expectations	9.6	58.5	31.9
Obtaining research funding	14.7	58.1	27.2
Salary levels	6.1	69.9	23.9
Factors with *ambiguous* influence on decision to pursue faculty career			
Appeal of other careers	32.9%	42.5%	24.6%
Ability to raise family and lead a balanced life	30.9	37.4	31.7
Spouse's/partner's career**	23.2	57.0	19.7
Geographic restrictions	17.8	54.4	27.7
Behavior of faculty in my program	17.1	58.9	24.0

Items were categorized as "Positively influencing" if the % of respondents was higher for "More Interested" than the "Less Interested" category. Items were categorized as "Negatively influencing" if the % of respondents was higher for "Less Interested" than the "More Interested" category.

N = 2505; those interested in faculty career.

** N =1381; those married or partnered.

Where do students want to be faculty?

Students reported being equally interested in faculty careers at all sorts of four-year colleges and universities. Of those interested in faculty careers, nearly equal numbers indicated a "very strong" preference for a position in a liberal arts college (54.3%), a large research-oriented university (54.1%), and a comprehensive university (43.8%). However, only 3.9% have a preference for a community college position. Students in molecular biology are least likely of all fields to be interested in liberal arts colleges (25.3% expressed a very strong interest), whereas humanities students are very interested in this option (art history 74.8%, English 71.3%, philosophy 64.6%). Molecular biologists are, instead, particularly interested in research university settings (71.8%), while chemists are least interested in working in research universities (34.5%).[W-1]

Students also understand that their institutional preferences may be unrealistic. Relatively few students believe they are very likely to be employed at the institutions where they want to work: liberal arts colleges (30.5%), comprehensive universities (26.8%), and research universities (19.6%). Conversely, although few students are interested in teaching at community colleges, 16.6% believe that they are likely to do so.

> "I don't think I understood how tough the job market was when I entered the program. I've also realized that being at a high-power research university will not give me the kind of life that I want (too many hours, too much stress, not enough value placed on teaching). This realization—along with my enjoyment of teaching—has led me to want a faculty position at a liberal arts college." Psychology student

> Upon coming to graduate school I knew I wanted to be a professor. During the course of my studies, it has become clear to me that the overhead associated with that is too much for me. Partly these changes in career goals were driven by my desire to have a family in a workable and balanced way. This is not possible (in my view) as a professor. Female chemistry student

The diversity dilemma

Desire for faculty careers varies by gender and ethnicity, as well as discipline. Women are less likely than men to want to be faculty (60.1% vs. 67.3%), and, among U.S. citizens, students of color are less likely than their white counterparts (58.4% vs. 64.2%) to desire faculty careers. Although these differences may seem small, our sample is so large that these numbers are statistically significant and indicate marked differences in the interests of these groups as a whole. Overall, white men are the most likely to desire faculty careers, followed by (in descending order) men of color, white women, and women of color.[W-2]

Women are more likely than men to desire positions in community colleges, liberal arts colleges, and comprehensive universities. Men are more likely than women to desire positions in research universities.

These findings highlight, among other things, a profound dilemma. On the one hand, it is important to diversify the professoriate. There are too few faculty of color in all disciplines, and too few women in many fields. Our data suggest that the professoriate, particularly at research universities, where they are least well represented, is unappealing to women and students of color. It seems one solution, then, would be to both encourage more underrepresented students to consider faculty careers and to provide the additional supports and changes to make the profession more attractive. On the other hand, the number of students—of all ethnicities, national origin, and genders—desiring faculty positions is far greater than the available academic positions. The obvious solution to this problem is both to reduce the number of doctoral recipients and to encourage them to consider careers outside of academia. These strategies, of course, are contradictory. This dilemma is rarely discussed, perhaps because it defies simple solutions.

How well are doctoral programs preparing students to be researchers?

The Ph.D. is a research degree, and as such, the students reported, their programs emphasize training in research, often to the exclusion of other skills. One consequence of this narrowly focused education is that students are primarily prepared to become faculty members who focus much of their energy on research.

Given the centrality of research, what can we expect doctoral students to know about conducting research and communicating research results? Excellent researchers are well-versed in the accepted methods of collecting and analyzing data in their fields. They are able to accurately report their findings and to advance knowledge in their fields. Doing so often requires new ways of thinking, as disciplinary boundaries shift and merge. As faculty, they are expected to uphold the norms and traditions of their profession, conducting themselves responsibly and ethically.

How well are these core purposes—research training and research faculty preparation—accomplished? Survey data show that even in preparing students for research-oriented faculty careers, doctoral programs are falling short.

Are students well prepared to do research?

Research training consumes the bulk of doctoral students' lives and is the one area of their preparation that seems successful. Among prospective faculty, 74.2% of students are interested in conducting research, 71.7% are confident in their ability to do so, and 65.1% reported that they are prepared by their program to conduct research.

Students are supported in sharing the results of their research and scholarship at conferences. Most students (93.4%) said that they have opportunities to give presentations at professional meetings. Further, 85.0% of those students are actively encouraged to take advantage of this opportunity and 76.2% of them had done so.[W-3]

> "My graduate experience has been entirely geared towards research, and in that capacity it has been excellent. It is difficult for me to tease apart any inherent disinterest in teaching I may have and my program's disinterest in it." Ecology student

We learned, however, that research training is not comprehensive. Students are not well-informed about all aspects of research. Publication is critical in the research process, but under half of the students reported being prepared by their program to publish (42.9%), and slightly more (52.4%) are confident in their ability to do so. About half (44.7%) reported having the opportunity to take progressively responsible roles in research projects. Students in psychology and the sciences are most likely to have such opportunities, while students in the humanities are the least likely to have them. Lab-based sciences, of course, most readily lend themselves to structuring such opportunities for students.[W-3]

Table 4:

Interest in, Confidence in, and Preparation for Research Roles and Tasks

	Interested and Looking Forward	Confident and Comfortable	Prepared by My Program
Conduct research	74.2%	71.7%	65.1%
Publish research findings	73.0	52.4	42.9
Collaborate in interdisciplinary research	61.2	49.9	27.1

% saying "very much." Other choices were "somewhat" and "not at all."

N = 2505; those interested in faculty career.

Are students encouraged to press the boundaries of their disciplines?

Pushing the boundaries of knowledge often involves collaborating in interdisciplinary research and exploring other disciplines. Over half of the students (61.2%) reported a strong interest in collaborating across disciplinary lines. However, only 49.9% of students feel confident in their ability to conduct interdisciplinary research, and even fewer (27.1%) reported being prepared by their programs to do so.

Coursework outside of the department can give students additional breadth, which is helpful both for advancing their disciplinary research and scholarship, and for providing them with skills to expand their careers in diverse directions. Doctoral students want to reach beyond the confines of their disciplines and understand, at least in hindsight, the value of curricular breadth. Had they to do it over, nearly half would consider taking additional courses outside of their department: 27.2% would definitely do so and 22.7% said they might.

> Our department puts out very specialized students with little knowledge beyond their research and lab experience, unless you choose to take classes both in and out of our department. Molecular biology student

When asked to specify which courses they would take, the seven most frequently cited course options (in order of popularity) were:

- Computer
- History
- Languages
- Math/Statistics
- Anthropology/Sociology
- Arts
- Business

Students in the humanities seek arts and history courses; social science students want courses in math/statistics and anthropology/sociology; physical science students want to take computer courses; and students in the biological and physical sciences are interested in business classes. Students across the disciplinary spectrum want to take language courses.

Do students understand the ethical underpinnings of the profession?

The academic profession depends on self-regulation and a clear understanding of the principles that underlie responsible practice. These principles and their practice are, presumably, transmitted from one generation to the next as an integral part of the mentor/apprentice relationship. To what extent, we wondered, does this happen? How well prepared are prospective faculty members to handle the complex aspects of faculty life, many of which have an ethical component?

Many complex situations confront faculty members, calling on them to resolve problems ethically. A faculty member should know how to work with students: avoiding romantic entanglements and allocating credit for authorship fairly. Faculty also need to treat their research responsibly: properly creating and handling data, avoiding conflicts of interest, using research funds appropriately, and following the principles for treating human and animal subjects suitably.

The data indicate that the ethical dimension of faculty and professional life—how to act responsibly and in the best interests of the profession—is not, as often assumed, part of graduate training.

Students reported that they understand the customary policies and practices regarding appropriate relations with undergraduates (60.7% reported having a clear understanding), using copyrighted material (55.1%), generating and using research data (47.4%), and resource care (41.9% understand biosafety, human subjects, and animal care). Although the respondents most clearly understand these policies and practices, a substantial proportion of students (13%–30%) reported being "not at all clear" on these day-to-day responsibilities of faculty members and researchers.

Regarding other customary practices, students' understanding declines precipitously. When we asked them about their knowledge of using research funds appropriately, allocating authorship for papers, submitting papers for publication, and reviewing papers, only 20% to 30% of the students reported that they are "very clear" about customary practices.

Students also reported low levels of clarity about patent policies and avoiding conflict of interest. This level of clarity is understandable, as these issues are at the intersection of research and commerce and might thus be relevant to students in just a few fields. However, these issues are of enormous importance in today's universities and are central to debates about the "corporatization of higher education" in which faculty members from all disciplines need to be able to engage.

> "I think more time needs to be spent on professional ethics in teaching and research in academic programs. I was lucky enough to take a seminar on ethics offered by our office of graduate studies; this was very useful to me. I would not have gotten this information from my department." Sociology student

Table 5:

Clarity of Understanding and Primary Source of Information for Faculty Responsibilities

Customary practices regarding:	% very clear	% not clear	Advisor	Other faculty	Students	Written Policy	Other
Appropriate relations with undergraduates	60.7%	14.9%	2.2%	12.5%	12.1%	56.0%	17.2%
Using copyrighted material	55.1	12.9	18.7	15.2	6.2	36.1	23.8
Generating and using research data	47.4	14.9	51.2	18.5	11.6	6.6	12.1
Resource care (biosafety, human subjects, animal care)	41.9	29.1	15.5	14.5	8.4	43.3	18.2
Determining and ordering authorship of papers	26.2	31.7	56.2	13.6	13.0	3.6	13.4
Appropriate use of research funds	25.8	33.6	52.7	10.5	11.6	13.4	11.8
Refereeing academic papers fairly	22.0	39.6	54.5	22.5	8.9	2.8	11.3
When and how to publish papers	20.3	34.4	63.3	15.9	10.8	2.7	7.4
Avoiding conflicts of interest	12.0	59.9	33.8	21.6	6.3	16.6	21.7
Patent policies	9.6	70.6	28.0	11.8	3.8	37.4	19.0

N = 4114

% saying "very clear" or "not at all clear." Other choice was "somewhat clear."

Primary source of information cited by those saying "very clear" or "somewhat clear" on item.

Shaded = Most common source of information.

Sources of information on ethics

The primary sources of information for ethics-related matters are written policy and advisors. Notably, three of the four issues about which students reported the highest levels of understanding are all learned from written policy. In most other cases, advisors provide guidance. However, as the overall level of understanding on many of these behaviors is quite low, it would seem that many advisors and programs are not meeting this professional responsibility. And yet the health of the academic profession, with norms of self-regulation and peer review, depends on shared values and practices. Students told us that they are unclear about many of the customary practices that rely on a shared understanding of ethical behavior. Those responsible for doctoral education cannot assume that norms and practices are routinely and informally handed down.

Are doctoral students prepared for the jobs that they do take?

No more than half of the doctoral students in the fields studied (which exclude such professional fields as engineering and education) will be hired into full-time tenure-track faculty positions. Of those faculty positions, only a small proportion will be in research universities.

Those students who move into non-academic positions need to understand the kinds of career options that are possible and to understand that these are respectable choices. Some disciplines have historically developed better connections to industry and government, but others provide few prospects for students investigating non-academic careers. In either case, we wondered if students had opportunities to explore non-academic careers.

Those students who do enter faculty careers are likely to do so at institutions different from those research universities at which they were educated. Faculty at community colleges, liberal arts colleges, and comprehensive universities spend most of their time teaching and in service activities that compete with time for research. Are students interested in faculty careers prepared to take these jobs?

What career paths do students explore and take?

A good deal of recent data paints a clear picture of the wide variety of career paths taken by recent arts and sciences doctorate-recipients. These paths do not match the careers that students say that they want.

Overall, unemployment of Ph.D. holders is very low

- Fewer than 5% of Ph.D. recipients report being unemployed.
- In recent years, it is taking doctorate-holders longer to find employment, and more of them begin their careers in temporary positions, as post-doctoral fellows or adjunct faculty.

Many, if not most, will not be tenure-track faculty members

There is considerable evidence that there are far more job seekers than there are tenure-track jobs available, and that this structural imbalance, rather than being temporary, is the new status quo. Although the number of full- and part-time faculty positions is growing every year, the number of Ph.D.s granted is steadily increasing as well. Thus, the gap between job seekers and available positions is likely to grow even larger.

In the disciplines we studied, no more than half of those receiving Ph.D.s ultimately end up in tenure-track faculty positions, although they may teach as adjuncts. According to available data:

- In English, 58% hold tenure-track faculty positions 10 years after the Ph.D. Fifteen percent are in non-tenure-track positions, and 16% reported working in business, government, and non-profit sectors.
- In the biological sciences, 40% hold faculty positions 10 years after receiving their Ph.D. Another 40% are working as scientists in other settings: industry (23%), government (11%), and other sectors (7%). Twenty percent are not working in science fields.
- In mathematics, 41% of Ph.D. recipients are in tenure-track positions five years after the Ph.D.
- In chemistry, 17% are in tenure-track positions five years after the Ph.D.
- In the geosciences, 30% are in tenure-track positions five years after the Ph.D.
- In psychology, 16% are in tenure-track positions five years after the Ph.D.
- In sociology, 51% are in tenure-track positions five years after the Ph.D.

Are students encouraged to explore various career paths?

Today's doctoral students will find work both inside and outside of the academy. The survey results indicate that programs are better at helping students find academic positions than at helping students to explore and secure jobs in government, industry, and the non-profit sectors.

We asked students if they had access to career planning workshops for academic and non-academic positions. (We should note that we do not know whether these opportunities, and others described later, are actually available on a given campus or department. We simply rely on students' reports of perceived availability.)

Students reported a relative scarcity of opportunities to explore their career possibilities. A workshop on the academic job search is available to over half of the students (57.7%), and nearly half of those (45.4%) have availed themselves of it.[W-4]

Fewer (45.6%) said that workshops on conducting a job search outside of academia were available. As with the academic job search, nearly half of those with access (43.9%) have taken advantage of this resource. The survey shows evidence of bias towards faculty careers: 55.8% of students are encouraged to participate in academic job search training, but only 31.8% feel encouraged to take part in non-academic job search workshops.[W-4]

Another strategy for learning about career options is to try them out. Internships are a way of learning about work in the private and non-profit sectors, and working on other campuses is a way to learn about the academic life. However, only about a third of the students reported the opportunity to do either of those things, and a small number of students actually had done such a placement.

In each case, there is wide variation in the rates of perceived availability of these opportunities both by institution and by discipline.[W-5] This illustrates that some faculty, departments, and universities value and emphasize career planning and development services. Others, however, either do not value or do not feel able to help their students explore career options.

> "My department is very focused on churning out researchers and does not encourage students to excel at teaching nor to investigate other career options, even though the majority of students completing the program do not go on to high-octane research positions, and instead teach at four-year institutions or go into other fields." Molecular biology student

What are available faculty jobs like?

As described above, no more than half of today's arts and sciences doctorate-recipients will secure tenure-track faculty positions. Nevertheless, most students yearn to be faculty members, regardless of the setting. We explored the extent to which prospective faculty members believe themselves to be ready and interested in assuming faculty positions at the many different kinds of colleges in the United States. Although doctoral students are prepared in research universities, the faculty around them lead lives that are quite different from the lives of most faculty members.

Where do faculty members work?

Nearly half of all faculty are part-time employees, and most faculty hold positions in comprehensive and community colleges.

- Currently, there are nearly one million faculty members working in U.S. colleges and universities. The number of faculty, combining full- and part-time faculty, is steadily growing.
- Among all faculty, 57% are full-time employees and 43% are part-time faculty.
- Among all faculty, 31% work in two-year colleges.
- Of full-time faculty, 20% are in non-tenure-track appointments.
- Part-time faculty usually work at community colleges (44%); the remainder are evenly spread across other institutional types.
- Full-time faculty are employed across the range of institutional types: 27% at research universities, 15% at doctoral granting universities, 25% at comprehensive universities, 7% at liberal arts colleges, and 20% at community colleges.

How do faculty members spend their time?

Although part-time and adjunct faculty make up a considerable part of the teaching force, there is little information about their work lives. It is probable that they spend the bulk of their time teaching and advising. Full-time faculty, aggregated across disciplines and institution types, allocate their time as follows:

- Teaching occupies most of a faculty member's time. Faculty members spend an average of 29 hours a week in teaching activities: 5-12 hours a week teaching in the classroom, 10-20 hours a week on preparation and grading, and 1-4 hours a week advising students.
- Service, administration, and governance also take time. Faculty members give an average of 11 hours a week to service and administration. Most faculty members spend these hours on committee work and meetings, community or public service, and other administrative tasks.
- Research absorbs very little faculty time. Faculty members spend an average of 9 hours a week in research and scholarly activities. One third report spending 1-4 hours per week on research and scholarly writing, and a quarter report spending no time at all.

Are students prepared for available faculty jobs?

Teaching, and to a lesser extent, governance and service, is the central activity in the lives of most working faculty members. We know, and have described earlier, that doctoral students are reasonably well prepared to conduct research. The survey results show, however, that they are not as well prepared to teach or be academic citizens.

Preparation for teaching

Teaching is one of the most appealing aspects of faculty life, as well as its core undertaking. Recall that 83.2% of the students we surveyed said enjoyment of teaching made them interested in being a professor. In response to open-ended questions, many respondents expressed a deep love for teaching.

In the past 10 years, a number of national and campus-level projects have helped students develop as teachers. These initiatives range from brief orientations for teaching assistants to quite robust programs aimed at developing future faculty. Most teaching development activities have focused on improving the skills of teaching assistants in order to ensure the quality of undergraduate education at that institution. Fewer initiatives have emphasized helping prospective faculty members learn the skills they will need, such as working with a diverse population of students, constructing a course, advising and mentoring students, employing a varied pedagogical repertoire, and assessing student learning.

Teaching requirements and opportunities

What kinds of teaching assignments and teaching development opportunities do students have? We found that training for teaching varies a great deal among the disciplines.

More than half (53.6%) of doctoral programs require students to serve as teaching assistants.[w-6] Teaching requirements are most common in science fields, especially chemistry (83.8%) and molecular biology (70.8%). They are least common in history (36.4%) and geology (36.3%).

It is important to realize that a program's requirement that its students serve as teaching assistants may be the result of educational concerns and a genuine desire to help students learn how to construct a course, deliver lectures, grade work, and help undergraduates learn. However, teaching assistantships are also a mechanism for financial aid and create a labor pool of junior instructors. Often, a teaching assistantship may serve all of these purposes, and ideally it always serves the first. It is an ongoing challenge for graduate faculty to ensure that the apprenticeship component of teaching assistantships is attended to.

> I have always considered teaching as my major reason for pursuing an academic degree. I am amazed at how little preparation I am receiving in how to teach. I am still planning on pursuing a teaching position but am filling in the gaps in my education and preparation on my own time with little encouragement from my academic program. Molecular biology student

However, serving as a teaching assistant may not fully prepare a student for running his or her own class. Ideally, students who aspire to become faculty should take progressively responsible roles in teaching (much as many do in research). We found that such opportunities are widely available in the humanities and social sciences, but are much less common in the sciences. So, although biology and chemistry students serve as teaching assistants, usually in introductory lab courses, most of them do not have the range of teaching assignments available to students in other fields.

A teaching assistantship for a term or so is not an adequate foundation for a lifetime of teaching. Like research, it is a skill best developed over time, with guidance and practice. We asked the students about four kinds of services or opportunities to develop teaching skills. The most widely developed resource was a teaching development center. (In many cases students at the same campus do not agree whether such a center can be found, illustrating how important it is to make students aware of existing campus resources.)

Table 6:

Availability and Use of Teaching Opportunities

	It is available *		Of those who perceive that it is available **	
	%	N	% using it	% encouraged to use
Teaching development center	62.4%	2539	50.2%	50.6%
Workshop/seminar on teaching in discipline	51.2	2076	72.3	66.9
Progressively more responsible roles in teaching	49.8	1998	72.9	64.0
Teaching assistant training course, at least one term long	46.4	1886	68.9	73.6

* N =4114

** Proportion of respondents who said resource is available.

Again, the survey results indicate considerable difference by discipline. Two cases of specialized teaching preparation illustrate these differences:

Teaching in the discipline: Overall, 51.2% of students have the opportunity to learn specifically about teaching in their disciplines. Workshops or seminars on teaching in the discipline are most common in English (68.3% said that the opportunity is available), history (62.5%), sociology (60.8%), and mathematics (59.2%). Students in geology (32.2%), art history (35.8%), and molecular biology (36.1%) have fewer opportunities to learn about discipline-specific teaching.[w-6]

TA training course: Overall, 46.4% of students reported that they could take a TA training course lasting at least one term, and 68.9% of them have taken this course. Such a course is most available to students in English (79.2%). It is least available in chemistry (28.4%) and molecular biology (30.1%); however, as described earlier, students in these science fields are the most likely to be required to teach.[w-6] This is an example of a mismatch between program requirements and support for meeting those requirements.

How well prepared are doctoral students to assume teaching responsibilities?

As described earlier, fully prepared teachers have many skills in their repertoire. College and university teachers are expected to teach a variety of courses, from introductory undergraduate classes to specialized graduate seminars. We asked students about their level of interest, confidence, and preparation for nine different types of teaching skills.

Students reported being most interested in, confident in, and prepared by their programs to lead discussion sections, teach lab sections (in science fields), and teach lecture courses. Even so, just over a third of the students (36.1%) said they have been prepared to teach lecture courses.

Advising is an essential part of the teaching roles played by faculty. We found that students look forward to advising duties. Among our respondents, 69.9% are very interested in advising undergraduates and 55.9% are very interested in advising graduate students. Once again, although faculty members routinely spend time advising, relatively few prospective faculty report being prepared by their program to do so.

One limitation of this research is that we measured students' opinions and perceptions. Students reported high levels of confidence in their abilities to perform faculty roles, which suggests that students have gleaned skills in other settings (such as observing faculty or being students). We do not know, of course, if that confidence is well-placed. But students clearly say that their programs have not prepared them to play these roles.

Table 7:

Interest in, Confidence in, and Preparation for Teaching Roles and Tasks

	Interested and Looking Forward	Confident and Comfortable	Prepared by My Program
Teach discussion sections	80.9%	83.7%	57.9%
Teach lab courses*	57.0	70.4	44.7
Teach lecture course	70.1	69.1	36.1
Create inclusive classroom climate	74.2	60.0	28.0
Advise undergraduates	69.9	68.0	26.8
Develop and articulate teaching philosophy	64.2	56.8	26.6
Teach specialized graduate courses	67.0	46.9	23.3
Advise graduate students	55.9	42.7	16.5
Incorporate information technology in classroom	41.4	33.5	14.1

% saying "very much." Other choices were "somewhat" and "not at all."

N = 2505; those interested in faculty career.

* N=910; disciplines with labs (psychology, ecology, molecular biology, geology, and chemistry.)

When we looked at two particular aspects of teaching, we again saw significant disciplinary differences:[w-6]

Giving lectures: In math and art history, approximately half of the students feel prepared through their programs to teach large lecture courses. By contrast, only 19.4% of molecular biologists feel prepared to do so, and about a third of the ecology, geology, and English students reported being prepared.

Teaching diverse students: The humanities seem to emphasize a different aspect of teaching—creating a classroom climate inclusive of diverse students and learning styles. Forty-three percent of English students reported being prepared to do so, compared with only 13% of the geologists and molecular biologists.

These data reveal significant disciplinary differences in opportunities to learn better teaching skills. Arguably, teaching skills will be important for all Ph.D. recipients, regardless of what career they pursue. Synthesizing and explaining complex material is an asset in many settings. In particular, molecular biologists and geologists seem disadvantaged in developing their teaching skills.

Preparation for academic citizenship

Faculty members traditionally are active leaders in the governance of colleges and universities, particularly in academic affairs. Faculty also influence the social, academic, and career development of undergraduate students. Their effect is felt far beyond the boundaries of the classroom; they have a great influence when advising students and interacting with students informally outside the classroom. In recent years, observers have decried the disengagement of faculty members from these "civic roles" of college and university life. On some campuses, administrators and other staff have taken on the functions traditionally played by faculty. Many claim that it is impossible to get faculty "involved." Others perceive that the shrinking ranks of the tenured and tenure-track faculty mean there is a decreasing pool of people to take responsibility for the governance of the institution.

We wanted to know if prospective faculty are indeed interested in connecting to the campus community. We found that overall, students are less interested in campus service than in service to the community or profession. However, when we asked students about their level of interest in four specific roles in a campus community, most students indicated a strong level of interest in being involved in everything except committee work.[W-7]

- Spending time with undergraduates outside of class: Fully 69.0% of our respondents are interested in activities such as advising student clubs or programs for students in residence halls. Overall, chemistry students (82.0%) are most eager and art history students (60.7%) are the least interested.
- Being a department chair or dean: Many respondents (53.1%) expressed interest. Art history students (59.0%) are most enthusiastic and mathematicians (41.8%) are least excited by this prospect.
- Serving on a university senate or governing body: More than half of our respondents (52.3%) are interested. English students (62.2%) are most attracted; molecular biologists (42.1%) are the least interested.
- Committee work: Only 28.5% of students are interested in committee work. Committee work might be onerous to many, but it is a role played by most faculty, and it is critical in college governance. Instilling students with a respect for this responsibility would surely help ensure a continued role for faculty in governing universities in the future.

> "There are a couple of factors that could have made my time in a Ph.D. program better. I wish I had been better prepared as a junior faculty member, especially in regard to service and departmental politics." English student

Are prospective faculty interested in service to the external community and to their disciplines? Service not only includes service to the college or university, but also to the community beyond campus and to the discipline. Outreach responsibilities are part of the work lives of most faculty, and are central to the mission of many colleges and universities. External service is often a mechanism for applying knowledge and expertise. We found that students are quite interested in these kinds of service as well:

- Community service: Over half (52.1%) of students are very interested in providing service to the community. Only 13.8%, however, reported any preparation by their programs for this role.
- Disciplinary service: Nearly half (41.6%) are very interested in disciplinary service, but only 19.1% reported being prepared to do so.

This interest in service and the application of knowledge bodes well for the future of American colleges and universities. However, incorporating service is not taught, either formally or informally, in doctoral programs. Although these may not be aspects of faculty life that demand the rigorous preparation demanded by research, surely future faculty would benefit from some discussion of how to undertake service responsibly and effectively. We recommend supporting students in these interests and, even more importantly, nurturing these civic impulses in new faculty.

Table 8:

Interest in and Preparation for Service Roles and Tasks

	Interested	Prepared by Program
General service roles		
Apply expertise to community beyond campus	52.1%	13.8%
Service to discipline: Review papers, serve on disciplinary society committees	41.6	19.1
Specific campus citizenship roles		
Get involved with undergraduates outside of class *	69.0	
Become a department chair or a dean *	53.1	
Serve on academic senate *	52.3	
Serve on departmental and university committees	28.5	12.7

% saying "very much." Other choices were "somewhat" and "not at all."
* % saying "very interested" or "interested." Other choices were "uninterested" and "very uninterested."

N = 2505; those interested in faculty career.

What experiences prepare students for faculty roles?

In the last decade a number of efforts, both nationally and on particular campuses, have focused on better preparing students for faculty life. Studies and programs have yielded the notion that students need to participate in a range of experiences beyond the traditional academic training to help them make informed decisions about whether they are suited to faculty life, and to help prepare them for faculty careers. These experiences could include visiting other campuses and learning about the variety of institutional types, learning about faculty life in a variety of institutional settings, developing teaching skills and learning how colleges and universities work. (One example of an initiative to fully prepare doctoral students for the professoriate is the Preparing Future Faculty program. Not only does this program prepare aspiring faculty for teaching undergraduates, but it also prepares them for the full range of faculty roles and acquaints them with the variety of institutions where they may work.)

We asked students if they had such resources and opportunities available to them, and if so, whether they had availed themselves of them. The order of the 12 items listed here represents the most to the least available of these resources:

- Teaching development center (62.4% said it was available)
- Workshop/seminar teaching in discipline (51.2%)
- TA training course, at least one term long (46.4%)
- Opportunity to work on another campus (39.0%)
- Seminar course to develop prospective faculty (33.5%)
- Mentor for professional development other than advisor (29.4%)
- Workshop/seminar on research ethics (29.1%)
- Internship (28.8%)
- Workshop/seminar on faculty roles and responsibilities (16.6%)
- Trip to other campus to learn about faculty life there (11.8%)
- Workshop/seminar on history, mission, and purpose of higher education (6.4%)
- Workshop/seminar on organization and administration of colleges and universities (4.4%)

The most widely available opportunities, the first three listed, are related to teaching. Fewer than a third of the students perceived the other experiences to be available. Encouragingly, however, with the exception of those activities requiring substantial time commitments, such as internships and working on other campuses, about two-thirds of the students who knew about the opportunity participated in it.[w-8] Yet, in many cases, students are not encouraged to join these programs.

We learned that only 8.6% of the students have participated in more than four of such activities. It is positive that those students are generally more interested in, more confident about, and feel more prepared for becoming faculty. If such activities were more widely available, more students would benefit.

We believe that providing a range of experiences to introduce students to faculty work will improve the breadth and quality of doctoral training for prospective faculty. Students are apt to take advantage of such opportunities if they are made available. From the data it seems that simply providing the opportunities is not enough; instead, they must be actively publicized, and students must feel encouraged to participate in them.

Many students do not clearly understand what doctoral study entails, how the process works and how to navigate it effectively.

We turn now from the goals and purpose of the doctorate to the structure and process of doctoral education itself. Although we conclude from the data that the scope of the degree should be broadened and that students should feel able to pursue a variety of career paths, the Ph.D. is fundamentally a research degree. Ideally, students are learning to conduct high-quality research and will be able to apply these skills in their chosen careers. To best meet this educational goal, then, doctoral programs should be individualized and flexibly tailored to meet the interests, needs, and goals of each student.

In conducting this survey, we assumed that the structure and process involved in earning the degree should not be so mysterious or opaque that students are distracted from learning. Programs and faculty have responsibility to set reasonable baseline expectations for students, publish clear program requirements, set boundaries and limits (such as time to degree), and establish minimal standards (such as funding level).

Overall, students reported high levels of satisfaction with their decision to pursue the Ph.D. and with their choice of discipline and advisor. However, they are uncertain about many of the particulars of doctoral education that affect their lives from day to day.

Most striking are the gaps in information that students have at all stages of the process. This suggests that students are not asking important questions at key stages, and program administrators are not providing essential information as a matter of course.

Students reported that they decided to enter a doctoral program without having a good idea of the time, money, clarity of purpose, and perseverance that doctoral education entails. The data reveal that many seem to have entered the pursuit of the doctorate blindly.

Once enrolled, many appear to receive little guidance about how to navigate the process. Key features that are critical to their success remain murky to them throughout their time in graduate school.

Closer examination of these trouble spots suggests that responsibility for correcting problems lies in the hands of program faculty and students. Program faculty should critically examine the norms and requirements of doctoral programs, more clearly communicate them and change them when it would be educationally beneficial to do so. Students must ask questions and demand that expectations be made explicit.

Are students satisfied with the decision to pursue the Ph.D.?

Overall, students are satisfied with the decision to become doctoral students and with the quality of their experience. Fewer than 10% said that they are uninterested in their dissertation topic or do not have the advisor they want. Three-quarters would not reconsider their decision to start a Ph.D. program.[w-9]

Moreover, most students understand the formal requirements of their programs. The students who understand their requirements most clearly are those in chemistry (96.3% agree or strongly agree), mathematics (94.6%), and sociology (94.3%). The students in English (89.5%) and ecology (89.7%) reported the lowest rates of understanding.[w-9] Students who are further advanced in their programs are more likely to say they understand their program requirements (86.1% of pre-qualifying exam students understand their requirements and 95.3% of post-dissertation-defense students do so).

Yet there are pockets of discontent and confusion. Despite generally expressing satisfaction with their doctoral experience, a surprising proportion of the students would make changes were they to start their programs again. Nearly half (49.1%) of respondents report that they would or might select a different university. Additionally, 36.8% and 41.8% answered "yes" or "maybe" to whether they might select a different advisor or dissertation topic, respectively.

Table 9:

Which Decisions Would Students Change?

	Yes	Maybe	No
Select a different dissertation topic	10.8%	31.0%	58.2%
Select a different advisor	14.3	22.5	63.2
Select a different field or sub-field	9.9	23.2	66.9
Select a different university	15.4	33.7	50.9
Change decision about taking time off *before* entering program			
Of those who took time off (N=2579)	12.1	11.1	76.8
Of those who did not take time off (N=1191)	22.0	19.3	58.7
Change decision about taking time off *during* program			
Of those who took time off (N=577)	16.8	15.6	67.6
Of those who did not take time off (N=3213)	4.4	9.0	86.6

N=4114

Do students gather sufficient information in selecting their programs?

Many students, we learned, enrolled in their doctoral programs with only a vague idea of what a doctoral program entails and what their professional futures might be. This conclusion follows from the answers to the survey's open-ended questions. Students said fervently that they would tell prospective and new graduate students to select a program carefully. From their advice, we assembled a list of the kind of information that students wish that they and their colleagues had collected before enrolling. (A more detailed discussion of this advice is on the project web site.)

Many students enroll without having clear reasons for doing so

The responses suggested that students often enroll in a Ph.D. program at the encouragement of a favorite undergraduate professor, without considering a full range of alternatives, and without developing a clear understanding of why they are doing so. Many students cautioned against enrolling simply because earning a Ph.D. seems interesting or the next logical step. Survey respondents would advise others only to attend graduate school if there is nothing else that seems compelling or interesting.

> "I tell anyone thinking about getting a Ph.D., especially in the humanities, if there is anything else that you can do and be happy, do that. Being a graduate student is a very difficult way to live. But if there is nothing else that you can do and be happy, come join us. You'll love it." Philosophy student

> Take time off between your undergraduate program and your graduate training. You need the time to develop your ideas and interests. My graduate program and current interests are much different than when I first graduated with my bachelor's degree. Consider doing a separate master's degree, and take the opportunity to work on separate projects and diversify your training. Ecology student

As detailed earlier in this report, most students have little information about the job market for Ph.D.s. "Naive optimism" characterizes a lot of entering students; many of the students in our survey expressed bitterness at not having known beforehand about the realities of the academic job market.

Many respondents advised prospective students to take time off before beginning a doctoral program. Taking time off between undergraduate and graduate school, or even pursuing a master's degree before committing to a Ph.D., is a useful mechanism for helping to determine if the Ph.D. is the right choice. As shown earlier, 68.4% of the students took at least a year off before enrolling: 76.8% of them would not change that decision, but 22.0% of those who did not take time off would definitely do so if they had to do it again (see Table 9).

> It is extremely important to visit prospective graduate schools to look for a fit with the faculty and potential advisor, the research and the atmosphere in the department and school. You want to make sure you will be happy where you are, otherwise your research and performance will suffer. The best way to ensure this is to go visit, talk to students and faculty, and just get a feeling for the place. Geology student

Students do not know how to assess a program and determine fit

The survey results clearly indicate that many students do not routinely ask questions about the process and outcome of prospective programs, nor, do we suspect, is this kind of information routinely available. Again, the advice and comments articulated in the open-ended questions provide the data for this finding. Many advised prospective students to visit programs, talk with students, and determine if the program is one in which they could thrive. Students are each others' best resources; in many cases faculty are unable to provide critical information.

Prior to enrollment, many students were unaware of the financial implications of doctoral study. (Confusion around funding continues even once students are enrolled, as described below.) Students described the prevalence, particularly in the humanities, of significant accumulated debt in graduate school. Survey respondents cautioned prospective students not to enroll without receiving a commitment to funding their studies.

Other pieces of information that students wish they had investigated and that they wish had been more readily available are the following:

- Are there an adequate number of graduate faculty in the desired area of interest?
- What are those faculty like as teachers, as researchers and, most important, as advisors?
- What is the typical time to degree in the department?
- How many students complete the degree? What is the attrition rate?
- What kinds of jobs do recent degree recipients enter?

In sum, the comments of the respondents reveal that many students came to graduate school with unformed expectations. They did not know about the constrained academic job market, nor did they have an idea of how to get the most out of the experience. Again, the solution lies in many hands. Prospective students must actively seek out the information they need to make a careful decision. Those institutions at which students seek to enroll have a responsibility to provide—as a matter of course—comprehensive information about the program and guidance to prospective students. Similarly, the institutions at which prospective graduate students are undergraduates also bear responsibility for helping students make fully informed choices.

Do students understand how to navigate the process of doctoral education?

Obviously, the experiences of doctoral students vary widely from discipline to discipline. The program of a student in English is very different from that of a student in molecular biology. Programs differ in such things as course requirements, timing of the dissertation process, and teaching assignments. There is also variation among the experiences of individual students within the same program. Nevertheless, at the program level, all doctoral programs have in common a structure of formal requirements and informal expectations for students. Ideally, students, particularly those who have been enrolled for a few years, should:

- understand and be adept at negotiating the formal logistical requirements of their program
- understand the mechanisms and overriding logic of the doctoral program
- grasp the informal and tacit expectations.

However, a startling number of students report that they do not understand what is expected of them as students and what they can expect from their programs.

This information deficit persists, despite the fact that most students told us that some channels for communication are well established:[W-10]

- Orientation to the program (88.1% said it is available; of those, 92.4% attended)
- Program handbook (84.6% available; 92.4% used)
- University graduate student handbook (69.7% available; 80.3% used)
- University graduate student orientation (55.9% available; of those, 69.6% attended).

Why, then, do students fail to understand so many aspects of their programs? It is possible these handbooks and orientation programs do not cover all of the kinds of information students need to succeed in their programs. Further, the first weeks of a program may not be the best time to initiate discussion about navigating the entire program. Instead, we recommend that program administrators and faculty provide information on a regular and ongoing basis.

Arranged in rough chronological order from the start to the end of a doctoral program, we explored six broad features of a doctoral program for which there ought to be clear understanding between students and program faculty.

Advising and advisor selection

A student's advisor plays a critical role in a student's doctoral education and professional career. Good advisors can help students learn and grow and flourish in their chosen careers. A good match between student and advisor makes the relationship mutually fruitful and satisfying.

The importance of this relationship emerged in the comments on the survey. Overwhelmingly, students urge their peers to make a careful and thoughtful choice of dissertation advisor. Students suggest seeking out other students to learn about the prospective advisor. Many students advise new students to select an advisor who shares an academic specialization and has a compatible working style.

Virtually all of the students responding to our survey have an advisor (only 1.1% do not). More than half (59.4%) can also identify a second faculty member who serves as a mentor; this is especially the case in history (72.1%), sociology (71.6%), and art history (70.2%) and least likely in mathematics (40.0%) and chemistry (43.0%).[W-11] Students with more than one mentor often benefit from a breadth of perspectives. A second mentor also helps mitigate against dependence on the sponsorship and control of only one faculty member.

> "Students should be encouraged to broaden their network of advisers so that there are other supporters to stand up for them. No qualified student should ever leave a program because of bad advising. There should be mechanisms, at all levels and in all departments, to protect students. Students in my program generally feel respected, valued, and are happy. I know this is not the case for everyone, but it should be." Chemistry student

How do students pair up with their advisors?

Most often, students either select their advisors after they start their programs (40.4%), or they enroll having agreed to work with a specific advisor (32.0%). Another quarter reported having switched advisors: either an unplanned switch (16.2%) or a switch that was expected (7.3%). A small group, 4.2%, reported being assigned to an advisor.

In each field there was a normative strategy: students either came to the program to work with that advisor (art history, psychology, ecology, geology, and history), or selected the advisor after starting the program (philosophy, molecular biology, chemistry, English, and mathematics).[W-12] Only sociology does not have a dominant mode: a third of the students selected their advisor after enrolling; another 20% started with a graduate program advisor, switching later; and a quarter made an unplanned switch at some point.

Why do students pick their particular advisors?

The top seven reasons (selected from a list of 13 typical reasons) that students selected their advisor are: [W-13]

- Has intellectual interests that match mine (65.2% cited as a major reason).
- Is doing interesting research (64.5%).
- Has a reputation for being a good researcher (56.1%).
- Is knowledgeable in the techniques and methods I will employ (53.3%).
- Was willing to take me on (52.9%).
- Will make sure I do a rigorous dissertation (40.6%).
- Has a reputation for being a good advisor (37.0%).

These data plainly show that research acumen and compatibility are the primary criteria students employ. Furthermore, skills as an advisor prove to be more important criteria than providing funding or fostering a good environment in their research group.

> "When selecting a research advisor, ask what they expect of you (time required, what is necessary to complete your degree, etc.). Equally important, ask what they expect of themselves. Be up front about your expectations of both yourself and an advisor, and make sure that these mesh with those of the potential advisor. Since it is often hard to define exactly what you need from the program or advisor (since you haven't been through the experience), talk to as many senior students as possible about their experiences." Chemistry student

Are advisor-student relationships satisfactory?

By one measure, they are. A student-advisor relationship has many facets, but overwhelmingly students have the advisor they want: 59.1% strongly agree and another 32.2% agree with that statement. Students in philosophy (95.6% strongly agree or agree) and English (95.3%) are most likely to say that they have the advisor they want. Although still highly satisfied, students in molecular biology (87.6%) and ecology (89.0%) are least likely to have the advisor they want.[W-14]

Students who enrolled already paired with their advisor were happiest with their advisor (65.9% strongly agree that they have the advisor they want), followed closely by those making an expected switch (63.2%), and those who matched with their advisor before enrolling (55.6%). Those who were assigned to their advisor were least happy (42.2%).

However, many students are not satisfied with the quality of their relationship with their advisor. About one third (32.5%) disagreed or strongly disagreed with the statement "I am satisfied with the amount and quality of time spent with my advisor." Art history (39.2% disagree or strongly disagree) students are the least satisfied with the amount and quality of time spent with their advisor. Students in mathematics (23.3%) and molecular biology (29.9%) are the most satisfied with the amount and quality of time spent with their advisor. [W-14]

Even more troubling, only a fifth of the students (22.5%) said that they are "very clear," and a third of the students (32.7%) reported being "not at all clear" about how much time they could expect to spend with their advisor. The four fields whose students reported the lowest levels of understanding are primarily in the humanities: philosophy (only 11.8% said they are very clear), art history (13.3%), English (13.5%), and sociology (17.3%). However, the science students—geology (29.7% very clear), psychology (28.5%), mathematics (28.4%), and molecular biology (28.2%)—reported somewhat higher levels of clarity on this point.[W-15]

How are satisfaction and selection linked?

One important finding from this study is that students who have the advisor they want used many more criteria to select their advisor than did those who reported dissatisfaction with their advisor. Whether students came to their program to work with a particular person or selected their advisor after enrollment, they relied on the same list of criteria (refer to Table W-13 for the list of reasons).

- Students who were happy with their advisor took many more reasons into consideration—they marked a mean of 6.14 (of a possible 13) reasons "major."
- Unhappy students took only 3.29 reasons into account.
- Conversely, the unhappy students marked an average of 6.21 factors as "not at all a reason"; the happy students marked an average of only 3.21 as "not a reason."

The conclusion is clear—there is a strong association between the number of factors a student considers when selecting an advisor and the student's satisfaction with that relationship. It behooves students to develop as full a picture of their advisor as possible when choosing that person.

> It is impossible to overestimate the significance of the student-advisor relationship. One cannot be too careful about choosing an advisor. This is both a personal and professional relationship that rivals marriage and parenthood in its complexity, variety, and ramifications for the rest of one's life. Ecology student

Financial Support

Most doctoral students depend on financial support to pay tuition and living expenses. The sources of financial support are typically fellowships, teaching assistantships, and research assistantships. Many students must also rely on personal resources; indeed, considerable data exist about the amount of debt accrued by Ph.D. recipients. Because of the complexity and diversity of funding streams, we chose not to investigate funding in detail. We simply investigated whether students have a clear understanding of the commitments regarding funding of their graduate studies and the commitments regarding funding of their dissertation research project. We found that students often did not know how they would be financially supported through the dissertation.

Overall, 57.3% of students reported having a very clear understanding of the commitments made to them about funding their graduate studies. Students in mathematics (70.9%), psychology (62.6%), molecular biology (61.8%), and philosophy (60.6%) have the most understanding, while students in history (48.6% are very clear) and art history (49.7%) are most confused about funding.[W-15]

Students are less certain about the sources of funding for their dissertation research: Only 40.4% have a very clear understanding and 20.4% reported being not at all clear. Science students, particularly in molecular biology (53.2% very clear) and geology (44.1%), reported the highest levels of understanding, probably because, for most, their research is part of a larger body of work funded by their advisor. Art history (34.3%), English (32.2%), and sociology (31.5%) students expressed the least certainty of how their dissertation work would be funded.[W-15]

> Don't borrow money to go to graduate school. Not one red cent. It makes absolutely no sense for anyone smart enough to get into graduate school to be so dumb as to go neck-high into debt when the job market is so bad (and shows no signs of letting up). I have friends in history programs who are $30,000-70,000 in debt. They'll be paying their creditors until almost the end of their lives. History student

The sources of information on funding graduate studies are primarily written policy or the advisor (particularly for science students); however, other sources of information are also used. There are disciplinary differences in source of information in the matter of funding research: Science students overwhelmingly rely on their advisor to make this clear.

There is no obvious connection between clarity of understanding and mechanism for communication; it is simply the case that a substantial measure of confusion that surrounds these matters. Furthermore, as described earlier, many students, particularly in the humanities, accumulate debt in graduate school. In their comments, these students argued adamantly that students should not enroll without explicitly understanding future sources of financial support.

Annual Reviews

An annual review is an opportunity for students to meet with their advisors and receive candid feedback on progress to the degree, discuss areas of strength and weakness, and set goals for the following year. Yet our data suggest that this practice has not been adopted uniformly. There is enormous disciplinary variation. Most students in psychology (83.6%), sociology (78.2%), and philosophy (72.6%) are annually reviewed. Reviews are relatively rare in art history (40.7%), English (35.2%), and chemistry (34.9%). There are strong institutional effects as well. At one university, where annual reviews are mandated by institutional policy, more than 90% of the students reported being reviewed.

Table 10:

Availability of Annual Reviews

	% Agreeing
Total	55.5%
Psychology	83.6
Sociology	78.2
Philosophy	72.6
Molecular Biology	70.2
Geology	62.6
Ecology	59.4
Mathematics	47.3
History	41.4
Art History	40.7
English	35.2
Chemistry	34.9

N = 4114

Coursework and examinations

The most common features of doctoral programs are coursework and examinations designed to determine if students are ready to advance to the next stage of doctoral study. Exams may have many names (qualifying exams, preliminary exams, orals) and take different forms (written or oral, formal or informal, research related or canonical), but they, along with courses and the dissertation, are part of nearly every program.

Coursework generally gets good marks, yet a third of the students believe it neither gives them a broad foundation of knowledge in their field (71.7% agree or strongly agree) nor has it laid a good foundation for doing independent research (70.4%). Furthermore, another third do not find their programs to be flexible (67.7%).[W-16] This suggests that some programs would benefit from a critical review of program curriculum to see that it aligns with students' needs and interests as well as current knowledge and thinking in the field.

There is a widespread sense that some exams and requirements (e.g., qualifying exams, preliminary exams, orals) seem arbitrary and unhelpful (43.5% of students agreed).[W-16] This concern is particularly acute among students in psychology (49.1%) and English (48.7%), and is of less concern in geology (32.7%) and molecular biology (32.5%). Surely some students are expressing their frustration with difficult exams, but we recommend that departments explore the extent to which their preliminary and qualifying exams truly serve the purposes they were intended to serve.

> "My one complaint is that the examination process—written and oral prelims—is relatively unconnected to the bulk of the work that we do. The faculty think they have designed a series of courses that do prepare us, but it doesn't. In the main, most of them are wedded to the exam system as it now stands because they had to do it and therefore think we should do it." History student

Teaching assistantships and grading

As described earlier in this report, about half of the students will serve as teaching assistants at some point in their programs. Given the importance of the teaching function for undergraduate education, it is imperative that graduate students clearly understand their obligations as teaching assistants, such as number of courses and number of hours spent. Furthermore, we would expect students to understand customary practices for grading student work.

Nearly two-thirds of the students (63.8%) understand their teaching assistant obligations, but fewer than half (42.0%) feel able to fairly grade student work (Table 11, page 42). The mechanisms of teaching assistantships, such as hours and courses, seem to be covered in written policy. Those students who understand about grading student work fairly learn this from faculty, primarily faculty other than their advisors.

Time to degree and graduation criteria

Two other clearly linked items—how long the student would be a student and what the criteria are for readiness to graduate—are the subject of considerable confusion. Overall, only 45.4% said that they have a very clear understanding of the criteria for determining that they are ready to graduate. Similarly, only 30.9% said that they clearly understand the length of time they would be students.

Clarity on the criteria for graduation is noteworthy, particularly because there is enormous variation by discipline. For most disciplines, the proportion of students saying they are very clear about this ranges from 40% to 50%. Students in art history and history have high levels of clarity on this point (68.4% and 60.9%, respectively).

Students in the two lab science fields—molecular biology (23.3%) and chemistry (24.4%)—show very low levels of clarity of understanding about graduation criteria.[W-15] In some measure, the unpredictable nature of experimental research in these fields makes it difficult to predict when a student will have completed his or her research. However, media attention surrounding particularly tragic events related to graduate students has confirmed persistent complaints from students in these fields that some advisors make arbitrary decisions about students' readiness to graduate, often influenced by that advisor's continued need for the student's hands and mind in the lab. Our findings confirm these complaints.

Table 11:

Clarity of Understanding and Primary Source of Information of Graduate Student Related Ethics Items

Customary practices regarding:	% very clear	% not clear	Advisor	Other faculty	Students	Written Policy	Other
Fulfilling teaching assistant obligations	63.8%	7.2%	8.0%	21.8%	13.7%	**49.7%**	6.9%
Funding graduate studies	57.3	7.6	27.7	11.1	11.5	**37.4**	12.3
Criteria for graduation	45.4	12.8	**41.3**	5.5	9.7	39.5	4.0
Grading student work	42.0	11.3	10.4	**55.3**	17.0	8.1	9.2
Funding of dissertation research	40.4	20.4	**52.5**	9.3	6.6	20.0	11.7
Length of time you would be a student	30.9	14.6	27.6	5.2	**35.5**	22.2	9.4
Time spent with advisor	22.5	32.7	**73.7**	0.8	19.6	1.4	4.5

N = 4114

% saying "very clear" or "not at all clear." Other choice was "somewhat clear."

Primary source of information cited by those saying "very clear" or "somewhat clear" on item.

Shaded = Most common source of information.

It is responsible educational practice to make expectations clear to students; students in turn need to ask for clarification when these core aspects of graduate life are unclear. Much of the critique of doctoral education centers around the lack of mutual understanding of how the process works and what roles of students and faculty play in ensuring that students are well educated. Clear communication between students and faculty is essential and can ensure that the fundamental aspects of doctoral education are carried out in an ethical and responsible manner.

Recommendations

The implications of our findings are readily apparent: In too many cases, doctoral programs and doctoral students are operating at cross purposes. The careers students are prepared for are not the ones that they will assume, nor are these the careers that students want. Many students enter their doctoral programs without a well-grounded or informed understanding of the nature of doctoral education. Nor do they understand if it is the best choice for them. As students progress through their programs, many of the details of the day-to-day processes are unnecessarily ambiguous; this uncertainty hinders students' ability to make the most of their doctoral education.

Students and programs need not be at cross purposes. Our overwhelming conclusion after conducting this research is that more information needs to enter the system. The responsibility for changing current practices lies with all of the parties engaged in doctoral education: students, faculty, and administrators. We encourage communication and cooperation.

Following is a list of recommendations for each group of participants in American doctoral education. Although they are based on our findings, many of these echo the recommendations made in other reports and publications, especially those by the National Academy of Sciences, the American Association of Universities, and the National Science Board. We offer these recommendations as a starting point for improving American doctoral education.

Students

Too often, students feel powerless and unable to speak up. However, students have a particular responsibility for initiating and arguing for change. Students must also advocate for themselves. By acting collectively, students can mitigate the possibility of reprisals. Some particular recommendations for doctoral students:

- Provide accurate information to prospective students, including information about the quality of preparation, the culture and climate of the department, levels of financial support, and the quality of teaching and advising. By reflecting the full range of experiences available in the program, the good and the bad, current students can help prospective students make sound enrollment decisions.
- Actively mentor new students in the program.
- Engage faculty and program administrators in making expectations mutually explicit.
- Press to ensure that accurate information about career placement, graduation rates, funding and the like are routinely provided to incoming students.
- Demand that faculty be good advisors and that students can get mentorship from more than one faculty.
- Learn about various career opportunities. Share information about non-traditional career paths with other students. Students who take non-traditional careers after graduate school should return to campus to share their experiences.
- Demand a voice in program decision-making.
- Talk about what does and does not work in the program. Initiate conversation about changes.

Graduate Faculty

In general, we encourage faculty members to reflect on how they conduct themselves and what they communicate to students about doctoral education and the academic profession. Graduate faculty have many competing demands on their time. However, advising and training doctoral students are two of the important roles they serve, and often get short shrift. We encourage faculty to take their advising responsibilities seriously and to undertake them deliberately. Specifically, we recommend that faculty:

- Deliberately inculcate values and ethics in future faculty. Explicitly discuss ethically complex issues (such as assigning authorship, mediating conflict with undergraduates, possible conflicts of interest) with students. This models ethical behavior and provides opportunities for discussing the role of values in professional conduct.
- Be a good mentor and advisor to advisees and to others.
- Clarify mutual expectations with advisees, including amount and quality of time spent together.
- Conduct a thorough annual evaluation of each advisee. Discuss students' timely progress through the program, and work to ensure that their experiences prepare them for the careers they plan to enter.
- Encourage students to expand disciplinary boundaries by taking classes outside of the department and exploring interdisciplinary research areas.
- Work to ensure students can make informed choices throughout their graduate careers.
- Support students' choices of non-academic careers.
- Encourage students to learn about academic citizenship by involving students in departmental and university governance and application of expertise to the community.
- Encourage students to take advantage of activities and opportunities that provide both depth and breadth of experience, even if this means that students take some time away from research activities.
- Determine if program requirements and norms effectively advance the educational goals of the program and the students.
- Examine the structure and content of courses and determine whether or not they contribute depth and breadth of knowledge and preparation.
- Ask students about their experiences. Listen to their responses.

> "Seek out the advanced students in the program and utilize them as mentors. The best and most useful information comes from other students, as they have just accomplished what you will need to do. They are often more direct, honest and realistic about current conditions." Sociology student

> "I came into my program with the idea that someone would say, "Do this and then you will be a philosopher." Naive, sure, but my university really stinks at providing anything even remotely like that sort of guidance. I would have appreciated some discussion of how I could use my graduate years and what some of the dimensions of that process were." Philosophy student

Department chairs, directors of graduate studies, and program administrators

Those who provide leadership to doctoral programs and academic department have the ability to ensure that the structure and process involved in earning the Ph.D. should not be unnecessarily mysterious or distractingly unclear. These administrators and faculty are particularly well situated to provide information to current and prospective students about what doctoral study entails, how the process works and how to navigate it effectively. Specifically, we recommend that they:

- Critically assess the program. Does the program provide opportunities for students to grow and develop in teaching, research, and service? Are apprenticeship teaching, research, and service activities planned to meet students' individual needs as they progress to the degree? Does the program include a formalized system for mentoring all aspects of students' professional development?
- Initiate a discussion about reasonable mutual expectations between students and advisors.
- Provide accurate, up-to-date information (e.g., time to degree, graduation rates, career paths of graduates, job market projections, financial support) to prospective students so they can form realistic expectations of graduate school.
- Help prospective students understand the nature of doctoral study and encourage students to make more informed decisions.
- Provide ongoing orientation activities for students.
- Set reasonable baseline expectations for students and the program. This should include publishing clear program requirements, setting boundaries and limits (such as time to degree) and establishing minimal standards (such as levels of financial support).
- Encourage students to take a full range of criteria into account when selecting an advisor, including working style and reputation as an advisor.
- Allow students to press disciplinary boundaries by taking classes outside the department and exploring interdisciplinary research areas.
- Expose students to various career paths by encouraging internships, inviting alumni to speak to students, and encouraging students who seek positions outside academia.
- Expose students to the breadth of the academic profession, including the range of roles played by faculty and the range of institution types.
- Make available and publicize opportunities to help students explore and prepare for a variety of careers, in and out of academia.
- Offer and publicize opportunities for developing students as effective teachers. Equip students for the changes taking place in teaching and classrooms.

- Provide a range of professional development activities that are thoughtfully integrated into the academic program and sequence of degree requirements.
- Provide opportunities to explore ethical dilemmas inherent in research, teaching, and service. One option is to offer courses in ethics.
- Include students in departmental decision-making.
- Ensure that departments and programs fulfill their responsibility to clarify expectations and core processes to students.

Graduate deans

Change often results from pressures from both above and below. Graduate deans are uniquely positioned to create policy, advocate with conviction, and provide resources aimed to catalyze change and support others. We recommend that graduate deans:

- Strive to open the dialogue between students and the faculty.
- Collect and disseminate up-to-date data on student outcomes: completion rates, time to degree, and career placement information.
- Require all departments and programs to collect accurate information and make it readily available to current and prospective students: graduation rates, career outcomes, program requirements, funding, and teaching responsibilities.
- Make available and publicize professional development opportunities for careers in and out of higher education. Provide resources and support for such activities.
- Provide resources and support for programs aimed at preparing future faculty.
- Encourage departments to enroll only as many students as they can adequately advise and support.
- Provide resources and support for services and programs that help students develop as apprentice teachers.
- Develop and routinely promulgate appropriate policies, expectations, and standards for doctoral study.
- Consider mandating critical practices, such as annual reviews, in formal policy.
- Develop centralized career services aimed particularly at doctoral students.
- Encourage and reward good advisors.

> "The program at my school has improved enormously in the last five years by making more requirements and being stricter about completion of those requirements in a timely manner. This was very helpful in getting students motivated, focused on achieving goals in a step-by-step process, and helping people complete." Sociology student

Undergraduate faculty, advisors, and career development staff

The colleges and universities from which pre-doctoral students graduate often provide little guidance to students about doctoral studies. Typically, career-planning centers focus their efforts on those students who are entering the work force, and faculty are expected to advise students about graduate school. Unfortunately, many faculty may have little time, experience or understanding of the realities of doctoral study today. Our recommendations for undergraduate institutions are designed to help prospective doctoral students make more informed decisions:

- Provide better information to pre-doctoral students so they can have realistic expectations of graduate school.
- Open an advising office for pre-doctoral program students. Do not rely on faculty to provide accurate information to students.
- Invite alumni who are in graduate school to come back and talk to students.
- Create research opportunities to allow students to experience what graduate school will entail.

Professional associations

Professional associations are the nexus of various programs in the same discipline. Professional associations can help shift the norms of practice in the discipline. Specifically, we encourage professional associations to:

- Foster dialogue about changing doctoral programs at professional conferences. Highlight successful innovations. Provide examples of excellent publications and policies.
- Showcase innovations in programs in publications and other association activities.
- Articulate clear standards for responsible practice for programs and graduate faculty.
- Recommend that routine program reviews include an assessment of the program's adherence to doctoral education responsible practices: providing information to prospective students, publishing clear program requirements, annually reviewing students, providing opportunities to help students explore careers in and out of academia.
- Collect discipline-wide data on career outcomes and options.
- Provide training for department chairs and directors of graduate studies aimed at assessing and improving the quality of the educational experience.
- Provide a forum for doctoral students and recent graduates to describe their experiences in doctoral education and provide suggestions for how programs might be improved.

Appendix: The survey respondents

We surveyed students at 27 universities and one cross-institutional program, the Compact for Faculty Diversity. The survey was sent in the summer of 1999 to currently enrolled doctoral students who were in their third year or beyond (started their programs in the fall of 1996 or earlier). We selected 11 traditional arts and sciences disciplines to get a balance across disciplinary areas (humanities, social sciences, physical sciences, and biological sciences) and across different methods of research (lab-based, library-based, and field-based.)

Table 12:

Disciplinary Distribution of Sample

	N	%
Humanities	865	21.0%
Art History	168	4.1
English	507	12.3
Philosophy	190	4.6
Social Sciences	1443	35.1
History	594	14.4
Psychology	454	11.0
Sociology	395	9.6
Biological Sciences	823	20.0
Ecology	252	6.1
Molecular Biology	571	13.9
Physical Sciences	926	22.5
Chemistry	574	14.0
Geology	147	3.6
Mathematics	205	5.0
Other	57	1.4

N = 4114

Table 13:

Number of Participants and Response Rates by School

Institution	Number of respondents	Response Rate
Arizona State University	74	47.1%
Brown University	93	38.3
Duke University	139	34.4
Florida State University	123	49.4
Harvard University	226	36.1
Indiana University	218	38.6
Marquette University	58	51.8
North Carolina State University	112	46.3
Northwestern University	197	41.7
Princeton University	73	40.3
Rutgers University	206	36.3
Stanford University	220	52.9
Syracuse University	75	44.6
University of California, Los Angeles	147	38.0
University of California, San Diego	245	40.2
University of California, Davis	159	51.0
University of Cincinnati	55	29.6
University of Colorado at Boulder	85	38.8
University of Kentucky	97	52.4
University of Minnesota	205	39.3
University of Nebraska-Lincoln	100	47.4
University of New Hampshire	42	38.2
University of Pennsylvania	161	41.7
University of Texas at Austin	219	37.2
University of Washington	298	51.3
University of Wisconsin-Madison	287	48.2
University of Wisconsin-Milwaukee	62	47.3
Compact for Faculty Diversity	134	45.3
Subtotal	4110	
Surveys missing identifier	4	
TOTAL	4114	42.3%

Response rate calculated as proportion of completed responses from valid addresses sent.

Respondent demographics

In the following characteristics, survey respondents resemble students who receive Ph.D.s from American universities as reported in the Survey of Earned Doctorates:

- Currently, across all fields of study, 40.6% of degree recipients are women. In this sample, 53.4% of respondents are female.
- This sample has far fewer international students, both permanent and temporary residents, than the total doctorate-receiving population, but does not include fields (such as engineering) with high international student totals.
- Of the U.S. citizen respondents, the ethnic composition of our sample is comparable to degree recipients: 83.2% of our sample classify themselves as white.
- The median age of the respondents (who are currently enrolled students) is 30.0 years, in contrast to the median age of doctorate recipients, 33.6 years.
- The Survey of Earned Doctorates reports that 53.8% of doctoral recipients are married. In this survey, 55% reported being married/partnered; 56.2% of the women and 53.2% of the men have a partner.
- Only 16% of the respondents report having children; here there are no significant gender differences.
- Students have highly educated families. Of the partnered people, 60.2% have partners with a graduate or professional degree. Fully 20.6% have a parent with a Ph.D.

Table 14:

Demographic Distribution of Sample

	N	%
Sex		
Female	2113	53.4%
Male	1843	46.6
National Origin		
U.S. Citizen / Permanent Resident	3544	90.5
Non-Citizen	370	9.5
Ethnicity (Of U.S. Citizens, N=3430)		
Caucasian	2818	83.2
African-American	181	5.3
Asian-American	148	4.4
Hispanic	133	3.9
Native American	26	0.8
Multi- / Bi-racial	51	1.5
Other	29	0.9
Age		
< 26	243	6.2
26 - 28	1175	29.8
29 - 31	1136	28.9
32 - 39	975	24.8
> 39	405	10.3
Marital Status		
Partnered	2153	54.9
Single	1768	45.1
Family Status		
No Children	3198	83.6
With Children	627	16.4
Family Education Level		
Spouse/Partner: M.A. or Professional*	895	41.7
Spouse/Partner: Ph.D.*	429	20.0
Parent: M.A. or Professional	1357	34.3
Parent: Ph.D.	817	20.6
Sibling: M.A. or Professional	1072	29.7
Sibling: Ph.D.	328	9.1

*n=2153; those married or partnered.

N=4114

Respondent Enrollment Information

Students were asked about their patterns of enrollment. These data help provide a portrait of these students' enrollment decisions.

- Like most doctoral students in the arts and sciences at top institutions, the students in this sample (94.1%) typically enroll full time.
- Nearly a tenth (9.7%) were previously enrolled in another doctoral program. Of those, 44.4% of those changed fields and 83.2% changed institutions.
- Most students took time off between receipt of the bachelor's degree and entering their doctoral program, although 31.5% enrolled immediately.
- Although the majority of students have been continuously enrolled, 14.6% report having taking at least a semester (excluding summers) off during their program.
- During the summer months, students are either enrolled (44.4%) or not enrolled but doing work related to their Ph.D. (39.4%). The remainder do work unrelated to their degrees. Summer plans vary significantly by field of study: Three-quarters of the students in biology and chemistry, and half of those in psychology and geology are enrolled.
- Reflecting our selection criteria of third year and beyond, most students in our sample have been advanced to candidacy and are actively conducting the research for their dissertations.

Table 15:

Enrollment Information for Sample

	N	%
Enrollment Status		
Part-time	243	5.9%
Full-time	3860	94.1
Stage of Program		
Course taking / Pre-quals	406	9.9
Post-quals / Mid-Candidacy and Proposal	818	19.9
Post-Candidacy	2449	59.7
Post-Defense	429	10.5
Summer Enrollment		
Enrolled	1812	44.4
Not Enrolled (working related to Ph.D.)	1607	39.4
Not Enrolled (work unrelated to Ph.D.)	664	16.3
Time taken off before doctoral program		
None	1232	31.5
1-2 Years	1128	28.9
>2 Years	1546	39.6
Taken at least one term off during doctoral program (excluding summer)		
Yes	596	14.6
No	3484	85.4
Prior Doctoral Program		
No	3574	90.3
Yes	383	9.7
Of those answering yes: (N=383)		
Changed Discipline	29	7.7
Changed Institution	81	21.5
Changed Discipline and Institution	10	2.7
Changed Advisor	6	1.6
Changed Discipline and Advisor	28	7.4
Changed Institution and Advisor	122	32.4
Changed All Three	100	26.6

N=4114

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Getting through the program is probably going to be more difficult than you anticipate. Just keep your sight on the goal, and you'll be fine. Realize that most Ph.D. students have to jump through a lot of hoops, and some are ringed with fire. Just DO it, and don't waste energy fighting it. Be honest. Be positive. Always take the high road. ➤ Most prospective graduate students are woefully mis/uninformed as to what graduate school will ACTUALLY do for them. ➤ Your choice of an advisor will have a much larger impact on your graduate school career than either your choice of university or your choice of topic. Also, do not think that there is only one way to accomplish the learning and research involved with an advanced degree. Look for opportunities to go in new directions and explore new possibilities. ➤ Graduate education is designed to create academics, of which there is a gross oversupply. Yet the everyday world of consultants, government, industry, business, pre-college education, etc., needs qualified people. ➤ There should be more career counseling and education about alternative careers. My professor wants his students to go into academics and teach, and this is really all that he knows about. I wish that there would be more support for students who do not want to follow this path, and more contact with people outside of academia. ➤ Students who want to get a Ph.D. should be ready to be trained for an academic job, and realize that Ph.D. programs are apprenticeships for academic jobs. They are not programs for people with general interests in the discipline. ➤ Make sure that your advisor not only has similar academic interests, but is compatible personally as well; he/she has similar philosophies on the graduate student/advisor relationship; shares the same goals for what you should get out of a graduate program; and provides the kinds of emotional support you need to perform your best work. ➤ I have always planned to become a professor at a major research university. The one thing that gives me pause, and increasingly so, is my perception of the job as highly stressful. I do not want to pursue my long-time goal if it compromises my health and happiness. ➤ Try not to accumulate large amounts of debt. While I do not regret this decision, I do not relish devoting a huge chunk of my income over the next ten years to repaying student loans. ➤ Reconsider your decision to pursue a Ph.D. The job market in most fields is poorer than your professors will lead you to believe. ➤ If you find out that graduate school isn't for you, don't be afraid to cut your losses and leave right away, or after only a master's degree. It's much better than spending four or more years of your life doing something you don't want to do, followed by perhaps a career in a field or setting you don't enjoy. ➤ I believe my program is typical of departments around the country. The program has fairly unclear and confusing requirements, especially in regards to completion of the Ph.D. There are a lot of hoops to jump through on the road to completion that have nothing to do with the actual degree. ➤ I started out thinking I might be a professor. However, my first few years of teaching made me despise the profession! I was given no guidance on how to teach a college course (or any course), therefore it was a traumatic experience for me and my poor students! ➤ One of the most difficult things about being a graduate student is being subject to the power of faculty members. I worry that there is often little real mentoring that goes on in graduate school. Many students are left to wander and try to figure out what are reasonable standards to hold themselves to and how they might meet those standards. I suspect that this is linked to the fact that our primary purpose is to provide cheap undergraduate instruction. I don't think there's much real attention paid to graduate students as human beings and as people who need to learn and be nurtured intellectually instead of being judged.