8. The “scholarship of teaching and learning” may no longer need a special note; it has been a growing part of the higher education landscape for more than a decade now—the locus of a number of national initiatives, an animating agenda on hundreds of campuses, a topic on the program of many disciplinary and education conferences, a new thrust for a number of journals, and the theme of a long list of publications. In The Advancement of Learning: Building the Teaching Commons, Mary Taylor Huber and Pat Hutchings argue that “the scholarship of teaching and learning entails basic but important principles that can and should be in every professor’s repertoire. It means viewing the work of the classroom as a site for inquiry, asking and answering questions about students’ learning in ways that can improve one’s own classroom and also advance the larger profession of teaching” (Huber and Hutchings, 2005, p. 1).

9. This formulation may recall the “vision of the research university of the twentieth century” as a “sheltered grove in which knowledge is propagated, created and applied” (Atkinson and Tuzin, 1992, p. 23).

10. The Integrative Graduate Education and Research Traineeship (IGERT) program was initiated in 1997 to establish innovative new models for graduate education and collaborative research that transcend traditional disciplinary boundaries. The Graduate Teaching Fellows in K–12 Education (GK–12) program funds graduate students in science, technology, engineering, and math (STEM) fields to work with teachers in K–12 schools. Both of those programs are NSF-wide and cross several directorates. The Division of Mathematical Sciences sponsored the Vertical Integration of Research and Education in the Mathematical Sciences (VIGRE) program from 1998–2002, aimed at “the development of a community of researchers and scholars in which there’s interaction among all the members” (National Science Foundation, 1997, p. 1). Mathematics departments that received multi-year VIGRE grants were expected to “vertically integrate” their graduate traineeship program, an undergraduate research experience program, and a post-doctoral program.

---

SETTING THE STAGE FOR CHANGE

The genius of American graduate education is that no one is in charge.

—Kenneth Prewitt

THE UNITED STATES IS A NEWCOMER ON THE DOCTORAL EDUCATION SCENE, relative to its European forebears, but its rise to international prominence has been meteoric. The first doctorate in the United States was awarded in 1861, and by 1900 a total of about 3,500 doctorates had been granted. At the start of the twentieth century, about 300 PhD’s were awarded each year; by 1960 annual production exceeded 10,000. Now, as the twenty-first century begins, more than 40,000 doctoral degrees are awarded each year, adding to the more than 1.36 million doctorates granted by U.S. universities during the twentieth century. The scope and scale of the enterprise has grown along other dimensions too. The number of universities granting doctorates swelled from forty-four in 1920 to over 400 today (see Table 2.1). New fields emerged, as well, many of them in recent decades. Along the way, the profile of the student body has changed dramatically, becoming more diverse in many ways, including by national origin. Whereas Americans once went to Europe for the doctoral degree, students now come from around the globe to study here.

This tale of continuous expansion, innovation, and diversification is one without an author. No one, as this chapter’s epigraph observes, “is in charge.” By almost any measure, it is a tale of success—and a typically American one at that, as early educational leaders both borrowed and departed from European models to fashion a new type of institution.
suited to the evolving needs of a young nation. Today, the U.S. model of graduate education is admired around the world. But this prominence comes with a shadow side. As the reputation of American universities has climbed over the last fifty years, successful practices have become deeply ingrained traditions, and, just as fish take water for granted, those inside the system find it hard to see those traditions and practices clearly; they are taken for granted, invisible, rarely interrogated. This is true, certainly, of the most visible elements of PhD programs: the qualifying or comprehensive examinations, the dissertation, and other requirements that have taken shape in the various disciplines and interdisciplines that constitute doctoral education today. It is also true of the less visible features of the enterprise: the valuing of specialization over broader kinds of formation, the way research and teaching are segregated and often set in opposition to each other, the atomized habits of faculty life that work against community, and the patterns of faculty-student interaction (the apprenticeship tradition) that shape scholarly formation. To think creatively about the future of graduate education, it is useful, then, to look back, remember how today’s realities came to be, reflect on the rhythms of change (and stasis), and draw from these, as we have tried to do, key principles for moving doctoral education into the future.

**A Short History of Doctoral Education in America**

Relative to undergraduate education, the history of graduate education has received little scholarly attention, but many readers will know of its German origins. In the 1800s American college graduates desiring advanced training traveled to Europe to get it; most chose to study in Germany. By one estimate some 10,000 Americans took German degrees during the nineteenth century (Berelson, 1960, p. 11). Not surprisingly, when graduate education took root in the United States—and there were several failed efforts to establish graduate study here—many features of the German model prevailed. Two notable characteristics were the emphasis on scientific inquiry and the expectation that faculty members would carry out research. The first PhDs—three of them—were granted by Yale in 1861, but the American model really gathered force when Johns Hopkins University opened in 1876. It pioneered research-oriented PhD degrees in the arts and sciences, and supported students with fellowships (Rudolph, 1962).

The climb to eminence over the next century and a quarter is a remarkable tale, to which we can hardly do justice here. But understanding the story of American graduate education allows us to consider how the current state of affairs developed and how further evolution can be fostered. This is a story of contradictions. On the one hand, growth and innovation are obvious hallmarks; indeed these are features that other countries seek to emulate. On the other hand, as colleges and universities have matured, they have developed traditions and administrative structures that may make current realities seem unalterable. Before we describe our theory of changing doctoral education, we tell an abbreviated history of American doctoral education as it grew and changed through four stages. The reader will see recurring tensions about the purpose of doctoral education, a theme we return to in Chapter Three.

**Stage One: Establishment**

What we now recognize as the American model of doctoral education emerged in the period from the 1880s to the 1930s. From the very beginning the enterprise was diverse and decentralized—a grafted hybrid of an undergraduate college (the English roots) and the graduate college (the German roots), with the same faculty teaching both groups of students. Because efforts to establish a single national university never got off the ground, this structure found a home on more and more campuses (Storr, 1973). And financially, especially in this stage, the graduate college was largely dependent on the undergraduate college—tuition and endowment funded the faculty, and teaching assistantships funded many of the students (Geiger, 1986, p. 219; Katz and Hartnett, 1976, p. 9).

Requirements for doctoral study were set by each university’s “graduate faculty” (a subset of each campus’s professoriate), under the leadership of a graduate dean who lacked budgetary or appointment power (Berelson, 1960, pp. 10–11). After completing an undergraduate degree, the
prospective student applied for admission and entered a community devoted to research and scholarship; participated in graduate seminars (a format developed for graduate education) as well as more informal, individualized teaching arrangements; passed examinations in two foreign languages (usually French and German) as well as a comprehensive examination (which many students failed); and concluded his studies by submitting a written thesis for approval by a committee of faculty members. Upon receipt of the degree, PhD holders entered an academic career. In these early years, students completed doctoral study in about two years (Harvard University, n.d.; Mayhew and Ford, 1974, pp. 5–6; Rudolph, 1962, chaps. 13 and 16). Thus began the cycle of professional preparation we take for granted today, in which promising students are nurtured by faculty and then become faculty themselves, committed to bringing up the next generation (Thelin, 2004).

It was during the early decades of the century that disciplines, as separately delineated interest areas, and academic departments, as structures within the university, took hold. Fields of study proliferated, especially in the new scientific and applied disciplines. By 1905, fifteen learned societies and numerous scholarly journals had been established. The shift from scholar as polymath, able to range freely among fields and areas of interest, to scholar as specialist was well underway. In parallel, authority about matters of disciplinary expertise (curriculum and hiring) shifted from the president to departments (Geiger, 1986, pp. 16–40; Rudolph, 1962; Storr, 1973, p. 50).

Even in the midst of this initial burst of growth and invention, concerns about quality were never far from the surface. In February 1900, the presidents of fourteen universities came together to form the Association of American Universities (AAU) to consider “matters of common interest relating to graduate study” (Speicher, n.d.). In particular, they sought to address issues of quality and prestige. As historian Roger Geiger tells it, “The creation of the AAU was a declaration by the leading American universities of independence and equality with regard to European universities as well as an endeavor to guarantee the value of their product against ‘cheaper’ foreign and domestic competition” (1986, p. 19).

Questions of purpose were front and center during this establishment phase. For one, college faculty often resisted efforts to expand into graduate study, fearing a dilution of attention and resources. Harvard’s president Charles Eliot responded to critics of the proposed Graduate Department: “It will strengthen the College. As long as the main duty of the faculty is to teach boys, professors need never pursue their subjects beyond a certain point. With graduate students to teach, they will regard their subjects as infinite, and will keep up that constant investigation which is so necessary for the best teaching” (Harvard University, n.d.). For another, the appropriate balance between research and teaching in university faculty life arose almost immediately. At the 1906 AAU meeting an entire session was devoted to the question “To what extent should the university investigator be relieved from teaching?” (Association of American Universities, 1906).

During the 1920s and 1930s the early sprouts became stronger seedlings. By the end of this era there were nearly 100 doctoral-granting institutions, and the AAU had grown to thirty-one members, two of them Canadian universities. Doctoral education, now an accepted and established segment of the larger higher education scene, was poised for unprecedented (and unplanned) explosive growth following World War II.

**Stage Two: Expansion and Link with Funded Research**

Sometimes characterized as the Golden Age of higher education, the decades of the 1940s through 1960s were a period of enormous growth. Following World War II, undergraduate education opened its doors to middle and working class students, largely because of the Servicemen’s Readjustment Act of 1944 (also known as the G.I. Bill of Rights). State, federal, and foundation funding converged to expand the capacity to provide postsecondary education. Then, as the first of the baby boomers hit college in the 1960s, existing institutions continued to expand their enrollments, and new colleges were founded at the rate of one a week throughout the decade.

The expansion of undergraduate education was more than matched in doctoral education, which experienced even greater rates of growth (see Table 2.1). Here, too, federal funding set the stage. The Manhattan Project and Vannevar Bush’s manifesto, *Science, the Endless Frontier* (1945), ushered in the era of federal funding for university research. Federal agencies like the National Science Foundation and the National Institutes of Health were established, channeling money into universities for faculty research that also supported graduate students. Federal funds also helped to develop university infrastructure, including buildings and equipment, and sought to democratize science education by developing the capacity for PhD production at “second-tier” institutions (National Board on Graduate Education, 1975b; Thelin, 2004, chapter 7).

This trend continued in the 1960s, when the post-Sputnik National Defense Education Act (NDEA) of 1957 released a flood of federal money to university campuses. Federally funded fellowships and traineeships grew.
In 1960 there were 5,500 graduate fellowships worth $24 million, and by 1970 the government funded 43,000 fellowships valued at $226 million (Mayhew and Ford, 1974, p. 149). Between 1960 and 1970 the number of doctorates granted tripled—from 10,000 to 30,000 per year—and the number of doctoral-granting institutions grew by nearly 50 percent, from 165 to 240 (Thurgood, Golladay, and Hill, 2006). In short, the 1960s proved to be a decade of explosive growth for doctoral education.

Many of the features of doctoral education that are now taken for granted took shape and settled (comfortably or otherwise) into place during these years. The strong link between federal research dollars, faculty research agendas, and graduate student research efforts was forged. Graduate faculty teaching loads were reduced to allow more time for research in the sciences, and, in the interests of equity, this privilege was extended to the social sciences and humanities as well. As a result, graduate students were given more explicit responsibilities as research and teaching assistants (Thelin, 2004, pp. 281–282), and time to degree rose, by this point, to about five years (Berelson, 1960, p. 158). The increased scale of graduate education and the sheer size of universities led inevitably to the delegation of authority for many aspects of doctoral education—admissions, fellowship allocation, curricular requirements—from the institution’s graduate faculty as a whole to individual departments. At the same time, universities developed bureaucratic processes (which may feel ossified today) to handle the ballooning undergraduate and graduate student populations.

Tensions around purposes were never far from the surface. The continued postwar support of graduate education was largely due to the “realization that the nation’s scientific and technological preeminence required a vast reservoir of highly educated manpower” (National Board on Graduate Education, 1972, pp. 1–2), but many wondered whether too many doctorates were being granted, resulting in a dilution of quality. But the demand was undeniable, and it was not just for researchers. The boom in undergraduate enrollment brought with it an unprecedented need for college teachers and early stirrings about the need for better ways to prepare those teachers.

**Stage Three: Retrenchment and Innovation**

Inevitably, though, the bubble burst. Often referred to at the time as “the new depression in higher education” (Breneman, 1975), the 1970s were a time of retrenchment as federal funding declined (cutbacks in R&D funding began in 1969), the academic job market constricted, and military draft deferments ended in 1968. Even as recessions in 1970 and 1974 led to increased numbers of applications for graduate study, doctoral degree production flattened (National Board on Graduate Education, 1975a).

Not surprisingly, hard times prompted energetic conversation about the purposes of graduate education. In 1971 the National Board on Graduate Education was established to provide “unbiased, thorough analysis of graduate education today and its relation to American society in the future,” and during its three-year life the organization issued six reports (National Board on Graduate Education, 1973, p. iii). Change was, for better or worse, the central theme, as the board’s reports stressed “the difficult process of adjustment to reduced growth rates in a less supportive environment” and urged that “changes in the scope or function of graduate education should reflect the graduate school’s central role in maintaining and advancing scientific and humanistic culture which is not only the means to an end, but is an end in itself” (National Board on Graduate Education, 1972, pp. 2, 6).

More pointedly, the board recommended that “federal, state, and institutional policies should encourage more explicit differentiation of function among graduate programs than currently exists” (National Board on Graduate Education, 1975a, p. 49). Noting that most colleges added doctoral programs in an effort to garner the prestige “accorded [to] the traditional PhD program and the faculty members associated with it,” the board urged that any newly founded programs serve part-time and older students with applied programs aimed at solving regional and national problems (National Board on Graduate Education, 1975a, p. 49). One promising response to the growing concern about the preparation of doctoral students for teaching was the design of a new degree, the doctorate of arts (DA), but the DA never spread widely.1

Meanwhile, students brought powerful voices to the table, raising concerns about the relevance of what they were studying. Student dissent contributed to the creation of new fields of study, including ethnic studies and gender studies. Students also critiqued the structure of doctoral programs; one survey found that up to a third of the best students in the program dropped out because they found requirements too constraining (Heiss, 1970, pp. 179–180). Criticisms helped change requirements, such as new forms and timing for comprehensive exams (Mayhew and Ford, 1974, p. 146). Ultimately, most departments removed even language requirements.

Even in politically tumultuous and financially challenging times, changes in doctoral education were measured and incremental, rather
than revolutionary. Although some programs contracted slightly during the 1970s and early 1980s, new doctoral programs—many looking quite traditional—continued to open (Bowen and Rudenstone, 1992, pp. 57–62). The forces of aspiration and emulation seemed unstoppable.

**Stage Four: Diversification and Fragmentation**

The student population changed considerably in the 1980s and 1990s (see Table 2.2). Though numbers vary by field, it was during this period that doctoral education opened fully to women. About 40 percent of the doctorates awarded to women in the entire twentieth century were granted in the 1990s (Thurgood and others, 2006, p. 16). Currently half or more of the doctorates in psychology, biological sciences, the humanities, education, health sciences, and most social sciences go to women; the physical sciences (26.4 percent) and engineering (18.3 percent) remain less hospitable (Hoffer and others, 2006). U.S. doctoral study also became markedly more international at this time. Most international doctoral students are from Asia, and most of those hail from China. Twenty-four thousand doctorates were awarded by U.S. universities to students from the People’s Republic of China in the 1990s (Thurgood and others, 2006, p. 18). Again, the distribution is not even across fields; over half the doctorates awarded in the latter half of the 1990s in agricultural sciences, mathematics and computer science, and engineering were granted to non-U.S. citizens.

These changes, in turn, made the failure of graduate education to diversify by race and ethnicity a glaring problem. In the last quarter of the twentieth century fewer than 10 percent of the doctorates granted were received by minority U.S. citizens: African Americans, 3 percent; Asian/Pacific Islanders, 2 percent; Hispanics, 2 percent; and American Indians/Alaska natives, 0.3 percent (Thurgood, and others, 2006, pp. 19–20). Shifting public priorities raise further questions about purpose in relation to larger social agendas.

<table>
<thead>
<tr>
<th>Year</th>
<th>Female</th>
<th>U.S. Racial and Ethnic Minority</th>
<th>International</th>
<th>Total Doctorates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>10.7%</td>
<td>—</td>
<td>12.7%</td>
<td>9,733</td>
</tr>
<tr>
<td>1970</td>
<td>13.5%</td>
<td>—</td>
<td>15.5%</td>
<td>29,498</td>
</tr>
<tr>
<td>1980</td>
<td>30.3%</td>
<td>8.3%</td>
<td>18.7%</td>
<td>31,020</td>
</tr>
<tr>
<td>1990</td>
<td>36.3%</td>
<td>9.6%</td>
<td>30.9%</td>
<td>36,067</td>
</tr>
<tr>
<td>2000</td>
<td>43.8%</td>
<td>16.1%</td>
<td>32.6%</td>
<td>41,368</td>
</tr>
</tbody>
</table>

**A Fifth Stage: Waves of Reform**

As even a short history makes clear, concerns about the purpose and quality of doctoral education are nothing new. The character of concerns has shifted, certainly, from an interest in distinguishing the American upstart from its much older European cousins, to competing on the global scientific stage, to addressing new social and political realities. As the enterprise has evolved, it has invented new approaches and structures to guide its work and future, locally and nationally—from the AAU, to the National Board on Graduate Education, to the Council of Graduate Schools (CGS). Indeed The Carnegie Foundation for the Advancement of Teaching has been a player in these efforts a number of times over the last century (see Exhibit 2.1). In recent years, the appetite for serious attention to doctoral
education has grown; starting in the 1990s, a series of significant reform efforts have come into the picture. These projects preceded the CID and primed the environment.

Exhibit 2.1. The Carnegie Foundation’s Involvement in the Study of Graduate Education

In 1927 Henry Suzzallo, who would shortly become president of the Carnegie Foundation, conducted an extensive review of the state of graduate education in an effort to outline a plan of research. Noting that “less objective study has been made of higher education on the graduate school situation than of any other of the important units,” he identified five areas for research: the student population, the graduate teaching population, the alignment between preparation and career outcomes, the distinctions between the master’s degree and doctorate, and “a careful analysis of the processes of instruction themselves” (Suzzallo, 1927, pp. 83, 87).

In October 1937 William S. Learned, Benjamin Wood, and others at the Foundation conducted the first administration of a newly developed test to “determine a student’s fitness to undertake graduate study” at Columbia, Harvard, Princeton, and Yale. It quickly proved useful as a supplement to transcripts for admissions and for determining who should receive fellowships. The result, the Graduate Record Examination, was administered by the Foundation until 1947 when the Educational Testing Service was formed (Savage, 1953).

In 1939, the Foundation published an early history of three influential American universities, Studies in Early Graduate Education: The Johns Hopkins, Clark University, the University of Chicago, focusing on the characteristics that led to their success (Ryan, 1939). Its companion, Studies in American Graduate Education, delayed because of World War II, was a comprehensive summary of the state of U.S. graduate education, based on a statistical analysis of student enrollment records and site visits to twelve leading graduate universities between 1937 and 1939 (Edwards, 1944).

In 1983, the Foundation published a slim volume called Scholarship and Its Survival: Questions on the Idea of Graduate Education, by Jaroslav Pelikan, dean of the Yale graduate school from 1973 to 1978. Pelikan makes the case for “scholarship as a way of life,” noting, “I have come to believe, reluctantly but ineluctably, the very survival of scholarship is at stake today” (1983, p. xvii). His concerns about

the purposes of graduate education and the future of the humanistic disciplines served as the opening salvo for an invited colloquium on graduate education, sponsored by the Foundation and the Institute for Advanced Study in December 1983. Subsequently Pelikan wrote a longer volume, The Idea of the University (1992), which included many ideas that evolved from this earlier work on graduate education.

One prompt for these efforts was the publication in 1989 of Bowen and Sosa’s Prospects for Faculty in the Arts and Sciences. Their forecast of a coming wave of faculty hiring failure to materialize, and a generation of would-be professors who had been encouraged to enroll in graduate school was stranded. This set in motion considerable attention to the connections between the career paths of doctoral recipients and the preparation they receive.

One response was to make more concerted efforts to prepare graduate students as teachers. Fueled by concerns about the quality of instruction provided by teaching assistants in undergraduate courses, the training of TAs became a highly visible reform agenda, and major research universities took steps hosting a national conference on the topic.

With these issues in view, the Preparing Future Faculty (PFF) initiative was launched in 1993 as a collaboration between CGS and the Association of American Colleges & Universities (AAC&U). The goal was to provide doctoral students with opportunities to observe and experience faculty roles at academic institutions with varying missions, diverse student bodies, and different expectations for faculty. Usually this involved partnerships between research universities and nearby two-year and four-year colleges. Over a decade of activity, formal programs were implemented at more than forty-five doctoral degree-granting universities and nearly 300 partner institutions in the United States (Preparing Future Faculty National Office, n.d.).

Building on PFF and other initiatives, a new project, called Re-Envisioning the PhD, synthesized the concerns of seven groups of stakeholders: research universities, K–12 schools, doctoral students, government agencies, industry, foundations, and educational associations. The project concluded with a conference in spring 2000 at which participants agreed on seven recommendations, including a need for “carefully planned, systematic collaborations” for change, more attention to preparation for teaching roles within and outside of academe, and the need to “make transparent to prospective doctoral students what doctoral education consists of and requires” (Nyquist and Woodford, 2000). Project staff also developed a Web-based clearinghouse of
Promising Practices for effective graduate education, which continues to expand and provide innovative ideas to the field (see http://www.grad.washington.edu/envision).

Drawing on the conference’s recommendations, a further initiative was established. The Responsive PhD (2000–2005), housed at the Woodrow Wilson National Fellowship Foundation, took a broad approach, working at the campus level at twenty universities. Its leaders emphasized four themes, called “the four Ps”: crafting new paradigms, exploring new practices, recruiting and retaining new people, and forming new partnerships (2005).

The 1990s were also marked by concern for the interrelated matters of high attrition rates and ever-lengthening time to degree, particularly troubling in the humanities. In Pursuit of the Ph.D. (Bowen and Rudenstine, 1992) drew national attention to those problems. In response, the Mellon Foundation created the Graduate Education Initiative (GEI), which included fifty-one departments at ten universities and explicitly tied graduate student funding to students’ satisfactory and timely degree progress. In return for fellowship funds, departments clarified expectations and rationalized their programs (Ehrenberg and others, 2005). In the same vein, the CGS PhD Completion Project (2005–2010) is working to implement best practices for reducing doctoral student attrition.

Disciplinary societies have also become increasingly active agents of change. Their readiness to engage in serious reform has often been primed by self-studies of doctoral education and the future of the discipline. Studies, in turn, have led to discipline-based reform activities. For example, in 2001 the American Chemical Society established an Office of Graduate Education and now publishes a newsletter for graduate students.

All of these predicate efforts set the stage for further efforts. The disciplines selected for the CID had all demonstrated concern about the future of doctoral education in their fields. And many of the CID participating universities had a history of involvement in prior reform efforts; some seem to have participated in all of them. In short, the CID did not start de novo; the Foundation planted seeds in soil that had been well prepared, and we trust that it, in turn, will set the stage for further work. Like scholarship, organizational change builds on efforts that come before.

This fifth stage in the history of graduate education has brought reforms that have already had significant impact. But the work is not done. And now is not the time to relax efforts at reform. With mounting pressure to change, graduate education must redouble its efforts to rethink the deep and surface structures for the formation of scholars in the twenty-first century.

Turning Resistance into Momentum

Looking back over more than a century of doctoral education and efforts toward reform, two stories emerge. On the one hand, the story is of change—gradual, yes, but ongoing and significant as PhD programs have evolved in response to new funding sources and incentives, more and different students, recalibrated purposes, and other changing circumstances both within and outside of the academy. On the other hand, the story is one of stasis—of structures and assumptions that have become increasingly difficult to budge. We took both stories into account as we developed our plan of action for the Carnegie Initiative on the Doctorate.

The details of what we did are described in Appendix A, but our plan of action must be understood as reflecting four larger ideas about doctoral education and what it takes to change it. We highlight these four because they offer different ways to think about seemingly stubborn obstacles to reform.

The (Partial) Myth of Money

In any conversation about how doctoral education can be improved, the theme of money comes up early and often. Unfortunately, it is often a conversation stopper. As history makes clear, funding patterns and incentives can radically reshape academic passions and pursuits. The availability of external funding, especially federal research funding, which began in the middle of the last century, has created a dynamic of competition and striving that makes attention to other matters (such as undergraduate teaching, or engagement with the community) a continuing struggle in many settings. The operative principles seem to be that more money leads to higher quality, and that nothing can be accomplished without the inducement of financial reward. This, in turn, supports a belief that positive change cannot take place in the context of the tight or diminishing resources faced by many public universities today, and that even affluent programs cannot afford to invest time and resources in improving their programs without additional funding.

We do not intend to downplay the significance of the financial challenges facing higher education. But Carnegie’s work with a wide variety of doctoral programs suggests a different way to think about funding and
The incentives it creates. For one thing, it bears noting that a good deal of money gets spent on ineffective practices. For another, money can induce temporary change but not necessarily improvement or lasting impact. Even more, funding can be seen not only as a condition for change but as its consequence. The CID did not provide funding to participating departments, but a number of them made improvements that have, in turn, led to a new source of funds. For example, the University of Texas's history department, working closely with the dean of Liberal Arts, developed a set of reforms that improved its graduate program, allowing the department to better compete nationally for new students. As a result, the administration has begun to deliver substantial annual increases that allow the history department, for the first time, to offer a significant number of multi-year support packages. It has also increased discretionary funds that will be used to support recruitment, research, and placement efforts (R. Abzug, e-mail to the authors, September 6, 2006, and November 9, 2006). At the University of Nebraska, efforts to bring more women into the study of mathematics, and to create a more supportive culture for students who might otherwise not thrive in the field, have brought significant federal (and institutional) funds to the program over the past decade.

And of course not all the "goods" come immediately in the form of funds. In the University of Michigan chemistry department, new opportunities for graduate students to explore educational issues (for instance, through a partnership with the College of Education entitled Chemical Sciences at the Interface of Education) have attracted outstanding applicants to the doctoral program. According to Professor Brian Coppola, "A number of excellent students have selected our PhD program over departments ranked higher than ours because we openly embrace future faculty development" (Hutchings and Clarke, 2004, p. 169). Over time (in the classic chicken-and-egg dynamic of academic reputation-making) better students help attract and retain more prestigious faculty, who bring in more grant support and more cutting edge research, which brings in more outstanding students. . . . This, then, is the cycle that drives improvement; good ideas and good faith leading to rewards that are invested in developing more good ideas.

The Power of the Disciplines

One of the themes in the history of graduate education, and in attempts to change it, is the increasing power of the disciplines and the departments that house them on university campuses. Though the need for work that crosses disciplinary boundaries is increasingly on the institutional agenda, and many universities are creating new incentives to encourage such work, doctoral education remains a locally controlled process: admissions, curriculum, and quality standards are all controlled by the department's graduate faculty. As any graduate dean will testify, disciplines and departments rule the day when it comes to shaping the experience of doctoral candidates. In short, departments have tremendous power and are deeply resistant to external pressures for change; they are, if you will, part of the stasis side of the story.

But the disciplines can also be engines of change, and that is very much how we have seen them in the CID. In contrast to a number of previous efforts to reform graduate education, the CID chose to go deep rather than broad, working in a small number of fields rather than across the full spectrum of graduate education.

This strategy reflects a basic recognition that the cornerstone of the faculty member's identity is her disciplinary affiliation. Thus, a vision of doctoral education in the service of preparing stewards of the discipline is one that appeals to faculty "where they live" and calls on them to make common cause with others who share their passion for the field and its future. Over and over, we found that ensuring the good of the discipline is a special responsibility that scholars take very seriously. Seen in this way, a department is not a silo or fortress barricading itself against the outside world, but rather a home base from which good ideas can travel. That is, effective practices and new ideas can be carried by faculty and students who teach and study at several universities over the course of their careers. Allegiance to the discipline, and a commitment to ensuring its health into the future, makes it possible—even for departments that compete (as of course they do) for students, faculty, or grants—to collaborate on building and advancing the field in the name of a higher good. In these ways the disciplines open new routes into the future of doctoral education.

Moreover, honoring the disciplines opens new doors to conversations among disciplines. Too often cross-disciplinary conversations about graduate education devolve into comparisons between those seen as "haves" and the apparent "have-nots." But, in fact, one of the clear lessons of our work has been the value of mixing it up, allowing departments and fields that do not typically interact to share what they do (and what they worry about) in ways that prompt powerful learning and change across settings. This was most apparent in the cross-disciplinary convenings we held the summer of 2006, which were organized by theme. Mathematicians, historians, and neuroscientists alike struggle with how to foster creativity and how to help students ask important questions. And they were
intrigued to learn how differently things are sometimes done in other settings. For instance, CID participants eagerly traded different models of qualifying exams—grant proposals, portfolios, and take-home exams.

The Double-Edged Sword of Decentralization

The fact that “no one is in charge,” as noted in the epigraph of this chapter, may seem to be a recipe for undercutting the effectiveness of any reform effort. Unlike Europe, where control of graduate (and all of post-secondary) education has been much more centralized and top-down, in the United States local decision making and diversity are features of higher education.

On the one hand, this highly decentralized structure makes American graduate education at once messy and unruly, and at the same time highly resistant to systemic change. In this sense, it is an element of stasis, a condition that makes widespread reform much more difficult than it might otherwise be. But we would argue that the decentralized nature of U.S. graduate education may also promote change because it means there are many more places from which good ideas and innovative practices can emerge. As one observer of higher education quipped in the 1950s, “They can do things at Kansas now that used to be done only at Harvard” (Berelson, 1960, p. 108). We would go further today, asserting that sometimes “they can do things at Kansas” that cannot be done at Harvard. In short, the U.S. system is perfectly designed for spawning local experiments; what is needed are more occasions, more channels, for making this work visible and available for others to build upon.

With this in mind, the CID has involved a wide range of institutions, diverse in a variety of ways that matter in education, and at different points on the aspirational pecking order that, for better or worse, command attention in higher education. And we strongly emphasized the importance of making local experiments and innovations public. Reports to the field, rather than reports to the Carnegie Foundation, were the expectation. And departments responded admirably, putting on panels at national meetings and writing about their work. Useful accounts can be found in, among other places, the Spring 2004 issue of Peer Review, a featured article in Chemical and Engineering News (Everts, 2006), and the electronic representations of departments’ CID work at http://gallery.carnegiefoundation.org/cid. Through this commitment to public exchange, reformers and innovators can be, in the words of neuroscientist Zach Hall, “vectors of information, skills, and ideas not only within programs but also across them” (Hall Z. W., 2006, p. 216).

Students as Agents of Change and Improvement

If anyone is in charge of graduate education, the general agreement is that it is the faculty. And clearly faculty are necessary actors in any meaningful reform. But one of the most powerful lessons of Carnegie’s work over the past five years is that students may well be the secret weapon for change. Enlisting them as partners in this work may not be a move that comes easily to faculty members; in general doctoral students (like students at other levels) have been seen not as agents, but as the products—or, more cynically, as “byproducts” (Bousquet, 2002)—of the educational process. But when unleashed upon an agenda as important as the quality of the educational experience, students bring staggering imagination and energy to bear.

Anticipating that this might be the case, we asked every participating CID department to include doctoral students in their work from the outset—as participants in the process of self-study, deliberation, and creative problem solving. Students also attended and actively participated in project convenings at the Carnegie Foundation, where their perspectives were crucial in shaping deliberations; indeed, the convenings became a sort of microcosm of the sort of intellectual community that many of the departments were also seeking to strengthen at home. Over and over, faculty gave testimony to their newfound respect for students as agents of change. Many cited this as the single most transformative insight emerging from the CID.

Along the way, students who participated in the process of reflection and change found themselves thinking differently about their own learning, becoming more intentional, more purposeful, more able to shape their own experiences—all habits that will give them a firm foundation in the shifting landscape of scholarly and professional life in the future. Clearly the formation of these students was influenced by participating in the CID in ways that promise to shape their work as future scholars in whatever settings they enter.

Back to the Future

The history of graduate education is in large part a history of shifting and competing purposes. At the broad national level, enduring debates about purpose have centered on two sets of questions.

First, what is the degree for? How “pure” should it be? Is it preparation for a particular career or vocation, or is it education in the quest for knowledge and understanding? Back in 1912, Princeton’s founding dean
of the graduate school, Andrew Fleming West, complained, "The most
sordid and dangerous thing just now in our graduate schools [is that they
are] attracting . . . men, not because they must be scholars but because
they want a job" (Berelson, 1960, p. 19). These questions of purpose
continue to be vexing today. Are students' vocational aspirations
and concerns trumping their passion for knowledge and inquiry? When
PhD chemists work in university or industrial settings, are these equally
laudable outcomes? Do they demand different preparation?

Second, for whom is the degree? Should any student who desires a
PhD be allowed to try for one? A recurring concern has been that too
many universities are granting doctorates to too many students, resulting
in dilution of quality. Concern about the proliferation of "sham graduate
schools" was raised by the AAUP in the early 1900s (Berelson, 1960,
p. 20). At mid-century the question still remained: "Some leaders of grad-
uate education were worried about the impact of numbers upon quality
when the system produced 300, 1,000, 3,000 doctorates a year; what
would they say today about the production of 9,000?" (Berelson, 1960,
p. 32). And what would they say about today's production of over
40,000, one might ask? Indeed, the entry of for-profit and online univers-
ities into doctoral study has raised many eyebrows, as has the large num-
ber of the EdD's granted by schools of education. And although it is
unlikely that anyone would now question whether women or African
Americans are constitutionally or intellectually able, there is resistance
in many quarters to adopting policies or practices to deliberately and sys-
tematically diversify the student population.

These tensions about purpose are arguably intrinsic to the very enter-
prise of graduate education. Throughout the last 125 years there have
been many competing opinions, and certainly no lasting resolution. As
new challenges appear, questions of purpose return with new force.

The question, then, is about the particular challenges facing doctoral
education today and in the coming decades. What are the larger social
and intellectual developments that cannot be ignored if doctoral educa-
tion is to move successfully into the twenty-first century? Many observers
point to globalization, new market forces, and changing patterns of fund-
ing as circumstances demanding urgent response. We agree. But perhaps
even more influential will be shifts in the way knowledge itself is gener-
ated and exchanged, potentially redefining the core work of the fields
around which doctoral education has traditionally been organized.

Early on in the work of the CCI, we commissioned essays by scholars in
each of the six participating fields, inviting them to reflect on their disci-
plines and how doctoral students should be prepared as stewards. In
addition, we asked several scholars to read through the full set of essays
and tell us what they saw. (The entire collection was published in 2006 as
Envisioning the Future of Doctoral Education [Golde and Walker].) Their
answers converged on a number of trends: a move toward greater interdis-
ciplinarity and interaction with neighboring disciplines; growing commit-
ment to team work—even in disciplines traditionally marked by solitary
scholarship—with more collaboration in both research and teaching; and
greater purposefulness in reaching out to partners and audiences outside
of academe in ways that connect academic work with the larger social context.

Many of the authors talk as well about the need for breadth of preparation
to complement in-depth specialization, and the need for more flexible, inte-
grated conceptions of scholarly work, whether in the laboratory, the library,
the classroom, or the community. Taken together, these trends provide an
urgent motive for change. And, says David Damrosch, they "reveal nothing
less than an emerging pedagogical 'consilience,' to use Edward Wilson's
phrase, which suggests the outlines of a substantial shift in the goals and
methods of graduate education" (2006, p. 34).

We share Damrosch's sense that graduate education faces significant
shifts in the ways doctoral students are prepared, and some of those shifts
are well underway. As intractable as questions of purpose are from a
system-level perspective, they can nevertheless be the subject of fruitful
deliberation within a department or program. Agreeing upon the purpose
of particular requirements—what is the role of the dissertation?—can
result in significant improvement in the educational effectiveness and
intellectual climate of the department.

But we know, too, that change is not easy, and it certainly is not auto-
matic. There are few habits or processes at the graduate level that prompt
programs to take stock, agree on goals, and design better ways of achiev-
ing those goals. The assessment movement, for example, which raises
questions about goals and effectiveness, has focused almost exclusively
on undergraduate education. And in some cases, "assessment" has
brought with it bureaucratic baggage that does not play well in graduate
programs. The need, then, is for a way for faculty and students to step
back and examine what they do and why—not as a process imposed
from the outside but as a commitment to inquiry and improvement
reflecting their own high standards for the discipline and its students.
This is our topic in the next chapter.

ENDNOTES

1. Prewitt is the Carnegie Professor of Public Affairs, School of International
   and Public Affairs at Columbia University—and also a member of the
   National Advisory Committee for the Carnegie Initiative on the Doctorate.
The epigraph comes from his essay *Who Should Do What? Implications for Institutional and National Leaders*, one of the commentaries on the collection of disciplinary essays commissioned at the start of the CID (2006, p. 23).

2. The U.S. Office of Education has taken responsibility for tallying the number of degrees ever since the early years, although researchers have more confidence in the data once the Office’s statistical field service was established in 1923. Walter Crosby Eells conducted an exhaustive analysis of alumni directories and other historical data and his most generous count of doctorates totals 3,553 granted by 1900 (Eells, 1956). However, others found that about a third of these were awarded by universities lacking legitimate doctoral programs or adequate facilities, and another 8–10 percent were honorary (Thurgood, Golladay, and Hill, 2006, p. 3). More detailed information about doctoral recipients became available with the advent of the Survey of Earned Doctorates, tabulated annually since 1957, and collected by means of a survey administered to all new PhD’s shortly before graduation. The 2006 NSF report *US Doctorates in the 20th Century* provides a wealth of historical data (Thurgood and others, 2006).

3. The number of doctoral-granting institutions and the number of doctorates awarded come from Figures 2.1 and 2.4 the 2006 *US Doctorates in the 20th Century* (Thurgood and others, 2006), with the exception of the year 2000, which come from the Survey of Earned Doctorate report, *Doctorate Recipients from United States Universities: Summary Report 2004* (Hoffer and others, 2005, Tables 1 & 2, pp. 39–40). The ratio of doctorates to bachelor’s degrees is based on a table in Bowen and Rudenstine (1992, p. 21), with data for 1900 computed from Babelson who uses 250 PhD’s for 1900 (1960, p. 26), and for 2000 from the *Digest of Educational Statistics: 2005*, Table 251 (National Center for Education Statistics, 2005).


5. The first Doctor of Arts (DA) degree was adopted at Carnegie Mellon University in the fields of English, fine arts, history, and mathematics in 1967, although the DA was first proposed in 1932. It was envisioned as a preparation for college teaching in each of the disciplines, rather than for a career in research. Four powerful advocacy groups—the Carnegie Commission on Higher Education, the Carnegie Corporation, professional associations, and state higher education coordinating boards—encouraged the adoption of the degree. The development of the DA was largely a top-down process, aided by planning grants and fellowship support from the Carnegie Corporation, which invested $3.2 million in the effort (Glazer, 1993).

Between 1967 and 1990 the DA was adopted at thirty-one institutions in eighty-eight departments in forty-four fields, most popularly English (eighteen), mathematics (eight), and history (eight). During those twenty-three years 1,943 DA degrees were awarded (Glazer, 1993). By 1991, only twenty-one universities were still granting the DA, a number which has shrunk to twelve as we write this volume. The DA degree never spread nor found the success that its proponents had imagined. Glazer attributes this to a combination of factors: competitive pressures that emphasize research over teaching for faculty and students, the collapse of the academic job market, and the proliferation of other specialized doctorates including music, business, fine arts, and many of the professions. We would argue that it failed to spread widely because the PhD was still being used for all career paths in most fields, and as long as one could earn a PhD, the DA was no competition.

6. The data are from the Survey of Earned Doctorates (Hoffer and others, 2001, Tables 7, 8, and 11; Thurgood and others, 2006). The first U.S. doctorate awarded to an African American was to physicist Edward Alexander Bouchet in 1876 from Yale. However, data on the race and ethnicity of doctoral recipients were not systematically collected until 1975. The proportions by race and ethnicity are computed from a total of those U.S. citizens who reported their ethnicity. The first American woman to earn a doctorate from a U.S. university was Helen Magill, in 1877 from Boston University, in Greek. The 1978 National Research Council’s *A Century of Doctorates* reported gender data in five-year averages. From 1900 to 1904, 8.8 percent of U.S. PhD’s were women, in 1920–1924 this rose to 15.1 percent, for 1940–1944 it was 13.5 percent, and it dropped to 10.8 percent in the 1960–1964 period (Harmon, 1978, p. 17). This same report notes that the proportion of international students was a stable 7–9 percent until the 1960s, when the upward trend began (p. 47).

7. The most comprehensive recent disciplinary study of doctoral education comes from the field of history (Bender and others, 2004). The American Chemical Society regularly surveys its membership, which comprises most
doctorate-holding chemists regardless of whether they work in academia or industry. A set of survey reports can be found on the American Chemical Society Web page (American Chemical Society, 2002). The Modern Language Association regularly collects and publishes data about graduate education as well, particularly related to the job market and career paths, and has sponsored conferences and other publications (for example, Laurence, 1998, 2002; Lunsford, Moglen, and Slevin, 1989; MLA Committee on the Status of Graduate Students in the Profession, 2001; MLA Executive Council Task Force on Graduate Education, 1999; Modern Language Association, 1998, 2003). The mathematics community was galvanized by several reports sponsored by the federal government (Board on Mathematical Sciences, 1990; Board on Mathematical Sciences of the National Research Council, 1992; National Research Council, 1984; Odom, 1998); and since 1965 the AMS, MAA, ASA, and IMS have co-sponsored the Annual Survey of Mathematical Sciences. This reflects only some of the activities in disciplines represented in the CID, and other disciplinary societies have also been very active.

8. Two recent exceptions are worth noting. The 2006 edited volume The Assessment of Doctoral Education (Maki and Borkowski, 2006), includes numerous models and case studies. A publication by the Responsive PhD project highlights promising practices and how they were assessed (Woodrow Wilson National Fellowship Foundation, 2005).

TALKING ABOUT PURPOSE

MIRRORS, LENSES, AND WINDOWS

One of the most powerful motivations for change is looking in the mirror.
—Lee S. Shulman

ONE OF THE MOST COMMON YET MYSTIFYING MILESTONES on the road to the PhD is the qualifying (or, as it is known in some quarters, comprehensive, general, or candidacy) examination. A long-standing, often-dreaded element of doctoral education, the experience that results in advancement to candidacy takes a variety of forms. In some cases "quals" are summative and backward looking, serving to assess whether a student has acquired sufficient content knowledge. In other cases they look forward and provide a roadmap for work to come, focusing on a student's ability to generate new insights, ask questions, make connections, and focus on a special area of expertise. And of course some look both back and forward. Candidacy exams often serve educational goals as well as gatekeeping functions; the process of preparing for and taking the exam, in whatever form, provides an important learning opportunity in and of itself.

Or so one would hope. As our work with students and faculty in the CID reminded us, qualifying exams can also be a source of profoundly mixed messages and cross-purposes. The educational purpose of the exam is often unclear to students. Although a majority of students surveyed in the CID said that expectations about the exams were conveyed to them, their