



Doctoral Education: Present Realities and Future Trends

- Doctoral education in the United States forms a huge and diverse enterprise. Seen from the outside, American graduate education is often hailed as the “gold standard” to which other nations and academic institutions aspire. From the inside, however, doctoral education faces many challenges. This article provides some basic information concerning doctoral education in the United States and will focus attention on the challenges facing doctoral education. While some U.S. analysts would disagree, my basic perspective is that American graduate education in general and doctoral education in particular is largely successful and effective.

by Philip G. Altbach

The system of doctoral education as it has evolved in the United States over the past century and a half serves both the academic system and society reasonably well. Indeed, many of the problems facing doctoral education are engendered by the system's success. Some of the challenges facing doctoral education relate to broader societal forces while others are internal to the academic system.

Doctoral education needs to be viewed alongside broader trends in American higher education, and especially graduate education. The doctorate, especially the Ph.D., is the pinnacle of a large and complex higher education system. This essay focuses mainly on the Ph.D. degree, the research-oriented doctorate, and not on the increasingly important professional doctorates such as the doctor of business administration (DBA), the doctor of law (JD), the doctor of education (Ed.D.), and others, although some attention will be paid to these degrees. Doctoral study also is related to graduate education generally—master's degrees in many fields including the traditional arts and sciences and in numerous professional fields (Conrad, Haworth, and Millar 1993). Postdoctoral study is also not considered in detail in this discussion, although in many fields in the physical and biomedical sciences a postdoctoral research appointment is increasingly considered part of research training and is quite common.

Doctoral education cannot be separated from either the American academic research enterprise or the arrangements for teaching large numbers of undergraduates in the larger research-oriented universities (Graham and Diamond 1997). Doctoral students, especially in the sciences, are an integral part of the research system. They provide the personnel at relatively low cost who do much of the research under the supervision of senior professors. The research grants provided by government agencies such as the National Science Foundation and many others, by private philanthropic foundations, and increasingly by corporations are the sources of funding for

graduate assistants who work on research while studying for their doctorates. In many cases, dissertation topics relate to the funded research. This system of financial support for doctoral study and basic research works well for American higher education. It ensures financial support for students as well as faculty mentorship and supervision for them, and it ensures a steady source of labor for research projects. These research funds are awarded on a competitive basis, and as a result the bulk of financial support for doctoral students in the sciences goes to the prestigious research-oriented universities. Doctoral students in all disciplines, but especially in the social sciences and humanities, serve as teaching assistants and sometimes as lecturers for undergraduate courses. In return for modest stipends and tuition scholarships, doctoral students provide much of the teaching in large undergraduate courses. Typically, they work under the supervision of a senior professor and conduct discussion sections for students as well as helping with grading and evaluation. In some cases, advanced doctoral students independently teach courses. In the sciences, doctoral students may help with laboratory supervision. Funds for teaching assistants generally come directly from the university.

The United States spends about half of the world's R&D funds—much of it supporting university-based research. Basic research, especially, is university based. A significant proportion of applied research, some of it funded by the corporate sector, is also located on university campuses. Thus, the health of doctoral programs in universities is of considerable importance for the entire research enterprise.

The Size and Shape of the System

In terms of total student enrollment, the American system of higher education is the second largest in the world after that of China, enrolling fourteen million students in postsecondary institutions. While no accurate statistics are available on

the number of doctoral students in U.S. universities, it is likely that around 400,000 students are working at the doctoral level in all fields.¹ In 2000, 44,808 doctoral degrees and an additional 80,057 post-baccalaureate professional degrees (e.g., medicine, law, theology, and others) were awarded. It is possible that half of the world's doctoral students are studying in the United States.

The size, scope, and diversity of doctoral education make accurate description difficult. A total of 406 universities award doctoral degrees, but 50 of them award half of all degrees (Nerad 2002). The 50 top degree providers consist largely of the most prestigious research-oriented universities—both public and private—although the proportion of doctorates granted by these prestigious universities has declined over the years.² People assume that institutions like Harvard and Yale are the largest doctorate awarding institutions, but in fact, of the top ten providers, eight are public universities (including the University of California-Berkeley and the University of Wisconsin-Madison, which are the top two). The only two private universities in the top ten are Nova Southeastern University and Stanford University. Like the rest of the U.S. higher education system, doctoral granting institutions are highly stratified. While doctoral education continues to be dominated by the most prestigious institutions, much of the growth in the past 30 years has been in less famous public universities seeking to boost their reputations by offering doctoral degrees. In the highly competitive American system, offering graduate and professional degrees is seen as a sign of prestige and of joining the “big leagues” of research universities. Some public university systems, such as California's, limit doctoral degree programs to specific institutions—for example, only the University of California institutions can offer doctoral degrees while the larger number of schools in the California State University system are limited to bachelor's and master's programs. Universities offering the doctoral degree are a reflection of the highly differentiated American system of higher education. Many are among the most prestigious institutions, both public and private, in part because research-oriented universities tend to be at the top of the hierarchy, but others are regional universities offering doctorates in certain fields.

In a small number of cases, specialized institutions offer doctoral degrees. Rockefeller University, for example, offers doctoral degrees only in the biomedical sciences and is one of the most prestigious institutions of its kind in the world. There are a few freestanding law and business schools as well. A small number of specialized institutions are authorized to offer doctoral degrees in psychology or psychotherapy and some other

fields. For example, some well-known universities, like the California Institute of Technology, are quite small institutions that concentrate on a small cluster of disciplines. In the past decade, for-profit academic institutions have emerged, and a tiny number offer doctorates. The large majority of doctoral degrees are, however, offered by traditional universities.

Patterns of Doctoral Study

The basic structure of doctoral higher education in the United States has increasingly become the pattern worldwide. Aside from some variations, describing the organization of doctoral studies in the United States is a fairly simple task. The traditional pattern of American postsecondary education includes three degrees, the four-year bachelor's degree, a master's degree that is typically one to two years in duration, and the doctorate. Doctoral study is quite variable in duration. While new “executive” or “cohort-based” doctorates exist in applied fields such as school administration or management that can be finished in as little as three years, including a dissertation, the “time-to-degree” in the traditional arts and sciences fields has been increasing—to almost nine years in the humanities and six years in the life sciences. In some fields and at some universities, students are admitted to doctoral study directly after completion of the bachelor's degree, while in other cases a master's degree is required for admission to doctoral programs.

Like much else in higher education, many variations exist in the structure of academic degrees, along with considerable differentiation and competition among institutions and even among academic departments and programs. It should be kept in mind that, at the undergraduate level, the majority of the system is unselective—community colleges for the most part are “open door” institutions offering entry to anyone with a secondary school qualification. Many four-year colleges and some lower-tier universities admit most students with the appropriate academic qualifications. Doctoral admission is, of course, more selective, even at the less prestigious universities. At the top of the system, admission to doctoral programs is immensely selective, with only the top candidates being admitted, while at institutions lower in the hierarchy, standards for admission are less stringent.

Traditionally, the doctorate was the quintessential research degree, aimed at preparing students for a career in academic or, in some fields, applied research. For years, however, many doctoral recipients, in fact, have done relatively little research in their careers, having been involved mainly in postsecondary teaching. Virtually everyone who holds a regular academic appointment in a four-year college or university, and many in the community college sector, hold doctoral degrees. The growing disjunction between the traditional purpose of the degree—training for research—and the actual use made of the doctorate has led to some criticism of the pattern of doctoral education, but so far little actual change.

The organization of doctoral study varies by discipline and field and also to some extent by institution. However, throughout the academic system, coursework, a set of examinations,

¹ In 2001, there were 354,800 students enrolled in science, engineering, and health fields in academic departments offering the doctoral degree. Some of this number are master's students, but most are likely studying for the doctorate.

² The major doctoral institutions are members of the Association of American Universities (AAU). This organization, established in 1900, is generally seen as representing the major, research-oriented American and Canadian universities.

and a dissertation are standard requirements for the doctorate. In contrast to the traditional European pattern of doctoral education, the American degree relies heavily on formal courses as an integral part of the process. The standard pattern for doctoral education includes approximately two years of formal coursework, which may include considerable laboratory work in the sciences. Courses typically include basic and advanced material relating to the field and the appropriate methodology both for doing research and for preparing a dissertation. Coursework is followed by a comprehensive examination, aimed at ensuring that the student has in-depth knowledge of the field. These examinations come in many different forms depending on the discipline, department, and university, sometimes including both oral and written parts or just written elements. Some examinations feature extended review essays, while others more directly cover the discipline. If a student fails to pass the examination (several attempts are generally permitted), he or she is dropped from the doctoral program. In such cases, which are not uncommon, the student is often given a master's degree. Upon successful completion of the doctoral qualifying or comprehensive examination, the student then prepares a dissertation proposal and engages in dissertation research. Most universities also stipulate a hearing concerning the dissertation proposal before it is formally approved and the student has authorization to proceed with the research.

The dissertation is a central element of any doctoral program, and is intended to be a significant piece of original research that makes a new contribution to science and the discipline. A significant number of students never complete their dissertations, creating the informal category of ABD (all but dissertation). The proportion of ABDs varies by institution and discipline, but it is high and growing. Dissertations differ in rigor and focus, of course, with major variations by discipline. In the hard sciences, dissertation topics are often related to the research program of the supervising professor, which may involve a team-based project. In the humanities and social sciences, dissertations are typically individual projects reflecting the interests of the researcher, often with some influence from the faculty supervisor. Dissertation supervision is the main responsibility of the "major professor," usually with the assistance of several other faculty members. The length, scope, and quality of a doctoral dissertation vary widely, depending, of course, on the discipline, the views of the supervisors, the norms of the university, and, of course, the interests and ability of the student. The length of time it takes for students to complete dissertations has come under much criticism, especially in the humanities and, to some extent, in the social sciences as the time-to-degree has increased for doctoral studies.

The traditional doctorate in the arts and sciences differs from practices in some of the professional fields that offer doctoral degrees. For example, the doctorate of education (Ed.D.), a degree usually obtained by people interested in school administration and related education professions,

requires a dissertation—but one that is more a description of a project rather than based on original research. Other professional doctorates also have introduced variations on the research-based dissertation. The growing trend toward tailored professional doctorates in such fields as management studies, education, and others means that accredited doctoral degrees are now offered that include cohort-based weekend coursework and dissertations or other research projects that many would say fall considerably short of traditional doctoral requirements. While many people have criticized this trend as "cheapening" the traditional doctoral degree, such programs are growing in number, as are doctoral degrees offered by for-profit academic institutions, usually in professional fields, that always lack the rigor of a traditional doctoral degree.

Another aspect of the system of doctoral education is postdoctoral study. In some fields in the sciences, the postdoc is becoming a standard part of the doctoral study cycle. A significant number of doctoral degree recipients take postdoctoral positions immediately following completion of their degree studies, spending a year or more affiliated to a laboratory prior to competing on the job market. Postdoctoral study permits a scientist to work closely with a senior researcher and often with a research group. In some fields, postdoctoral experience is a necessary prerequisite to obtaining a regular academic job. This arrangement delays the start of a career in some ways and introduces an additional level of uncertainty. Postdoctoral appointments are largely limited to the sciences, and are seldom available in the humanities or social sciences.

Accreditation and Quality Control

Doctoral study takes place mainly at traditional universities—academic institutions that offer undergraduate and graduate degrees, including the doctorate, in a variety of disciplines and fields. These institutions are accredited by one of the regional accrediting agencies responsible for accrediting all postsecondary institutions. These regional agencies are not government bodies but rather private organizations controlled by the academic community itself and recognized by government to carry out accrediting activities. Nonaccredited institutions are typically not eligible to receive government loans or grant funds. In some fields of study—such as engineering, business administration, law, and teacher education, among others—additional accrediting bodies controlled by the professional associations must provide authorization for institutions to offer degrees of various kinds. The traditional arts and sciences disciplines have no accrediting beyond the overall institutional accreditation described above. This patchwork of accrediting and authorization, carried out by nongovernmental organizations and agencies, but with government at both state and federal levels recognizing the validity of these accreditors, constitutes the pattern of American accreditation.

Institutional and program accreditation has a long history and is, in general, quite rigorous. Institutions are asked to provide detailed information and self-evaluations of their

work, encompassing doctoral programs, extracurricular activities, academic resources such as libraries and laboratories, the qualifications of academic staff, and many other aspects. This information is carefully evaluated by accreditation teams made up of peer committees, and final decisions are made by the accrediting bodies. Institutions and programs are given basic accreditation—they are not ranked in any way. When a university or program specialty is found deficient in some way, it can be given provisional accreditation and asked to remedy the problem or, in rare cases, can be denied accreditation. A denial generally means that the institution or program ceases to function.

In some states, additional authorization from state agencies is required in order to offer specific academic degrees, with some states extending this authority to private as well as public institutions. This authorization is often legally required in order for academic institutions to operate, and can apply both to entire colleges or universities or to specific degree programs. In some cases, state authorization is linked to institutional or program quality, but more often it is a matter of appropriately registering with state agencies and providing evidence of adequate academic resources—such as libraries, teaching staff, and the like. Some states also take into account the perceived need for additional programs or institutions in the state. It is universally the case that there are controls over establishing or expanding public institutions or programs. Controls over private institutions vary from state to state and this process is less rigorous. Accreditation basically provides certification that an institution or program meets the minimum standards of academic quality and has the minimum resources deemed necessary.

Accreditation is not the same thing as quality control or assessment. In fact, there is no systematic quality control over higher education institutions or academic programs at the national level. In a few states, there are some limited and generally incomplete efforts to measure the academic quality of public institutions and their academic programs. While there is considerable discussion concerning the quality of academic programs and concern over the cost of providing academic degrees, no comprehensive plans exist to measure quality in any systematic way. One specific issue being discussed widely is the perceived need to measure the outcomes of academic programs in addition to the inputs, but there are no agreed standards or programs relating to such measures.

There is no national or state quality assessment of doctoral programs in any discipline. However, several agencies have attempted to rank academic institutions and discipline-based programs. The most influential and widely circulated such ranking is that done by *U.S. News & World Report*. The *U.S. News* annual rankings attempt to measure quality based on a number of variables for academic institutions and programs at all levels. Rankings are provided for graduate programs in many, but not all academic and professional fields, but there are no specific rankings for doctoral programs alone. The most comprehensive national evaluation of doctoral programs was

carried out by the Committee for the Study of Research-Doctorate Programs in the United States and was conducted by the National Research Council (Goldberger, Maher, and Flattau 1995). This study ranked doctoral programs in various academic fields but not in professional areas. Professional organizations, including some that accredit graduate programs, have been concerned with quality assessment and assurance as well. For the past 30 years, the Carnegie Foundation for the Advancement of Teaching has provided a categorization of American academic institutions by type—including a category for research and doctoral universities. While not a ranking, this listing helps to identify types of institutions.

The basic fact, however, is that the United States has a complex and highly effective set of accrediting arrangements, sponsored and managed by the academic community, that provides a basic “floor” concerning academic quality and resources at all levels of the postsecondary system, but very little in terms of quality assurance or assessment. Indeed, the United States is behind some other countries in thinking about and implementing programs in this area.

The Funding of Doctoral Study

The pattern of funding for doctoral education in the United States is complex. As with higher education generally, funding comes from a combination of sources. For doctoral education sources include the 50 state governments (mainly through funding of public higher education institutions and systems), the federal government (mainly through research grants to individual professors and occasionally to academic institutions and several different kinds of loan programs), tuition and fees paid by students, university endowments, philanthropic foundations, and businesses of various kinds. The mix of funding varies by field, type of institution, and even program within a university. Generalization is difficult.

Basic institutional support is provided by the states for public universities, although the proportion of state funding has decreased in many states as part of a public disinvestment in higher education generally and in the light of current economic difficulties. The federal government traditionally does not provide basic institutional funding, although it does support some university-based laboratories and facilities in areas defined as in the national interest—mainly although not exclusively defense related. Neither state nor federal funding is available for basic institutional support for private universities, although a few states do provide direct funding to private universities for doctoral education and the federal government funds some research facilities at private institutions. For private institutions, basic funding comes from tuition and fees, the university’s own endowment and other funds, and research grants and contracts.

The mix of funding varies by institution as well. The top 50 doctoral granting universities receive the bulk of research funding from the federal government. They also dominate foundation and corporate research funding. These universities are typically able to provide funding packages for many,

and in some cases, virtually all of their doctoral students. A large proportion of students have research assistantships and work directly on research projects with professors. This pattern holds for both public and private universities. Less prestigious universities have fewer financial resources. More of their students pay for their studies, and a larger proportion serve as teaching assistants than is the case at top-tier schools.

There are also differences by field and discipline. The sciences are generally better funded than the humanities and social sciences. A larger proportion of science doctoral students receive funding packages that permit them to study on a full-time basis. The size of stipends and scholarships is also typically larger. There is less external funding available in the humanities and social sciences. As a result, fewer students receive full financial support. Most students study part-time. A larger proportion obtain loans rather than grants; more take longer to complete their doctorates and more drop out before completing their degrees.

Providing funding for doctoral study in the U.S. is a perennial difficulty. The present situation is especially problematic because of a change in funding patterns in most states and the impact of the economic downturn. State governments, in general, have reduced their overall support to public higher education, and this has had an influence on doctoral education because the decline in general support has meant fewer resources, higher tuition charges, and less funding for academic facilities. At the same time, corporate R&D expenditures in some fields have declined. The federal government has, so far, not reduced funding for research significantly, but the focus of research funding has shifted to some extent. More important, the federal student loan programs have not kept pace either with demand or with the rising tuition charges at many universities. Funding for doctoral study faces some difficult challenges.

Doctoral Education as an International Enterprise

International students constitute an important element of doctoral study in the United States. Almost half (267,876) of all international students are studying at the graduate level, with a majority of these in doctoral programs. International students constitute 13.3 percent of all graduate students, significantly higher than the 2.7 percent of all undergraduate students that are international students. Just as important, international students tend to be concentrated at the most prestigious universities and in a small number of fields of study. Business and management is the most popular field for international students (almost 20 percent of enrollments are international students), followed by engineering and mathematics, and computer science. In these fields, about half of all doctorates are earned by international students. It is also the case that international students from a number of the countries sending the largest numbers to the United States—such as India, China, South Korea, and several others—tend not to return to their home countries immediately following the

completion of their degrees—with half or more remaining in the United States.³

In fields such as engineering, computer science, mathematics, business administration, and several others, a significant part of the professoriate is also from other countries. International students are especially numerous in doctoral programs at the most prestigious research-oriented universities. Many international students who earn doctorates in the United States do not return to their countries of origin, and significant numbers enter the professoriate (Choi 1995).⁴ Those who do return home bring the norms and orientations of their American doctoral training with them.

The model of American doctoral education—the commitment to teaching and research at the same institutions, rather than separating them in specialized research institutions and teaching-oriented universities; coursework as part of doctoral training; a variety of academic institutions of different quality, prestige, and orientations offering doctoral degrees; and a mixture of funding patterns have proved to be quite influential globally. While U.S. universities have not exported doctoral training abroad, as they have done with some undergraduate and especially professional degrees, other countries have looked to the United States as a model for expanding doctoral training. For example, Japan is currently expanding its doctoral training opportunities and is looking mainly to the U.S. for ideas.

Although the U.S. borrowed the basic concept of doctoral education from Germany in the 19th century, adapting it to meet American conditions, in recent years, the United States has not been much influenced by other countries. The influence flows largely from the United States to the rest of the world.

Challenges to Doctoral Education

Seen from abroad, American doctoral education seems successful and innovative. Unparalleled in size, comprehensiveness, and quality, doctoral education in the United States seems to have little to worry about. Yes, there are major criticisms made of doctoral education, and the entire system of doctoral training and research faces some difficult challenges in the coming decade. The following discussion highlights some of the main points of criticism currently being discussed.⁵

The Research Enterprise and Doctoral Education

Doctoral education is closely linked to the research enterprise in American higher education, especially to basic

³ Most of these statistics are from *Open Doors*, 2003.

⁴ In many fields, foreigners with U.S. doctorates find it easier to enter the academic profession than to compete for jobs in business or other sectors of the American economy. Americans, on the other hand, are often attracted to private sector employment where remuneration is higher than in academe. As a result, foreign degree holders are probably overrepresented in academe.

⁵ This discussion follows many of the points made by Maresi Nerad in her paper "The Ph.D. in the U.S.: Criticisms, Facts, and Remedies." The Council of Graduate Schools, which is the main organization representing the interests of graduate programs in the U.S., highlights many of these issues in its publications and on its Web site.

research. In the sciences, the traditional model of research production is under strain. There is greater pressure for research to be linked to applied usage, especially so that income from patents and other innovations can be earned (Bok 2003). There is also pressure from private-sector corporations, especially in fields such as biotechnology, to be involved in academic research and to have rights to the results of research done on campus. Traditional funders of basic research, including such government agencies as the National Science Foundation as well as private philanthropic foundations, have been critical of the traditional patterns of research funding. At present, the level of funding for research has not significantly decreased although there is some evidence that patterns of funding may be changing. Further, funders are in many cases less willing to provide money for doctoral students, especially when such support cannot be directly justified in terms of research outcomes.

Doctoral education, especially in the sciences and at the most prestigious research-oriented universities, is linked to trends in research funding—both amounts of money available for research and the configuration of research support. This introduces significant uncertainty in terms of levels of funding that will be available, the areas that will receive external support, and the numbers of students who can be supported.

The tight link between external research funding and doctoral education in the sciences at the most prestigious universities has always been problematical. So long as funds were available and providers permitted the academic institutions sufficient autonomy, the system worked. Now, there are signs that this status quo is changing, and it is not clear how either basic research or the provision of funds for doctoral students will survive. This situation has never been a major factor in the social sciences or especially in the humanities, since significant research funding has not in any case been available.

Narrowness and Limited Relevance of Doctoral Training

As knowledge has expanded, there has been a trend toward increased specialization in doctoral training, producing doctoral degree holders whose skills are limited and who have limited opportunities for employment as a result (National Academy of Sciences 1995). Employers in industry and many students and recent graduates complain that their training was too narrow and that graduates were ill prepared for a rapidly changing job market. The doctoral curriculum and the philosophy of doctoral education is mainly in the hands of professors who are in general insulated from the job market.

A related complaint, perhaps most widespread in the humanities and social sciences, is that doctoral degree holders are not well trained to teach. This complaint is related to the narrowness of the curriculum, but it also highlights the fact

that doctoral programs provide virtually no training in pedagogy and many offer only limited, if any, opportunities to teach.⁶ It has been pointed out that the majority of doctoral degree recipients in the humanities and social sciences, and a large proportion of the total number, engage primarily in teaching at the postsecondary level, including in community colleges. Critics have advocated that doctoral preparation include training to teach. They point out that even those doctoral students who serve as teaching or laboratory assistants during their degree program are often not given instruction in how to perform their limited teaching duties. While pedagogical training has never been part of doctoral education in the United States, many advocate it as a necessary reform to meet the changing roles of doctoral degree holders in many fields.

Doctoral training, many critics argue, has also become ever more specialized, creating further problems for degree holders as they enter an increasingly differentiated and complex job market. The reasons for increased specialization relate to the expansion of scientific knowledge in all fields and the perceived need to discover new knowledge, albeit in an ever contracting universe. Doctoral faculty, committed to the traditional values of scholarship in this context, have contributed to this specialization. Critics have also argued that doctoral training is also inappropriate for contemporary science and scholarship. It does not sufficiently emphasize collaborative work and new trends in scientific investigation. These trends have played themselves out in different ways in various disciplines, with some more affected than others, and with variations by broad scientific field as well.

Growing Irrelevance in a Changing Job Market

Due in part to the overspecialization discussed here, to a changing academic labor market, and to the fact that growing numbers of Ph.D. degree holders are finding employment outside the universities, there has been criticism that the doctorate has become irrelevant (Altbach 1999). Faculty members responsible for doctoral training still have the traditional model of a faculty career in mind. The fact is even for those entering the academic profession, the terms and conditions of the professoriate have changed for many. A declining proportion of doctoral degree holders can expect to work at research-oriented universities, while a growing number find themselves at colleges and universities that focus on teaching rather than research. And in many fields only a minority, and sometimes a small minority, find positions in academe. The job market for doctorates has been ever more diverse as many enter private industry, including entirely new fields such as biotechnology, consulting firms, and the like. Government service at various levels also increasingly attracts doctoral graduates.

This changing and in many ways expanding job market for Ph.D. holders has put pressure on doctoral training to be more flexible and aimed at a wider array of jobs than the traditional academic profession. While some fields have made some minor changes, there has been little rethinking of the links between doctoral training and the changing labor mar-

⁶ The Carnegie Foundation for the Advancement of Teaching is currently studying doctoral preparation in the United States and will focus on teaching as an essential part of the process.

ket. The Center for Innovation and Research in Graduate Education has done research to show that both the career goals of doctoral students and the actual jobs obtained by graduates are changing.⁷ In biochemistry, for example only 32 percent of doctoral students want to become professors, while in electrical engineering 35 percent aspire to the professoriate. In English, 81 percent desire an academic career, as do 72 percent in political science. In terms of actual employment, the “Ph.D’s Ten-Year Later” study found that about two-thirds of doctorates in English, mathematics, and political science held professorial positions, while half of those in biochemistry and roughly one-third of those in computer science and electrical engineering were in the professoriate (Nerad 2002, p.7). A significant and growing number of Ph.D. recipients are employed outside academe.

The transition from doctoral study to work is also increasingly problematical in the United States. Obtaining an academic job, still a goal for many doctoral students and the predominant desire in many fields, is difficult and ever more complex. It is taking longer for a Ph.D. holder to find a tenure-track academic job. The growth of postdocs in the sciences lengthens the time period of obtaining a “regular” academic position in those disciplines. And there is little articulation between doctoral study and the growing number of nonacademic jobs available to Ph.Ds. Efforts are being made to smooth this degree-to-work transition, but the problems are considerable.

“Time- to-Degree” and Degree Completion

Many have noted that obtaining the doctoral degree is taking longer on average, and this is seen as a problem. It now takes between six and nine years to complete a doctorate—with variations by field and by institution. Students in the humanities take the longest, while those in life sciences complete their studies most quickly. There are many reasons for this trend. Faculty point out that knowledge has expanded and it takes more time to impart the necessary skills (including ever more complex methodologies) to doctoral students. As funding has become less available for the growing number of doctoral students, many are forced to study part-time or to delay their studies. In the humanities, where funding is most problematical, students often accrue loan obligations of \$20,000 to \$30,000 during their doctoral studies. Further, the changes in patterns of funding tend to slow doctoral completion as students are asked to serve as teaching or research assistants, often in areas peripherally related to their specialty.

Some have pointed out that the increased time-to-degree is not cost effective either for students or academic institutions. The universities accrue costs from having students remain on campus for an extended period, and of course, the

students themselves face low incomes and the continuing expense of study. Increased time-to-degree lowers morale and contributes to a growing rate of noncompletion of studies. This complex nexus of conditions has created a pattern of difficulties that has made doctoral study more difficult.

Recruiting the Best and the Brightest

One of the greatest challenges for American higher education in the coming period will be recruiting top-quality scholars and scientists to staff the postsecondary education system and especially to ensure that the research universities have the best-quality staff. Doctoral education plays a key role in this arena because the academic profession as well as those who staff research laboratories and institutions of all kinds typically hold doctorates and are trained at research universities that offer doctoral degrees. Those at the top of the system are trained in the key 20 or 30 research universities.

Ensuring future scientific and academic leadership is now in question. The problems, some of which are discussed here, facing doctoral education in particular and higher education in general in the United States, are serious. Continuing financial problems are placing strains on the doctoral training system and on higher education. Universities find it hard to compete with the private sector for the best talent. Many of the best young minds are unwilling to undergo the long, poorly paid, and often disorganized road to a doctoral degree. The problems encountered by Ph.D.s in obtaining academic employment are another deterrent.

The United States imports some of the best minds from other countries. In some cases, these people are trained at American universities, and many seek employment in u.s. academe. Others are recruited from universities overseas, lured by better salaries and working conditions in the United States. This strategy is neither fair to other countries, nor is it an assured means of providing the best talent.

Conclusion

This analysis has provided both an overview of the pattern of American doctoral study and an indication of some of the problems facing this key sector of higher education. It may seem paradoxical that the system of doctoral education admired, and often replicated, in other countries, is seen by many people as having some severe problems. The basic structure of doctoral training in the United States as it has evolved during the past century, is an effective means of training creative specialists in the disciplines and, increasingly, in multidisciplinary fields. Doctoral programs have proved to be sufficiently flexible to allow for new scientific developments and to adjust to the development of mass higher education.

The American pattern of combining instruction and research as part of doctoral preparation has proved to be effective. The “taught doctorate,” as opposed to the European-style research doctorate, has been effective in providing the depth of knowledge required by the expanding disciplines.

⁷ The Center for Innovation and Research in Graduate Education is a new agency involved in research and analysis relating to graduate study. Further information can be obtained from CIRGE, Box 353600, University of Washington, Seattle, WA 98195, USA. E-mail: cirge@u.washington.edu

Locating doctoral study in universities rather than specialized research-focused institutions has also been effective. The fact that doctoral education exists in a large and highly differentiated academic system is also a major advantage—doctoral education is, for the most part, located at the best universities, institutions that can in general afford to provide the facilities needed for quality instruction and research.

The basic structure of American doctoral education does not seem to be in need of dramatic change. However, reforms that will ensure that past successes can be continued are needed. Of greatest importance, perhaps, is ensuring that sufficient funds are made available to provide high-quality training and to support the research enterprise that is integrally related to doctoral education. It is also necessary to ensure that doctoral programs are sensitive to changing employment trends, scientific developments, and the needs of doctoral students and faculty.

References

- Altbach, Philip G. 1999. Harsh realities: The professoriate faces a new century. In *American Higher Education in the 21st Century: Social, Political, and Economic Challenges*, edited by P.G. Altbach, R.O. Berdahl, and P.J. Gumpert. pp. 271–297. Baltimore, MD: Johns Hopkins University Press.
- . 2001. The American academic model in comparative perspective. In *In Defense of American Higher Education*, edited by P.G. Altbach, P.J. Gumpert and D.B. Johnstone. pp. 11–37. Baltimore, MD: Johns Hopkins University Press.
- Bok, Derek. 2003. *Universities in the Marketplace: The Commercialization of Higher Education*. Princeton, NJ: Princeton University Press.
- Choi, Hyaewool. 1995. *An International Scientific Community: Asian Scholars in the United States*. Westport, CT: Praeger.
- Clark, Burton R. (Ed.). 1993. *The Research Foundations of Graduate Education: Germany, Britain, France, United States, Japan*. Berkeley, CA: University of California Press.
- Clark, Burton R. 1995. *Places of Inquiry: Research and Advanced Education in Modern Universities*. Berkeley, CA: University of California Press.
- Conrad, Clifton F., Jennifer Grant Haworth, and Susan Bolyard Millar. 1993. *A Silent Success: Master's Education in the United States*. Baltimore, MD: Johns Hopkins University Press.
- Goldberger, Marvin L., Brendan A. Maher, and Pamela E. Flattau, (Eds.). 1995. *Research-Doctoral Programs in the United States: Continuity and Change*. Washington, D.C.: National Academy Press.
- Graham, Hugh Davis, and Nancy Diamond. 1997. *The Rise of American Research Universities: Elites and Challenges in the Postwar Era*. Baltimore, MD: Johns Hopkins University Press.
- Geiger, Roger L. 1986. *To Advance Knowledge: The Growth of American Research Universities, 1900–1940*. New York: Oxford University Press.
- . 1993. *Research and Relevant Knowledge: American Research Universities Since World War II*. New York: Oxford University Press.
- Gumpert, Patricia J. 1993. Graduate education and organized research in the United States. In *The Research Foundations of Graduate Education*, edited by B.R. Clark. pp. 225–260. Berkeley, CA: University of California Press.
- Koh, Hey-Kyung. 2003. *Open Doors: Report on International Educational Exchange*. New York: Institute of International Education.
- National Academy of Sciences. 1995. *Reshaping the Graduate Education of Scientists and Engineers*. Washington, D.C.: National Academy Press.
- Nerad, Maresi. 2002. *The Ph.D. in the US: Criticisms, Facts, and Remedies*. Paper prepared for a conference at the Center for Higher Education Policy Studies, University of Twente, the Netherlands.
- Rhoades, Gary. 1991. Graduate education. In *International Higher Education: An Encyclopedia*, edited by Philip G. Altbach. pp. 127–146. New York: Garland.

ABOUT THE AUTHOR

Philip G. Altbach is Monan Professor of Higher Education and Director of the Center for International Higher Education at Boston College. He is author of *Comparative Higher Education: Knowledge, Development and the University, Student Politics in America*, and other books. He edited *International Higher Education: An Encyclopedia*.

This article originally appeared in the Fall 2004 (Volume 80, No. 2) issue of College & University, and is being reproduced/ distributed with the permission of the American Association of Collegiate Registrars and Admissions Officers. Copyright 2004.