

Re-envisioning
the
Ph.D.

Funded by The Pew Charitable Trusts

What Concerns Do We Have?

Jody D. Nyquist
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CONCERNS BRIEF:

A synthesis of concerns expressed from 365 interviews with stakeholders from research-extensive/intensive universities, K-12 education, doctoral students, government funding and hiring agencies, business and industry, foundations, disciplinary societies and educational associations.

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PLEASE NOTE: THE PAGINATION OF THIS DOCUMENT DOES NOT MATCH THE PRINTED DOCUMENT. IT HAD TO BE REFORMATTED IN ORDER TO WORK WELL WITH THIS PDF. NO CONTENT WAS REMOVED. THE ORIGINAL PAPER VERSION IS 36 PAGES LONG.

PREFACE

In July 1998, funded by The Pew Charitable Trusts, two research assistants and I initiated an “environmental scan” to document current promising practices as well as concerns about Ph.D. education as identified by institutions preparing Ph.D.s, by graduate students, and by those who hire Ph.D.s. Very quickly, we discovered that even though U.S. doctoral education is considered the world’s best, with international students vying for admission, concerns about its future were being expressed by many groups. These included research intensive universities, comprehensive and doctoral universities, liberal arts and community colleges, doctoral students, business and industry, foundations, government, disciplinary and educational associations, K-12 education, and accrediting agencies. Under the rubric of Re-envisioning the Ph.D., we interviewed more than 375 individuals, conducted numerous focus groups, compiled an impressive bibliography related to issues in doctoral preparation, and inventoried numerous strategies that each of the groups was using to respond to criticisms and concerns in very creative and innovative ways.

The Promising Practices have been posted to a web site <http://depts.washington.edu/envision/promprac.html> that links the reader with the actual web site for the practice wherever it occurs, in this country and abroad, or it provides contact information. The Selected Bibliography has likewise been posted to the web site at <http://depts.washington.edu/envision/sel-bibl.html> and is published in a companion monograph to this one. Thus, these are the three “products” of the Re-envisioning the Ph.D. project.

In this volume, you will find brief descriptions of **concerns** raised by the sectors listed previously. These concerns are a distillation of transcripts of interviews, analyses of email inquiries, articles, task force reports from various agencies and other documents related to reconceptualizations of the Ph.D. In all cases, we tried to listen to and read carefully what the various constituencies interested in doctoral education were suggesting in terms of concerns with the present circumstances. We have tried to identify the major themes from each sector and the intensity with which the interviewees or authors offered their opinions.

Throughout the process, Lana Rae Lenz, Senior Consultant at the Center for Instructional Development and Research, proved invaluable. She provided considerable contributions to conversations about the data, as well as assistance in writing, to bring this monograph to completion. In addition, we are grateful for the editorial assistance of Debby Hatch, Senior Consultant, Michael Peck, Staff Consultant, and Madelle Quiring, Secretary, CIDR.

We hope that the project’s three products, the Promising Practices, the Selected Bibliography, and this Concerns Brief will assist in answering the question of “How can we re-envision the Ph.D. to meet the needs of the society of the 21st Century?” We also hope that these contributions will aid in strengthening the Ph.D., which is the pinnacle of academic accomplishment, whose recipients offer so much to the knowledge society of the 21st Century.

Jody D. Nyquist
April 13, 2000

OVERVIEW

Legendary achievements have come from graduates of doctoral programs in the United States. Expertise produced by doctoral training has resulted in advances in science, medicine, and engineering that were unimaginable only a few decades ago. Doctoral training in the social sciences has provided new understandings of the human condition that inform our daily life and public policy. Scholarly work in the humanities has enabled us to better understand and appreciate cultural differences and dimensions of the moral and ethical nature of our human existence. Students travel from across the world to participate in an array of doctoral programs at U.S. public and private institutions. The one-hundred-year history of Ph.D. programs in this country is impressive, and there is much about doctoral education of which everyone can be very proud.

As in any success story, however, the accomplishments must always be under scrutiny. Although the axiom, “If it ain’t broke, don’t fix it,” may be appropriate in the case of some Ph.D. programs, significant revisions seem to be needed for others, and will require the efforts of many. We are convinced that we must respond to concerns about the degree and its purpose, and that it is imperative to address the question, “How can we re-envision the Ph.D. to meet the societal needs of the 21st Century?”

The Goal of This Study

The Ph.D. is the result of a loose but interdependent system of partnerships between a number of groups and belongs to no one sector or constituency. As Bob Weisbuch, President of the Woodrow Wilson National Fellowship Foundation, asserts,

“When it comes to doctoral education, nobody is in charge, and that may be the secret of its success. But laissez-faire is less than fair to students and to the social realms that graduate education can benefit. Re-envisioning isn’t about tearing down this successfully loose structure but about making it stronger, most particularly through asking it to see and understand itself.”

Doctoral education and its subsequent societal enrichment depend upon intricate partnerships. Each constituency or sector has an important role in this enterprise. To understand these roles the various constituencies play, and to uncover agreed-upon areas for change, we asked people from each sector about the concerns that they currently hold about the Ph.D. By mapping areas of overlap and agreement among the producers, the funding agencies, and those who hire graduates from Ph.D. programs, we began to see potential elements of an agenda for change. As one interviewee declared,

“This is a community problem. It is going to require input from federal agencies, input from industry, input from academia and from others who hire Ph.D.s. What we have not done is to sit at the same table and declare what the ground rules are going to be. Because, no one party can change effectively what we are trying to do.”

Thoyd Melton

We identified those parties or sectors as:

- Research-intensive institutions
- Teaching-intensive institutions (comprehensive and doctoral universities, liberal arts and community colleges)
- K-12 education
- Doctoral students
- Business and industry
- Government funding and hiring agencies
- Foundations
- Disciplinary societies
- Educational associations

Doctoral education is also affected by higher education governing boards who approve Ph.D. programs and relevant accrediting agencies. We conducted a few interviews in each of these groups and included their responses in the data, but the majority of what we report comes from the nine identified sectors.

The Process

The research team* carried out the “environmental scan” by conducting over three hundred interviews, five focus groups, six sets of email inquiries, and one mail survey. In addition, over four hundred articles and documents were collected to contextualize the project, and a selected number were abstracted. What follows in these pages is a

* Jody Nyquist conducted over 300 interviews. Bettina Woodford conducted 25. Together we reviewed thousands of pages of transcripts to bring meaning to the qualitative data. Amy Mickel, Research Assistant, conducted numerous email surveys and analyzed the results. Lola Estelle-Martin read, abstracted, and analyzed most of the over 400 documents we collected focusing on doctoral education since 1925. Joyce Raveling, Research Assistant, assisted for one quarter in that work, and Nancy Horkley, Research Assistant, helped enter data into a software program.

brief account of the interview, focus group and e-mail data, informed by the print materials that we reviewed. Each member of the research team contributed to an overall understanding of the information. This work differs from other qualitative studies, as it is an open-ended opinion study of what people who are obtaining, supervising, funding, and employing Ph.D.s think about the process and its outcomes. It is based upon an availability sample from within each of the identified sectors.

Most respondents were working toward or hold, a Ph.D.; other respondents were employed in similar positions as those holding the degree. (Represented organizations, corporations, agencies, and institutions are listed in the Appendix.) The interviewees bring a variety of experiences and expertise to bear on the issues, and many of their resumes reflect significant professional experience in multiple sectors. The implicit assumption has been that their opinions, convictions, and beliefs comprise important perspectives that need to be carefully represented in a discussion of possible changes in doctoral education. Whenever possible, we went to their offices or campuses to better understand their perspectives in their environments. In a few cases, we interviewed them by telephone. They suggested other individuals or groups we should contact, and we followed their leads. These visits and conversations made it easier to understand interviewees' networks, to involve more people in the national conversation, and to collect ideas and materials. In all cases, we tried to confirm ideas with those from others within the same sector and across other sectors, assessing the intensity and level of concern.

What We Learned

Unintended consequence. We began to recognize that what had occurred over time, an oversupply of Ph.D.s for academic positions, was an unintended consequence of responding to significant societal needs.

- Enrollment of greater numbers of undergraduates in a time of diminishing or stable resources (particularly in the public institutions) has resulted in the need for greater numbers of graduate students to teach or assist with the teaching of undergraduate courses and has in turn contributed to producing more Ph.D.s than positions available in academia.
- Society's thirst for scientific advancement, including large scale investment in labs, created a greater demand for research assistants and has resulted in an oversupply of scientists in some fields.
- Higher education's commitment to improvement has come to be based largely on the Carnegie Classification System and National Research Council rankings, which privilege the research model and drive a prestige economy resulting in an increase in Ph.D. programs across the country.

In addition, the success of these endeavors led to the valorization of research with the outcome that continued funding in many fields depends upon the quality of research rather than the quality of graduate training.

Regardless of the etiology, we are left with this less-than-desirable consequence of well-intentioned efforts. Ph.D.s who do not have academic positions have become a concern for many fields. This "crisis," originating in the humanities but now experienced in other disciplines, has proven to be a stimulus and an occasion for rethinking the Ph.D. in terms of eligibility, purpose, and training. And existing discussions reflect remarkably dissimilar views on these issues.

Conflicting views about doctoral education. Although we found general agreement that doctoral education successfully prepares graduates to conduct quality research, there is wide disagreement about whether conducting research is sufficient training for a Ph.D. Individuals within and outside the academy claim that doctoral education inadequately prepares students for the other responsibilities and aspects of their careers.

Specifically, some in higher education argue that an overemphasis on scholarly research leads to inadequate preparation of future faculty for responsibilities such as teaching, collegial evaluation, collective and individual curricular planning, and service to the college, university, and community. In addition, aspiring faculty need better preparation for using technology. Leaders in business and industry argue that Ph.D.s lack collaborative ways of thinking, intellectual and task related, that are required in today's working world, and claim that students' dissertations and research interests are often disconnected from other knowledge and real-world problems. Finally, interviewees report that the process of getting a Ph.D. can be unpleasant, even intolerable, for students, and that some of the best and brightest students are leaving doctoral programs for these reasons. Major differences of opinion about these issues exist among doctoral students, supervisors of doctoral students, agencies that fund doctoral students either directly or indirectly, and those who hire the graduates of our programs.

We had not anticipated the passion and strength of conviction represented in the interviews and surveys. Interviewees' personal experiences in obtaining their Ph.D.s provide the primary lens through which they assess doctoral education. Almost every interview with a Ph.D. included the phrase, "When I got my Ph.D. . . ." Doctoral education raises issues of identity, rightness, fairness, inclusiveness, rites of passage, and nuanced meanings of words such as specialized, rigor, depth, applied, practical, "work." The emotional as well as intellectual involvement in interviewee responses reminded us that doctoral education not only deals with the production of degree holders, but with a cultural belief system that shapes professional lives.

These differences of opinion range over a multitude of issues, but a distillation of some of the major areas of concern can be simplified into three sets of continua:

Purpose



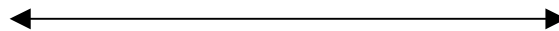
Ph.D. is a research certification.

Ph.D. requires broader professional preparation.

To prepare students as academics.

To prepare students for a variety of career options.

Enrollment



Ph.D. programs need to be very selective.

Ph.D. programs should admit all qualified applicants..

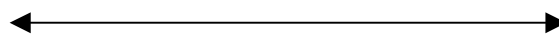
Need to decrease the number of Ph.D.s

Need to increase the number of Ph.D.s.

U.S. students should be privileged.

International students should be encouraged.

Training



Best preparation is the apprenticeship model.

Other types of mentoring are needed.

Funding practices work well.

Funding practices need to change

Current model attracts the "best and the brightest"

Current model discourages the "best and the brightest."

Interviewees revealed their individual positions along these dimensions, often strongly advocating their perspectives. In some cases, respondents held completely opposing views about an issue, even within the same sector. For instance, a university dean urged that doctoral education should include the kinds of professional skills and abilities sought by business and government, while another dean asserted that other sector's interests should have no bearing on the Ph.D.

Shared concerns about doctoral education. These differences of opinion notwithstanding, individuals expressed common concerns about several issues. Though from different vantage points, the concerns about which interviewees expressed overlapping agreement are:

- Shortening time to degree for the Ph.D.; determining its "essence"
- Developing more diversity among the recipients of Ph.D.s
- Increasing doctoral students' exposure to technology
- Preparing doctoral students for a wider variety of professional options
- Incorporating an understanding of the global economy and environment
- Making interdisciplinary work a more integral part of doctoral education

On the need for more interdisciplinary training, for example, those in business and industry reported wanting to hire Ph.D.s who can meaningfully connect their work to that of others. Those from primarily teaching institutions emphasized the urgent need to hire faculty who have been trained across disciplines in order to teach in contexts where curricula are not discipline-specific. Driven by the complexity of current research questions, those from research-intensive universities report a need for more multidisciplinary approaches.

This is the heart of what interviewees' responses reflect: general agreement that doctoral education needs to improve in the above ways. The following pages provide brief illustrative examples of what respondents from each sector report. Though each sector has its own vocabulary and way of framing the issues, we believe you will notice much agreement and commitment to change in the comments. From these examples, a picture emerges of similar calls for change from the interconnected segments of the broader community of doctoral education.

The conference on Re-envisioning the Ph.D. is a unique occasion for this community to come together, exchange opinions, strengthen agreements, and mutually establish an agenda for change. Each sector has an important role to play in transforming doctoral education and in developing a stronger community, one in which members can be more accountable to each other. Each sector needs to ask itself, "What is our contribution to changing doctoral education?" Sectors need to ask each other, "How can we collectively re-envision the Ph.D. to meet the societal needs of the 21st century?"

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CONCERNS IDENTIFIED BY RESEARCH-INTENSIVE UNIVERSITIES

Research-intensive universities set requirements for obtaining the Ph.D. They report that many factors contribute to their current challenges: lack of positions in academia, government funding, burgeoning undergraduate enrollments, definitions of achievement and excellence in the disciplines. The majority interviewed felt change is needed, but that research institutions are constrained by policies of granting agencies, by the teaching and research needs of the institution, by the expectations for bringing in external funding. Some members of this sector are emphatically opposed to any change in what they believe a Ph.D to be, citing the history of successful training of humanists, social scientists, and scientists. Others believe that changes are long overdue in several ways:

- The composition or “essence” of the Ph.D. needs to be defined. Some members of this sector believe that the Ph.D. is a selective, specialized degree with the singular focus of producing a creative, self-initiating, independent scholar and researcher for academia. Others believe that the degree should produce graduates who can consider an array of options in terms of careers and contribute to society in many ways outside the academy.

“Students come through the process not even knowing what transfiguration is occurring. All they know is that they are there to get a degree, to write a thesis, to get a couple of publications out. There’s a metamorphosis that occurs; and we need to think about that, whether you’re in English or whether you’re in science.”

“There is resistance to understanding that everyone who gets a Ph.D. isn’t going to be emulating the career of the mentor. What we as faculty need to do is be creative about allowing our students to see a broader range of life and career opportunities.”

“I think fundamentally the Ph.D. is a research degree, and the idea is to give people the foundations of the discipline and the opportunity to become engaged while they’re still students under the supervision of a mentor. I don’t care what industry people or government people would like to say about Ph.D.s; research is the essential heart of the Ph.D. And anything that undercuts that, I think, is doing damage to it.”

“We’ve never separated, as was done in most countries, research institutes and graduate schools. That’s been a great strength; but one of the fallouts is that no one has really clearly thought through the fact that, in my mind, the [doctoral] experience is somewhere between an educational experience and an employment of students to help the research enterprise. And it needs to be shifted much more, in my view, towards the education end of things.”

“We need to say very clearly to our faculty colleagues, and with all respect for what they do, that about one in ten of their students will end up leading a life quite like theirs, and the other nine won’t. And what about the other nine? They will either be at very different kinds of academic institutions, or in a world that is not strictly academic at all.”

“It is impossible to prepare students for the broad array of positions as is being advocated. There are too many, and we are not familiar with the possibilities. That is the hiring institution’s responsibility.”

Time to degree of Ph. D.s needs to be shortened. Most respondents agreed that, due to a variety of factors, time to degree is too long—that the essence of a Ph.D. could be accomplished in less time.

“I think there must be a breakthrough on time to degree, and I don’t think that is uniformly part of the way faculty members think and behave. There is too much narcissism and selfishness on the part of faculty mentors. We fool ourselves into believing that the best times in the lives of these students are when they are under our wing.”

“My main concern about graduate programs has very little to do with programmatic innovation; it really has to do with size and length of time to degree.”

“Limit the Ph.D. to three or four years of intensive study and research. This is more like the European system and more like other professional schools. Let a stronger masters precede the degree, with postdoctoral positions developing teaching, research and other skills. Such a system would at least limit some of the undesirable effects of earning a Ph.D.”

- The Ph.D. experience should include more interdisciplinary opportunities.

“I don’t mean that everyone should be doing an interdisciplinary Ph.D., but your Ph.D. work has to teach you how to work with other disciplines.”

“It’s really important to understand the relationship of your discipline to other disciplines. So many important problems are inter-disciplinary in their nature, and you’ll have to work on interdisciplinary teams.”

“I do think the dissertation has just gotten too narrow, too long and too specialized.”

- The pool of doctoral candidates is insufficiently diverse.

“The strategic vision to increase diversity in education must be maintained. If the academy is not assertive in making the case for graduate education to lots of constituencies, then those who self-select will be the only ones to go.”

- Providing greater access for undergraduates, particularly at public institutions, affects graduate admission and assignments.

“I would like to see funding for students in graduate education be such that it really would support the development of the students as opposed to getting the work of the department done.”

“If I could change one thing for the students we have here, it would be to de-couple this sense that they have to work for us. When I went to graduate school, we were seen as apprentices in training. We didn’t work for our major professors. We developed our own projects that gave us more time, more opportunities to fall on our faces. I really resent the fact that I am supported to bring in students who are essentially cheap labor for me.”

“The need for teaching assistants is a key determinant of graduate student enrollment.”

- The faculty member’s reputation and accompanying rewards are based on external funding and publication success. The “culture of prestige” affects doctoral students.

“If I have a NIH proposal, I have objectives that I have to meet, in terms of what the research goals are. If I have a student on that, I have to weigh what that student does in light of making sure that I get my objectives done. My career depends on that, and the student’s future depends upon that as well. The reward system that agencies have, they’re going to have to be at the table to understand that their monies are certainly needed, but they can play a bigger role in helping to change how we actually go about training students.”

“[Funding agency] program officers try to make their money go farther, so PIs have to get multiple grants to do the same things that 25 years ago, they could do with one grant. It would be better if the funding agency would say, ‘OK, here’s Professor X; I’m going to support his research program, because it’s good.’ And he won’t have to be constantly hustling and writing proposals.”

“The federal government has this odd kind of idea that when they pay ‘salary savings,’ these faculty are supposed to come out of the classroom and work for them. I can’t go out and hire the equivalent of a full professor who is an excellent teacher, wonderful researcher, mentor par excellence, for a temporary three-year time with his salary savings.”

“Departments are one of the structural impediments to any kind of deeper kinds of reform.”

“Now for us in the humanities, preparing graduate students for institutions other than research institutions, creates a real disconnect between what we’re doing and where we’re going to appear on the NRC rankings.”

- Furthering partnerships with business, industry, government, non-profits, and others will result not only in issues of intellectual property but also in a loss of control over determining what questions will be asked.

“Academic freedom, per say, in publicly funded science is a myth, because you clearly have no choice over what you will pursue.”

One respondent explained to us that, especially in the humanities, professors are wary of external funding that dictates their area of inquiry. They want control over their own questions.

CONCERNS IDENTIFIED BY COMPREHENSIVE AND DOCTORAL UNIVERSITIES, LIBERAL ARTS AND COMMUNITY COLLEGES

This sector represents a broad array of large and small, public and private institutions with differing missions. Faculty and administrators in these institutions report that, for the most part, graduate students are not encouraged to explore these environments, even though the placement numbers tell us that this is where the majority of those going into higher education will find employment. There are, of course, many success stories of faculty thriving in these environments, but the institutions still believe that better preparation should be provided. They believe the option ought to be presented and encouraged by advisors, instead of thought of as a second-class choice. Research-intensive universities need to create partnerships with other kinds of institutions in higher education to provide an opportunity for students to learn about expectations of faculty in those colleges and universities. Recommendations for re-envisioning doctoral education were expressed in various ways and at varying levels of intensity on a significant number of concerns:

- Graduates applying for positions have little knowledge about what it means to be a faculty member in these institutions. Respondents describe applicants as uninformed as to differences in institutional mission, shared governance responsibilities, tenure and promotion processes, and expectations for faculty performance.

“Graduate students need to understand the differences between institutions long before they are on the job market, when they are thinking about why they want a Ph.D. They need to visit us and see if they like it here, see if we fit their expectations for a professional career.”

“When the Preparing Future Faculty students visit us, they are often surprised that we are engaged in research—even though it may not be defined by large labs and outside funding. The pace is slower, and the work is with undergraduates, but all faculty have to both teach well and pursue some type of scholarly activity.”

- Lack of pedagogical training means that new faculty are not prepared to teach today’s students at these colleges and universities. The main preparation for new faculty has been teaching assistantships, so they are limited in their teaching repertoire by the nature of their particular assignment—usually in a discussion section or laboratory for a large lecture class, often without supervision or adequate mentoring.

“Our new faculty do not understand students for whom school comes after family and job. Sometimes, I don’t think they even like this type of student, but they [the students] represent our livelihood.”

“New faculty must have an understanding of how to motivate learners, assess learning, and use technology for instructional purposes.”

“New faculty have had little training in designing courses, developing curricula, and the more recent active learning pedagogies.”

- The individualism and specialization fostered in doctoral study does not prepare new faculty to work collaboratively as departmental or institutional citizens to develop departmental policy and curricula. Graduates have been socialized to believe that the most important element of faculty work is their own research.

“New faculty want time off from teaching so they can do their research, when we are a teaching institution!”

“Even though we attempt to be perfectly clear during the interview process about our priorities, new faculty try to change us because of the value system they have acquired during graduate study that puts research before anything else.”

“Specialization creates lack of breadth in content knowledge, so that beginning faculty are not prepared to teach a wide range of undergraduate courses at the lower division. Sometimes the specialization even creates a lack of depth in understanding needed for teaching upper division courses.”

“New faculty come out of ‘department worlds’ and are not prepared to work collaboratively with student affairs, librarians, and other groups to get their own goals accomplished.”

- The lack of diversity represented in doctoral graduates makes it increasingly difficult to hire underrepresented minorities as faculty, especially in science and engineering.
-
- Graduates demonstrate lack of interest in, understanding of, or commitment to outreach/service to the community—forms of service that are especially required by public and religiously-based colleges and universities.

“Our tenure depends in part on what we do to demonstrate that our college is part of the community, that it shares its concerns and provides expertise to serve others. ‘To serve others’ is a basic building block of the institution.”

- Graduates are lacking in understanding of professional ethics as they relate to both research and teaching.

“I guess they [the doctoral students] are supposed to pick this up by observing their advisors, but our new faculty do not report having had seminars or even discussions about ethics, except for human subjects stipulations, unless they are on a NIH grant where it is required.”

“This is a small community with close relationships with students. This requires that faculty be extremely prudent in their involvement with students. They also are accountable to the highest ethical standards for their approaches to testing, grading and other aspects of faculty work.”

CONCERNS IDENTIFIED BY K-12 EDUCATION

Historically, universities have not demonstrated responsibility or concern about K-12 education, outside of schools and colleges of education. Respondents in this sector point out that universities both employ and produce anthropologists, psychologists, linguists, scientists, and others whose expertise could assist K-12 to reinvent itself. The one focus group and limited interviewing we were able to conduct within this sector (given the busy schedules and other priorities of this group) helped us to understand their particular concerns about current Ph.D. programs.

- K-12 education should be of interest to everyone, not just colleges and schools of education.

One interviewee felt that K-12 and universities mutually need each other, but that their worlds unfortunately remain far apart. She asked, 'Why aren't they interested in K-12 [public education]? Do all their children go to private schools?'

"Today's schools are the disgrace of the nation. We need everyone's help. What are Ph.D. programs doing to help us?"

"We are hoping to become the best urban school district in the world. Are Ph.D.s going to help us do that or are they off in their own worlds, doing other things?"

- Faculty who offer Ph.D. programs in education are often not interested in the concerns of K-12 educators.

"How are these programs providing the leadership to help solve our problems?"

A respondent insisted that he did appreciate educational theory, because he realizes that it is needed to inform practice. He was, however, critical of the narrow focus of research.

- Ph.D. programs in education should be more closely linked to the study of the brain and learning that occurs in other disciplines, such as psychology and medicine. There is a need for more interdisciplinary collaborations.

One respondent reported that her Ph.D. committee was so inflexible that they not only discouraged her from taking courses outside the college, but they also would not count her courses in developmental psychology towards her degree when her degree was in curriculum and instruction.

- Those from public education most often seeking a Ph.D. are aspiring superintendents, for whom the degree is becoming an expectation. Many superintendents lament that the curricula in doctoral programs are often irrelevant for the work they will be doing after obtaining the degree.

In one case, a superintendent discussed the difficulty he faced in getting his dissertation committee to approve a topic he found most relevant to the pressing problems his school district was facing. Ultimately, his committee won and he quickly resigned himself to jumping through the hoops to get finished.

- Few doctoral programs recognize how the "wisdom of practice" can inform theory. As one foundation executive, who had an earlier career in K-12 administration, pointed out,

"Who better than a teacher of high school juniors and seniors to come to the campuses to inform TAs and faculty understanding of how freshman learn?"

- There is a cautious, sometimes skeptical, view of the ways higher education has recently reached out to K-12. A few respondents asked if this interest is driven by federal granting agencies' requirements, or by legislators, or if it is a genuine concern of universities.

- Doctoral programs should pay more attention to technology and explore more vigorously its potential applications in K-12 learning settings.

- Apart from schools of education, both for Ph.D. programs and in terms of hiring faculty, increasing diversity does not appear to be a priority.

CONCERNS IDENTIFIED BY DOCTORAL STUDENTS

Although doctoral students report much excitement related to learning and love of their chosen disciplines, those with whom we spoke expressed concerns about many aspects of the experience in which they invest a number of their prime years*. Many doctoral students are aware of their unmet training needs, but because of their status, often do not feel fully empowered to initiate the change that they deem necessary. Their comments reveal a desire for improved understanding of the workings of faculty life, the quality of faculty life, professional preparation for a variety of opportunities, mentoring (including better mentoring for teaching), funding practices, and the global context of knowledge.

- Many doctoral students reported unclear expectations of the academic career. The need to balance teaching and research responsibilities, and the different cultural expectations at different types of institutions, are especially unnerving. Their comments revealed that exposure to the wide range of faculty members' roles and responsibilities—committee work, service, teaching across disciplinary lines, faculty governance and institutional politics—often remains very much unaddressed in traditional TA and RA experiences.

"I never wanted to be an academic. [But] I'd love to be a professor. I want to hang around [this] university and teach." Two years into her doctoral program at a research university, this student was worried about "being [treated as] a second class citizen" because she realized her dedication to teaching was not valued.

"I would love to be a professor. Teaching one class a year or something like that would be perfect!"

"The longer I'm in the program, the more I know that teaching is not valued...it's only research, and it's not only here, but in the profession at large in academia. You don't get any mileage out of teaching."

"I sort of hoped the faculty would help you figure that stuff [the nature of faculty work] out. [As far as] learning how being a faculty member works, I feel like I know less [now]."

- Doctoral students reported feeling alarmed about the quality of faculty work life. They are initially attracted by the perceived autonomy and intellectual freedom of academe. After a few years of observing professors' lives in their programs, many students come to re-interpret that idea as "the freedom to work all the time." Comments about stress, isolation, and lack of time to connect with students, community projects or even family were common. Some students explained that their love for the academic environment and intellectual pursuits are eroded by the uncertainty of how big a sacrifice of personal life seems to be required for a scholarly career.
- What counts as professional preparation is too narrowly defined. Students pursue doctorates for a variety of reasons: for the love of the subject-matter, to do research, to teach, to obtain the credential to work at a certain level in industry or secondary education administration, or to figure it out along the way. These reasons are usually much more varied than the career paths their departmental cultures or professors are equipped to help them achieve. Doctoral students reported wanting more concrete exposure to varied options and multiple contexts in which to apply their hard-won knowledge and skills.

"You have all this interest now in non-academic careers, but you don't have people available who can provide that kind of experience or instruction. There's nobody I know who can help me do that, because [the faculty] have all grown up in the academy and been in the academy all their lives."

A fourth-year science student, who had successfully engaged in a government-funded, environmental policy research project related to his field, but not on his dissertation topic, reported feeling dismayed when his lab supervisor characterized the experience as a "diversion" from his doctoral work.

"The academic environment is still very insular. And our society is not insular, and people who are well prepared have a multitude of experiences and interaction with people in different sectors. And that's still not happening; it's still not there. And it's desperately needed."

"I wanted to add this, a 'too' list: Graduate school is too expensive, graduate school is too impersonal. It focuses people down a narrow path. It discourages social interaction. It doesn't provide the opportunity to connect in ways that are good multidisciplinary, it doesn't provide enough opportunities to fit into the global economy and global technology. It's the Ted Kaczynski at the back of his research lab kind of thing."

- Despite many engaging relationships between students and advisors, an overwhelming number of students reported that the lack of quality mentoring and support they expect to receive from faculty was disappointing. They stressed that mentoring needs to begin earlier, to be more systematic, to be based on a multiple-mentor model and to formally include teaching and curriculum concerns and career planning.

* Responses are drawn from interviews conducted with doctoral students representing eight disciplines for the longitudinal study called, "The development of graduate students as prospective teaching scholars" funded by The Spencer Foundation and The Pew Charitable Trusts, and from interviews conducted for the Re-envisioning the Ph.D. Project.

- A number of students wished their mentors were more explicit in providing concrete direction, performance feedback, and emotional support. Some felt very strongly that the vague information they receive about expectations, responsibilities, and job market realities is unethical.

“No mentoring at all. Zip. Zero. None.”

“There is no [other] authority, there is nobody that I can go to and ask any questions with any sense of feeling I can proceed [on the dissertation].”

“What [programs do] is rely on the strength, the strength of the individual to get through.”

“I feel like I have no [teaching] supervision!”

“The best mentoring I ever had is with my current advisor, who says that his job is to build his graduate students’ careers.”

- Funding threats to graduate education and the part time nature of graduate appointments, make doctoral students very sensitive to financial issues, particularly the low pay and status within the academic community. Interviewees stressed their desire for a system of employment that is fair, equitable, and reasonable for today’s market.

“And at the same time [legislators are] defunding you, so there’s a terrible contradiction built into what they’re saying, which is, ‘We want excellence in education, but we’re going to remove all your educators and give you part-timers who are under stress, underpaid, and can’t possibly work up to a certain level of excellence.”

“[Business people] don’t realize how hard we work. I work, and I’m a student, constantly. There’s not a day when I’m not working all day and into the night. And I make about \$10,000 a year. I don’t think many people in the business world really understand that. I think they think we just show up and read a poem and then go home and that’s the end of it, and wait for the paycheck.”

“The pay scale for sole instructors is belittling. What we have to do is create some fairness. In some departments people are sole instructors but [paid] as assistants and in others the TAs have one once a week 50-minute session for the same pay, the same rights, the same [letter of] recommendation.”

- Students desire more concrete ways to understand, and to situate, their education and training within the context of the global economy. Students indicated that they feel like they are missing out.

“When we interact with international [graduate] students, one of the things that strikes me is how much more cosmopolitan they are, how much more aware of what’s going on in the real world.”

“Doesn’t it make sense that the academy would be the one place where [globalism] was being addressed? And if the Ph.D. is not the place where people become more attuned to a global environment, where else is?”

CONCERNS IDENTIFIED BY GOVERNMENT AGENCIES

Government agencies fund, on a considerable scale, much of the basic science research and technological innovation that occurs in this country. Support of such efforts is accompanied by the expectation that the research will yield concrete benefits for society. Government agencies have a stake in doctoral education because of their funding of university research which provides support for graduate students.

- Representatives of government agencies report that traditional departmental “restrictions” and “parochial interests” persist in research intensive institutions and hinder production of the kind of Ph.D.s that they need. Ph.D.s are “undertrained” in clinical and applied sciences, and in cross-disciplinary interaction—both key to the development of “new formulations for the future,” new fields and new applications.

“At my agency we don’t have departmental restrictions the way a university might, so [we can] talk to the biophysicists and the physicists and the computer scientists and the biologists and so on.”

“Bringing [disciplines] together—a paradigm that I think any reasonable person would agree with.”

“And universities are quite capable of responding. I mean, the university is a wonderful institution, and it should be able to respond to needs, and government and the private sector have to contribute.”

- There is an overproduction of Ph.D.s if the underlying assumption is that the only worthy career for a Ph.D. is to be a professor in a research institution. Those we spoke with in government agencies hold that this is a narrow-minded assumption. They emphasize that multiple professional opportunities can be nurtured to meet society’s many needs.

“We need to deal with people [that institutions are] producing who are very important members of teams, who work in industry, who work in universities, who work in allied professions that may not be directly science. We need to work on the fact that they deserve the same prestige as people who go into independent research.”

“[There are] entirely new sets of careers open to [Ph.D.s] that require other kinds of skills than the traditional ones.”

“Our failure is not recognizing that the education of [doctoral students] needs to be a little more relevant to what they’re going to be doing, or what we think they’re going to be doing. Obviously, it’s a question of skating to where the puck is. And we can make miscalculations, but we’re going to be in trouble if we keep doing the same thing for year after year after year and don’t change direction.”

“The funding mechanisms are so fundamental to what drives graduate education, [not only] in economic terms, but psychological and social as well. People want some kind of security, so faculty are going to be doing the things that will get them tenure, which are not necessarily the things that are going to improve graduate education, the way the system is now.”

- Broader and more teaching experiences, internships, traineeships, and co-op experiences should be encouraged so that students will not be so dependent on their advisors’ money for research assistantships, thereby gaining more control over the opportunities.

“It breaks up the campus, campus, campus life, campus, campus life, campus, campus, campus life, campus, campus. I think that’s a good thing.”

- Sharing information is critical. Only collaborations between industry, government and academia can make this happen. It needs to be made public immediately, and free of charge, so no one person owns it and everyone can all use it. Many individual institutions and industries, however, still think too parochially to accept this.
- Outreach and science education are critical. Government, as an employer, is concerned about the quality of the next generation of scientists. Because science advances so rapidly, collaborations with K-12 need to be strong, to develop curricula for new knowledge and emerging fields, and to develop teachers, many of whom are not comfortable doing science.
- There need to be more minority scientists.

“If institutions, government, and industry do not engage students in science at critical stages of their academic development, to hopefully encourage them into research careers, science will lose many great minds to other majors and occupations.”

- Teaching is undervalued in doctoral education, and newly hired professors aren’t as prepared as they could be to teach the next generation of scientists.

“[Preparing institutions] need to better integrate research and teaching [in the doctoral experience] to use the system to maximize educational opportunities.”

“Hiring institutions ought to treat new hires the way they treat incoming students. So some universities [would say], ‘You don’t appear to have had any real classroom experience. Well, fortunately for you, we’re going to hire you to come on July 1, because we have our three-month intensive Learn the Classroom Program.’ Is this rocket science?”

- There is not enough research support provided to other kinds of higher education institutions to enable science teachers to maintain a foot in the laboratory.

“I think it would be a good idea to take those liberal arts colleges and particularly in the sciences, make sure that the faculty has some research support. It doesn’t have to be grandiose. If you opened up 20,000 jobs in liberal arts colleges, you would have the best post-docs in droves looking for those positions.”

- The post-doc period is being dragged out way too long, which many view as “abusive.”

“[Universities] want to be competitive for research, but they don’t allow people to have positions in order to apply for research dollars. Do you see a little problem here?”

“What they’re saying is, ‘No, we won’t give you a real job, but you could work if you want a post-doc.’ My problem is, is this a problem that the government should solve? And I am very wary of government reaching in and solving these problems because a lot of what works in one institution won’t work in another.”

- Graduate students need to be seen as the lifeblood of graduate education, not of an individual professor’s research agenda or of a department’s instructional needs.

“We see [graduate students] as the sauce on the wonderful roast.... They are the most exciting part of any training institution.”

“But, many universities depend [too much] on graduate students, and that creates a problem because the only reason to have the graduate students there is because they’re a pair of hands, and that’s not a good reason to have graduate students.”

CONCERNS IDENTIFIED BY BUSINESS AND INDUSTRY

Those surveyed and interviewed from business and industry were enthusiastic about their own environments as employment possibilities for Ph.D.s. They were supportive of Ph.D. programs, as business and industry are dependent upon universities to educate the next generation of their workforce. They stressed that their perspectives, in their roles as employers of Ph.D.s, were not suggesting that doctoral training be specific to particular jobs. They believe that:

- Mentors' visions for doctoral students are too narrow. Too often, mentors privilege only one outcome for students—to be like them—when there are many possible careers beyond academia.

"In my ideal world, a Ph.D. educational program would be more neutral in where it's trying to direct people, do more in qualifying them to be competitive for whatever alternative they might choose."

"Ph.D. training in the sciences and engineering has had the perverse effect of putting blinders on people in terms of their career aspirations. What they know is how to formulate problems, and solve them from a very fundamental perspective. They have, or should have, obtained a kind of powerful intellectual armamentarium that they should be able to use in many fields. But they think they are failures if they move out of academia or into some other intellectual endeavor. There isn't any other factor that even comes close to the perverse effect that the faculty culture has."

"Universities need to make certain that their graduate students and post-docs hear from individuals that not only are professors at universities, but also have had a variety of different career paths in industry."

"It's just mind-blowing how open this industry is to absorbing and reshaping people. And it isn't even that big of a reshape. It's taking what people have developed, a sense of curiosity, a sense of adventure, and just focusing it on the problem at hand."

"It's a narrowness of attitude that's a bothersome thing."

- Doctoral work should be focused, but not disconnected from other aspects of a discipline or across disciplines. Graduate students need to be able to make connections to the world outside of academia.

"When you hire them, you don't want them to drill in the same hole, [or just] drill deeper. You want them to be able to decide where to drill next, to do it again. To use their breadth to understand where it is that they ought to be looking to solve the next important problem, using the skills they demonstrated [before], but not duplicating exactly what they did."

"I think you develop vision by climbing hills or climbing mountains, so you actually recognize there's much more to see than you've been looking at. One of the problems with deep, intense education, is that it can end up confining. Anyone who has read broadly realizes that you can pull a concept out of some seemingly unrelated place and by putting a nuance on it, enrich what you are trying to do. You need an intellectual diversity, a more robust perspective on what you're doing."

"I had become so specialized in what I was doing. I realized there was enormous potential in bringing [other] disciplines into the questions I was asking. In an academic environment, I didn't have access to those people. Coming to a pharmaceutical industry, I was able to create the multi-disciplinary teams that I was really yearning for to increase and expand my knowledge base."

"The sin is that people get the impression that going narrow and deep is the essence of it, but the essence of [the Ph.D.] is really trying to be critical and original and to do things on your own. We need people that are intellectually adventurous."

"We would never make a plea for the fact that somehow the substance or specialty of a Ph.D. should be diminished. It is a call simply for some stimulus for students to contextualize their work, so that they are more adept at connecting it to the real world where they are obliged to operate in an environment other than the academy. There they can indulge this disconnectedness to their heart's content. But there's no place else in the world that they can. So the rest of us are saying, 'Well, it's no help if you can't connect.'"

"I think faculty should encourage their students to visit other departments to find the connections [to other disciplines] in their work."

- Students and faculty should spend some time in industry settings.

"Summer or other internships should be required of students so they can assess other professional opportunities for themselves. To give them a cultural change—to give them the opportunity to learn the cultures and the language."

“I’d like to see faculty more interested in working for three months in industry. Nearly two thirds of Ph.D.s in chemistry go into industry, and yet academicians, by and large, have very little idea of what it takes to succeed in industry and exactly what goes on.”

“Further time in industry, if it is leading edge, also provides students with exposure to the latest technology that they might not have on their campuses.”

- Doctoral students need further preparation in communication, group process and decision making, and team work.

“Your performance is going to be in two areas: one, what you do that’s attributable to you, and two, what you do as a member of your work group, for the group.”

“Beyond technical competency, you need idea leadership and the ability to get a group organized to work together, to get technical results. You may be the idea leader, but you also have to organize and coach the other people so that they’re working together. If someone hasn’t done all of this and made an impact by the end of a year, people will begin to question whether we made a good decision in our hiring.”

- Doctoral students need to be more diverse. We need more diversity in the workplace.

“And if you look, I will tell you, in terms of our recruiting, particularly in chemistry and mathematics, all of the Ph.D.s that we’re recruiting are of Asian background, [or come from] India, or China. And you can see that trend when you go and visit the schools, that that’s who’s going to graduate school to get their Ph.D.s.”

- Doctoral students need to acquire a more global perspective.

One respondent emphasized to us that we are operating in a global society—most of today’s business is international. Students become too narrowly focused in “their work,” that which has been accomplished in this country. “Don’t they know there is a whole world out there?”

CONCERNS IDENTIFIED BY FOUNDATIONS

A foundation's funding agenda reflects the types of initiatives it considers likely to yield a successful return on investment, in both social and educational terms. Unlike most Ph.D.s in business, industry and government, many foundation officers and executives have had long careers as professors and administrators in major universities; they bring this professional and personal experience to bear on decisions about funding. The concerns below were extracted or paraphrased from conversations with program officers, directors of programs, vice presidents and presidents.

- Many strides have been made to increase the number of minority students in doctoral education. Foundations should not only continue these efforts, but do even more to decrease the sense of isolation many minority students experience through more systematic mentoring and networking strategies. This would aid completion rates and placements into better faculty positions.

"You have a conjunction of two things. One is relative isolation within the departments [and] the other is the fact that a number of minorities come from poor families where they're the first ones going into the academy. So, the overall contours of the academic profession and the academic culture are conflicted [for them]."

One foundation interviewee described the placement problem in terms of "the glass ceiling" that minority students face. She found that some prestigious institutions were enthusiastic about hiring her program's minorities as post-docs, but not to hire them into tenure-track positions. She described this problem as an "unintended consequence" of the foundation's funding, and she is concerned about how to solve it.

Another respondent attributed the lack of minority faculty to the decentralized structure of universities, in which faculty do most of the hiring directly; they are used to hiring people just like themselves. The institutions that are most successful at recruiting minority faculty are those where the commitment of Presidents and high level administrators' is strong, public, and active.

- The narrow scope and length of many Ph.D. programs need to be addressed. The culture of prestige that persists in doctoral education is such that many Ph.D. programs continue to struggle to become flexible enough to meet the demands of a changing world. Rigid or antiquated structures and disciplinary insularity impede change.

"We're not doing a good job of understanding how the academic world is changing [and the] mismatch between supply and demand. Not only in what kind of training we're giving, but [in the] kind of socialization [that is] taking place."

"Overall, the professionalization of academia and mainly of research has created a niche and legitimacy of its own which, by and large, is good. But it has some costs. One of the costs we are paying for the professionalization of research [is that] it is very difficult for us to get rid of some of the limitations we have built into the system."

"Why don't we have Ph.D. degrees Type A and Type B? Why should they all be the same? They're not, in fact the same. The problem is, what is [the Ph.D.] really good for? Recognition. And we are using the same label to hide differences because we want the social prestige."

"It's a system that finances graduate education substantially, via employment as research assistants or teaching assistants. So the main drivers are the need for [them] in the institutions. There are other drivers as well, but they're more like floors than drivers. If you only have five graduate students, why have a department of X? So there's a floor they need as a kind of imperative for survival. But beyond that, the drivers are the flow of funds. That's not a system that has any necessary connections to the demand for Ph.D.s"

The term "interdisciplinary," one respondent said, is already outdated. Interdisciplinary work is not systematic or programmatic enough. The complexity of today's social, political, and scientific problems require that "multi-disciplinary" work be the standard, not merely an add-on to the doctoral student experience.

To reduce time to degree, an interviewee argued that two years should be cut from doctoral study. She remarked that presently it is the students who are penalized for time-to-degree excesses, but that if the tables were turned and advisors were penalized monetarily, these excesses would diminish.

The same interviewee further argued that dissertations need to be more flexible in structure and shorter. After a certain length, she believes, they become "too uninteresting," less intelligible, and less useful. She also called for more grants for dissertation completion because, she found, it is at the dissertation stage that funding has "the most bang for the buck."

- Lack of attention paid to how Ph.D.s can really expect to use their degrees contributes, unintentionally, to a mismanagement of human capital. The professional preparation of doctoral students needs to value teaching experiences, as well as to create stronger bridges to connect doctoral level knowledge and skills to the contexts of need, both within and outside of higher education.

“Even when there’s a more concerted effort to look at the training [of doctoral students], very few programs are really up-to-date on the art of teaching involved as part and parcel of the discipline.”

“I want there to be an amateur pedagogy expert in every darn classroom in any college or university in the country, and so creating a small number of a separate class doesn’t appeal to me. Asking everybody to think about the implications of their scholarship in terms of pedagogy, to me, that’s the scholarship of pedagogy, that’s where the thing comes together.”

“People of thought and people of action must travel together, need to be in constant commerce with each other, or both will suffer. And that’s what our graduate education has to head toward.”

Academe, business and government, a respondent explained, are all responsible for improving the Ph.D.: business for providing up front the funds to develop more internships, including broader conceptions of professional development than just research, and academe for making the curriculum flexible enough to recognize that kind of experience.

“Non-profits, corporations, foundations, educational administration. Right within the university you could give people a taste of these experiences. The goal, by the way, in all of this, is not to make sure that poor graduate students get jobs upon graduation. We just think there’s a terrible waste of talent going on, and that it’s a cultural sadness.”

- Faculty involvement is key to new conceptualizations of doctoral education. The present faculty promotion and reward structure, however, constrains professors’ ability to make significant moves toward change and still keep their jobs.

“The ‘researchization’ of higher education rewards only research, research, research.”

“Faculty who want to teach are pushed to write when they have nothing to say; faculty who want to do research are pushed to teach when they don’t want to be near students. The bottom line is we need more diverse ways to count success.”

Faculty are so focused in their work, a respondent lamented, that they cannot “raise their heads to look around.” The incentives of the reward structure should be more flexible. For example, faculty could take sabbaticals in different environments, such as business or non-profits, but the current reward structure penalizes them for spending their time this way. Younger faculty, she stressed, are key to changing the reward structure.

- Foundations are also concerned about the process of change itself.

“The Hippocratic oath should apply to this kind of adjustment of an unstable system that’s out of equilibrium, that is, above all, you don’t want to do harm. You wouldn’t want to throw out the current system sort of root and branch and come up with a new one, because you wouldn’t know if it would be as good. I think it’s better to have evolution than revolution, I would look for changes at the margin, incremental changes that over time would change the incentive structures that currently have trapped PIs.”

“I still can’t escape the sense that the operating assumption is that graduate education is broken and has to be replaced. Certainly a lot has to be reviewed and some has to be adjusted as a function of discipline, but I for one wouldn’t touch the existing structure without testing alternatives within that structure first, or without setting up an entirely new institution based on a different model. Anyone want to invest half a billion dollars?”

CONCERNS IDENTIFIED BY DISCIPLINARY SOCIETIES AND EDUCATIONAL ASSOCIATIONS

Those interviewed in this sector report that their role is to respond to members' needs. Based on membership interest, associations and societies provide opportunities for scholarly exchange and publication, and other activities as requested. Officers and professional staff feel that more attention must be given to graduate student preparation, to teaching by aspiring and current faculty, and to participation from persons outside of academia. Concerns from this sector are expressed as follows:

- Disciplines vary enormously in terms of doctoral student experiences, the expectations of students, sequence of experiences, potential placement of students and time-to-degree concerns. What is considered the norm in some disciplines would be considered extremely unusual in others. Such disciplinary differences must be considered when identifying changes that would affect expectations for a Ph.D. Issues such as degree requirements are part of discipline and departmental culture that define appropriate experiences for doctoral students.

“Not only can we learn from one another, but if we’re going to change the culture of the academy, it has to come from all different perspectives or directions. The disciplines have to be involved because the change has to be a change in the culture, and the culture is going to be made up of the faculty, and they have to buy in. That’s where the disciplinary associations come in.”

“The Ph.D. means lots of different things. What I would like to see is the documentation of how much diversity there really is, and statements on different models that are effective.”

“I think, actually, they’d have shorter [time to degree for] Ph.D.s if students were much more aware early on of the options for what they might do. If you think the only hope is academia, you stay on and on and on till you get the most out of your Ph.D.”

- Disciplinary associations privilege research, the presentation of papers and networking at national and international meetings, publications and journals. Disciplinary conferences are organized around the research activity of the membership.
- More attention must be given to graduate student preparation and to teaching by aspiring and current faculty.

“There is no question that [in our] association, the thrust of every conversation between our professional division and our teaching division is how the graduate departments can think more broadly about educational opportunities for their Ph.D. candidates.”

“I think there is plenty of time in a five year graduate program for something besides just being in a lab. It doesn’t mean you’re spending half your time out of the lab, but we’re talking about ten percent of your time doing something else, and that is not going to make a real difference. In fact, I feel that the graduate students here on campus who’ve spent four hours a week in public school volunteering, get energy from it that they then use in their work in the labs.”

- The culture of research universities is strong and dominates the agenda and programs of many associations and societies. Many suggest that they would benefit from more involvement by “practitioners” and those from outside academia. In the sciences, unlike the humanities and social sciences, more association meeting participants come from business and industry.

“We don’t explicitly exclude, but we have less of a history and therefore have not been successful in fully having represented in our society, for example, Ph.D. scientists in industry, or scattered wherever they may be, in law offices or Wall Street, or whatever. We welcome such people. But since we don’t have a tradition of having them amply represented, they’re not members and particularly leaders in our society in proportion to their existence in the Ph.D. population.”

“The response of some disciplines is to try and exercise what I call academic birth control, or doctoral birth control. It can’t be done. The engineering schools went through decades of trying to tailor supply and demand and of course you can’t predict demand. What we’ve said is that education isn’t really that important unless it’s funneled into this narrow and historically kind of bizarre niche, of being a university faculty member as we have known them throughout our careers. What would happen if, instead, we invested in expanding doctoral students’ horizons about what they can do?”

Associations have launched many new teaching-related projects, including workshops, special interest sessions and roundtables, and report limited, but slowly increasing interest from their membership. On behalf of, and related to, the interests of their membership, they pursue outreach projects to K-12, including task forces, standards development, and partnerships with NSF. Organizers of national conferences offer workshops on topics ranging from teaching writing in the sciences to the use of instructional technology in the classroom, but also experience uneven attendance at these events.

“If you could get the associations to adopt a fairly different idea of what the Ph.D. is, yes, that could do something. But by and large, when you go to a disciplinary meeting, the session on [the future of] the Ph.D. is at 7 a.m. in the morning, on the last day of the conference.”

“Graduate schools, as a result of their research-focused selection process, tend to recruit students who can’t teach well, and sometimes would rather not teach at all. Those who do want to teach have it socialized out of them in a culture where becoming anything but a researcher is a failure.”

“Faculty respond [to student organizations] in a way that they don’t respond to individual students. And I think faculty has been very responsive to the request by postdocs for various kinds of experience. So I think the first thing to do to change the environment is to encourage web-based connections to other postdoc and graduate student organizations to enable them to be effective in changing the mindset of the faculty, who will just continue on the same track; they are busy, and they are living in another world. One of the things students should be asking for, in addition to seminars by people who are professors, are people who are out in industry, people who are out in government, people who are out teaching.”

APPENDIX

We are grateful to representatives from the following organizations, corporations, agencies and institutions for taking the time to share with us perspectives on doctoral education:

- American Anthropological Association
- American Association for Higher Education
- American Association of Colleges of Nursing
- American Chemical Society
- American Council of Learned Societies
- American Council on Education
- American Historical Association
- American Institute of Biological Sciences
- American Institute of Chemical Engineers
- American Institute of Physics
- American Mathematical Society
- American Philosophical Association
- American Political Science Association
- American Psychological Association
- American Society for Cell Biology
- American Society for Microbiology
- American Society of Mechanical Engineers
- American Sociological Association
- American University
- Antioch University
- Arizona Board of Regents
- Associated New American Colleges
- Association of American Colleges and Universities
- Association of American Geographers
- Association of American Universities
- Bates College
- Battelle
- Bell Labs
- Borough of Manhattan Community College
- Bowling Green State University
- Bristol-Meyers Squibb
- Cabrillo College
- California Institute of Technology
- California State University, Fullerton
- California State University, Hayward
- Carnegie Corporation of New York
- Center for Hellenistic Studies
- Chevron
- City University of New York
- Claremont Graduate University
- Columbia University
- Commission on Professionals in Science and Technology
- Council of Colleges of Arts and Sciences
- Council of Graduate Schools
- Council of Higher Education Accreditation
- D. E. Shaw & Co.
- David and Lucile Packard Foundation
- Duke University
- DuPont Pharmaceuticals
- Eastern Washington University
- Ecological Society of America
- Educational Testing Service
- Elon College
- Environmental Protection Agency
- Exponent
- Exponent Failure Analysis Associates
- General Electric
- General Motors
- George Mason University
- Georgetown University
- Graduate Management Admission Council
- Harvard University
- Hewlett Foundation
- Hewlett-Packard
- Higher Education Programs, U.S. Dept of Agriculture
- Highline Community College
- Hoffman-La Roche Inc.
- Howard University
- IBM
- IBM Pacific Development
- ICOS Corporation
- Indiana University

- Indiana University-Purdue University, Indianapolis
- Industrial Research Institute
- Industry Roundtable, University of Alabama-Birmingham
- Institute for Advanced Study
- Institute for K-12 Leadership, University of Washington
- Institute for Systems Biology
- Intel Corporation
- International Institute for Aerospace Survey and Earth Sciences
- International Institute for Aerospace Survey and Earth Sciences, Environmental Protection Agency
- Intuit Web-based Financial Products
- Iona College
- Kellogg Company
- Kent State University
- KPMG Foundation
- Lawrence Livermore National Laboratory
- Library of Congress
- Linguistic Society of America
- Lucent Technologies
- Menlo College, University of Michigan
- Merck Research Laboratories
- Miami University
- Michigan State University
- Microsoft Research
- MIT
- Modern Language Association
- Modern Language Association Graduate Student Caucus
- National Academy of Sciences
- National Aeronautical and Space Administration
- National Association of Graduate and Professional Students
- National Association of State Universities and Land Grant Colleges
- National Black Graduate Student Association, Inc.
- National Communication Association
- National Health and Environmental Effects Research Laboratory
- National Institute for Science Education
- National Institute of Standards and Technology
- National Institutes of Health
- National Intelligence Council
- National Research Council
- National Science Foundation
- New York University
- North Carolina State University-Raleigh
- Ohio Board of Regents
- Pew Health Professional Commission
- Pfizer
- Preparing Future Faculty Project
- Princeton University
- Procter & Gamble
- Professional and Organizational Development Network in Higher Education
- Ramapo College, New Jersey
- RAND Graduate School
- Research Triangle Institute
- Rohm and Haas Research Laboratories
- San Diego State University
- Schering-Plough Research Institute
- Seattle Public Schools Board
- Seattle University
- Shaw University
- SmithKline Beecham
- Social Sciences and Humanities Research Council of Canada
- Society for Industrial and Applied Mathematics
- Southern Regional Educational Board Doctoral Scholars Program
- Stanford University
- State Higher Education Executive Officers
- State of Washington, Office of the Superintendent of Public Instruction
- Technical University of British Columbia
- The Alfred P. Sloan Foundation
- The Camille and Henry Dreyfus Foundation, Inc.
- The Carnegie Foundation for the Advancement of Teaching
- The Chronicle of Higher Education
- The Education Trust
- The Ford Foundation
- The Gates Foundation
- The John D. & Catherine T. MacArthur Foundation
- The Kellogg Foundation
- The Mellon Foundation
- The Pew Charitable Trusts
- The Spencer Foundation

- The Woodrow Wilson National Fellowship Foundation
- U. S. Senate
- U.S. Department of Education
- U.S. Department of Agriculture
- U.S. Department of Energy
- University of Alabama-Birmingham
- University of British Columbia
- University of California, Berkeley
- University of California, Los Angeles
- University of California, San Diego
- University of California, San Francisco
- University of California, Santa Barbara
- University of Cincinnati
- University of Kentucky
- University of Massachusetts, Amherst
- University of Michigan
- University of Missouri, St. Louis
- University of North Carolina-Chapel Hill
- University of Pennsylvania
- University of Puget Sound
- University of Texas, Austin
- University of Toledo
- University of Virginia
- University of Washington
- University of Wisconsin – Madison
- Virginia Tech, Falls Church
- Walden University
- Washington State University
- Washington University
- WestEd
- Western Association of Schools and Colleges
- Western Interstate Commission for Higher Education
- Weyerhaeuser Company
- White House Initiative on Educational Excellence for Hispanic Americans
- Yale University

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