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ABSTRACT

This report presents a comprehensive study of graduate education in Illinois. The report begins with an overview of current conditions examining the origins and development of advanced study in the state, Board of Higher Education policies, and salient program and student characteristics at Illinois colleges and universities. The configuration and capacity of graduate programs at public universities are examined and discussion analyzes the following emerging issues: the responsiveness and effectiveness of existing program structures, placement of students and program capacity, and graduate education financing. New models for doctoral education which address these issues are described. The report concludes with a statewide agenda for graduate education for the coming year, and suggests new policies for consideration by the Board. These recommendations are grouped to address the following areas: need, quality, objectives, research, professional education, preparation for careers, admissions, curriculum and faculty, and viability. Two appendixes present, first, a summary of existing Board of Higher Education policies on graduate education and, second, a detailed examination, by field, identifying areas where public universities should consider program eliminations or other program modifications, undergraduate expenditures at the department level, number of faculty and staff, tuition and fee waivers are included. Twenty-seven tables provide detailed data on the current status of graduate study in Illinois and trend data since 1984. (Author/JPB)

Item #6A
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Background

Introduction

This report presents a comprehensive study of graduate education in Illinois, the first such review since the Board of Higher Education revised its policies on doctoral education in the mid 1980s. The report begins with an overview of current conditions examining the origins and development of advanced study in the state, Board policies, and salient program and student characteristics at Illinois colleges and universities. The configuration and capacity of graduate programs at public universities are examined and an appendix presents a detailed examination, by field, identifying areas where public universities should consider program eliminations or other program modifications. The report continues with a discussion of emerging issues: the responsiveness and effectiveness of existing program structures, placement of students and program capacity, and graduate education financing. New models for doctoral education which address these issues are described. The report concludes with a statewide agenda for graduate education for the coming year, and suggests new policies for consideration by the Board. The policies will be brought to the Board for action at a fall meeting.

Evolution of Graduate Study in Illinois

Graduate education in Illinois is a large, productive, and diverse enterprise with a long and distinguished private and public tradition. Almost from the inception of advanced study in the United States when some American universities began modeling their practices after German research universities in the late nineteenth century, Illinois citizens and institutions have assumed a leadership position in American graduate education. Perhaps the state's early historical influence was best illustrated in 1900 when the University of Illinois at Urbana-Champaign and The University of Chicago joined with 12 other universities in the United States to found the Association of American Universities, an organization whose establishment represented "both a fitting symbol and a concrete embodiment of the emergence of twentieth century American research universities".

From these beginnings, graduate education in Illinois has grown and prospered. In the past year, over 60 institutions of higher education sponsored more than 1,700 master's and doctoral programs in the process providing education to nearly 100,000 students and awarding nearly 24,000 master's degrees and 3,000 doctoral degrees. Graduate education programs covering a wide range of disciplines and serving a diverse student clientele can be found in each major metropolitan region of the state, as well as in other urban, suburban, and rural settings. They range from programs that are designed to offer entry or development in professional careers to large scale, intensive research projects that have far-reaching technological and industrial applications. The resource investment in graduate education is substantial. At Illinois public universities, costs for graduate education (excluding indirect costs) amounted to $228 million in fiscal year 1995, or about two-thirds of undergraduate costs.

To a large extent, the factors that influenced the founding of graduate programs have continued to fuel their growth: the increasing specialization and diversification of the economy including the development of new technology, and the expanding role of professions in American life. Corporations

and professions have benefited by drawing on the expanding body of knowledge offered by graduate education. Growth in knowledge and resources also has generated internal pressure within academe to create structured curricula, organized by disciplines and subdisciplines, and to establish standards for training for the Ph.D. When viewed broadly, the growth of graduate education reflects a sensitivity and responsiveness to societal and economic needs. Interestingly, this expansion has been driven, in large part, by faculty for whom intellectual curiosity and creativity often have been ends in themselves.

In recent decades, the growth in graduate education has received additional impetus from federal funding of research. Under the leadership of the National Science Foundation and National Institutes of Health, a large and complex federal funding structure emerged with defense priorities, albeit broadly conceived, in the 1950s, 1960s and 1970s and, more recently, with a growing emphasis upon life science and health research. This new federal role arose at the same time that higher education was enlarging its physical plant and reshaping its program offerings to accommodate the needs of the baby boom generation. The research emphasis affected the articulation of higher education's expansion as expressed both through changes in institutional missions--with former teachers' colleges now offering master's and doctoral degrees in many disciplines--and faculty activity--with hiring, tenure, and promotion decisions showing greater stress on research at all types of colleges and universities.

Given the importance of graduate education, higher education must periodically reexamine the policies and operations that affect advanced study. A reexamination is particularly needed at the current time since there are indications of stresses and strains within graduate education, as well as a questioning of its objectives, structures, and products. Some disciplines have endured a chronic, overproduction of Ph.D.s for more than two decades. More recently, conditions and issues of doctoral oversupply have spread to fields in mathematics, sciences, and engineering. Decreasing federal research support, particularly in the humanities and social sciences, and a growing number of researchers competing for federal grants have placed additional pressure upon graduate programs.

External changes such as corporate restructuring have had implications for the conduct of research and development within American business and, indirectly, for graduate education. A prestigious national study jointly conducted by the National Academy of Science, the National Institutes of Health, and the National Academy of Engineering recently has called for a "reshaping" of graduate education in mathematics, sciences, and engineering to produce graduates who are highly trained, yet better able to adapt to the research needs of the private sector. A major theme of this national report resonates in many contemporary critiques: graduate education must pay greater attention to preparing students for their future professional roles both inside and outside academe. These studies do not downgrade the importance of graduate education or the role of research, but assert the need for better graduate training and the development of broader student skills, ultimately seeking to raise the general level of intellectual leadership that is a product of advanced study.

Board of Higher Education Policy

The Board of Higher Education adopted its existing policy on graduate education in 1985, after an extensive study undertaken at that time. Focusing on doctoral education, the policies emphasize issues such as need and quality that have been of long-standing concern to the Board. The policies, reproduced in Appendix I, start from the premise that doctoral programs are important to the "state's future economic, social, and cultural development". Given the substantial investment required for high quality doctoral programs, the policies stress the need for rigorous Board scrutiny before granting approval of institutional requests. "New doctoral programs in public universities will be approved only when need can be clearly established based on an examination of existing doctoral capacity, student demand, occupational trends, the importance of the proposed program for the overall conduct of quality doctoral education at the university, and the importance of anticipated research and public service outcomes that are associated with the program."

Board policy also stresses program quality which is to receive "special consideration" in program review and approval. This quality emphasis reflects, in part, the Board's 1985 study of graduate education and an examination of the results of a national reputational ranking of doctoral programs which displayed a "bimodal" pattern among Illinois universities with clusters of programs at the upper and lower ends. Existing policy counsels that universities that have programs with serious quality deficiencies should be advised that such programs are "no longer educationally and economically justified". The Board should support university efforts to strengthen low quality programs only "if the university's doctoral mission statement provides a definitive basis for determining that the program is central to the university's long-run priorities for doctoral education."

Current Board policies on graduate education are concise and do not venture beyond issues of need and quality. In this regard, the restricted policies on graduate education contrast with the Board's more extensive policies on undergraduate education. While there are issues within graduate education that are esoteric and complex, it is the assumption of this study that a broad examination of practice and policy may prove beneficial, especially if examined within the context of the Board's initiative on Priorities, Quality, and Productivity (P•Q•P).

Program Characteristics

Illinois colleges and universities offer a wide and growing array of graduate programs. An increasingly diverse and specialized workforce and growth in the number of professions and professional standards have contributed to enhanced program activity. For instance, some professions such as library science, speech pathology, and social work require a master's degree as a prerequisite for certification and practice, while other professions such as physical therapy are moving toward a master's degree as the required entry-level credential. In many fields, such as teaching and business, advanced study enhances skills and presents opportunities for promotion and salary advancement. The success and development of academic study, itself, also have generated further program growth. Biology, for example, once simply categorized in a few subdisciplines such as botany and zoology, now consists of a vast array of subdisciplines offering a long menu of advanced study opportunities in programs such as cell and structural biology, ecology, microbiology, biochemistry, molecular and cell biology, biophysics, integrative biology, developmental biology, and genetics.

Table 1 indicates that Illinois institutions of higher education currently offer 1,258 master's programs. About 40 percent of these programs are in three fields: education, health professions, and business. Table 2 shows that Illinois universities offer 472 doctoral programs. Biological sciences, followed by education, constitute the fields with the most doctoral offerings. In addition, Illinois institutions currently offer more than 600 master's programs off-campus, about three-quarters of which are in the fields of education, business, and engineering. Illinois institutions offer 12 doctoral programs off-campus, nine in the field of education.

Sixty-two Illinois colleges and universities offer master's programs and 33 universities offer doctoral programs. The large research universities sponsor the most programs. For instance, the University of Illinois at Urbana-Champaign offers 123 master's and 84 doctoral programs, Northwestern University offers 111 master's and 83 doctoral programs, and The University of Chicago offers 88 master's and 74 doctoral programs. As shown in Tables 3 and 4, many institutions have multiple graduate offerings, although colleges and universities commonly develop their own niche or specialties. Some programs, usually at the master's level, have a regional focus. In other cases, programs cluster around a discipline or group of related disciplines. A few institutions, such as Illinois Institute of Technology, specialize by offering graduate programs and courses off-campus via telecommunications.

The quality of advanced study in Illinois is very high, partly reflecting the presence of three universities with distinguished national reputations: the University of Illinois at Urbana/Champaign, The University of Chicago, and Northwestern University. State residents can choose among multiple

programs of the highest quality in almost all academic fields. In the past year, the National Research Council (NRC) published a study of doctoral programs which included a reputational ranking, and was a follow-up to an earlier study published during the 1980s. Table 5 shows the results of the NRC study, by field, for Illinois institutions. Of the 145 Illinois programs examined by the study, 59 programs were ranked in the first quartile. Over 60 percent of Illinois programs were placed in the top half of the national rankings.

Student Characteristics

The past decade has exhibited strong absolute and relative increases in graduate student participation (see Figures A to D). In 1995, Illinois institutions awarded 23,731 master's degrees and advanced certificates, and 2,835 doctoral degrees. From 1984 to 1995, master's recipients increased by 41 percent and doctoral recipients by 48 percent, in contrast with a 11 percent growth in bachelor degree recipients. In graduate study, and particularly doctoral education, degrees are often a better measure of student participation than enrollment, since institutions can vary in the methods used for identifying a master's versus a doctoral student, and fall enrollment data can mask differences in program size and scope.

Master's enrollment is weighted towards a few disciplines, as shown in Table 6. More than half of all master's degrees are awarded in two fields: business and education. When degrees in these fields are combined with degrees from health professions, public administration, and engineering, they constitute over two-thirds of all master's degrees granted by Illinois institutions. Doctoral degrees are spread more evenly across academic fields with the greatest number of recipients in education, engineering, theology and religion, and psychology (see Table 7). Most fields had significant growth in the number of master's and doctoral recipients during the past decade. Unfortunately, the largest increases were not necessarily in fields with favorable employment opportunities. For example, some of the strongest growth in Ph.D. production occurred in mathematics (174) and English (139 percent) where many graduates across the United States had difficulties securing appropriate placement.

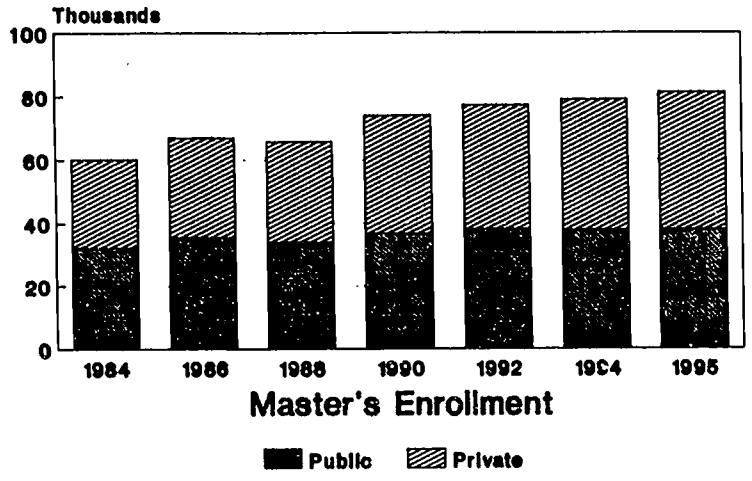
Participation by female and minority students in graduate programs, historically very low, has shown strong improvement in recent years. While females actively participate in master's programs where they account for more than half of total degree awards, female representation declines at the doctoral level. This trend has begun to reverse during the past decade as female doctoral degree recipients grew from 32 percent in 1985 to 37 percent in 1994.

Perhaps one of the most important trends in higher education during the past decade has been the rise in Black and Hispanic participation in graduate education (see Figures E to H). *Minority Student Participation and Achievement in Graduate and First-Professional Degree Programs in Illinois Higher Education* (July, 1995) presents extensive enrollment and degree information on this topic. The study demonstrates that Black and Hispanic enrollment and degree recipients increased in the past decade at all levels of advanced study, types of institutions, and types of academic programs, with enrollment and degree growth exceeding national increases for both populations. The report concludes that "since the gains in Illinois have occurred at all types of institutions, it seems likely that state-level policies and programs are in part responsible for this improvement. Financial aid programs for minority graduate students such as the Illinois Consortium for Educational Opportunity Program and the Illinois Minority Graduate Incentive Program, which originated in the 1980s, have facilitated access to advanced study in Illinois colleges and universities. Projects funded through the Higher Education Cooperation Act (HECA) also have supported the cooperative efforts of colleges and universities to enhance minority participation and achievement at precollegiate, baccalaureate, and graduate levels."

Another representational characteristic of graduate study is the strong presence of foreign students, particularly in doctoral programs where they account for more than one-quarter of degree

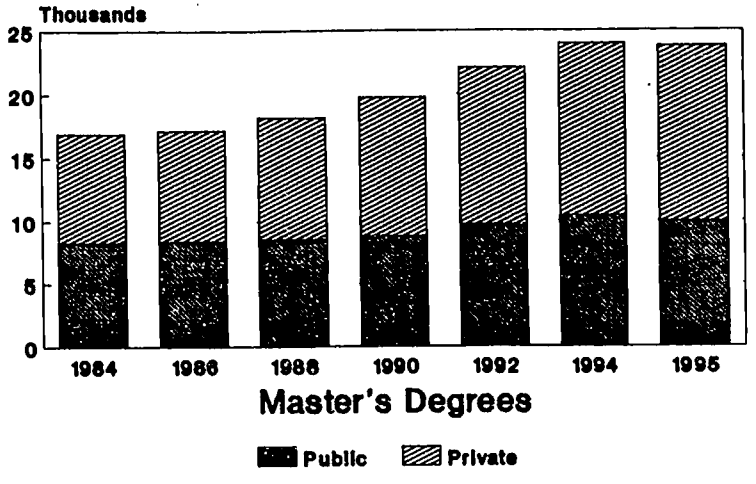
GRADUATE STUDENT ENROLLMENT AND DEGREES AWARDED

Figure A



•Also Includes Advanced Certificates

Figure B



• Includes Advanced Certificates

Figure C

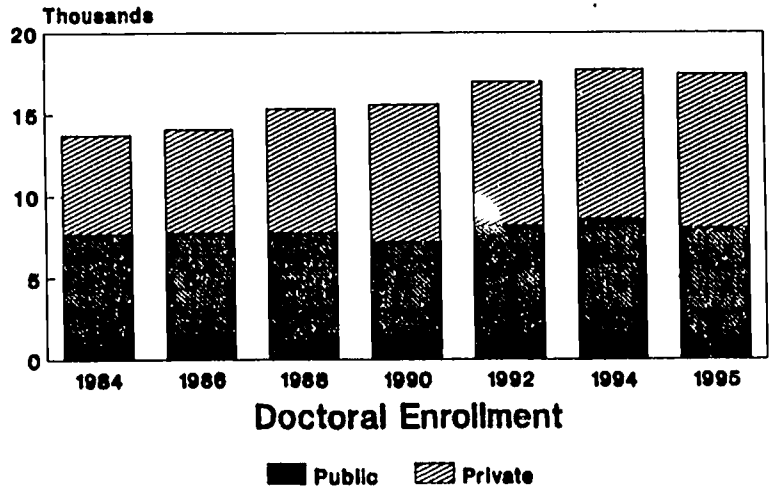
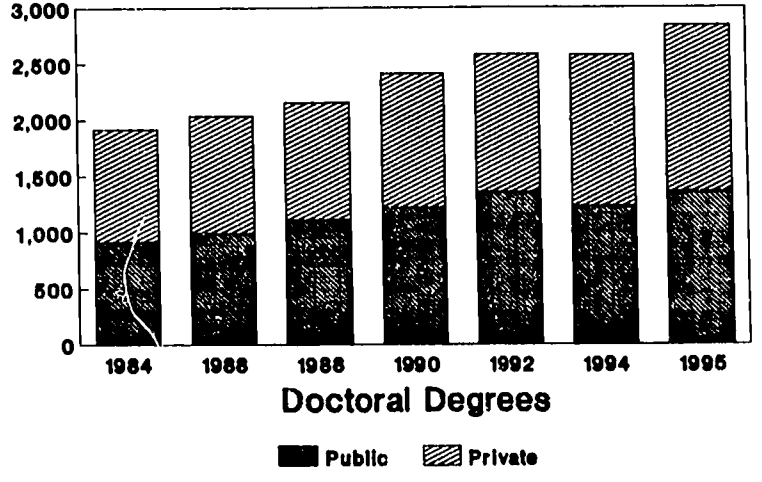
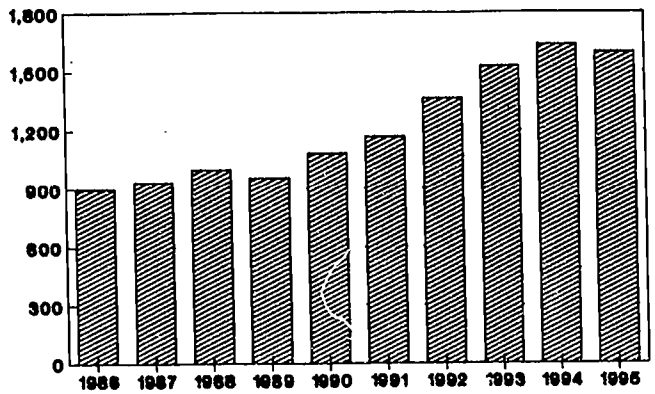


Figure D



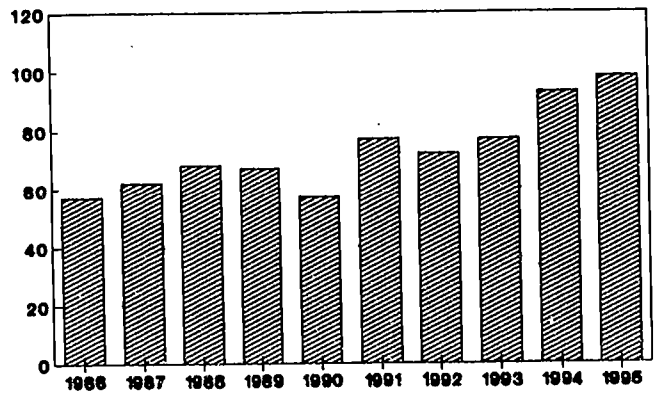
BLACK AND HISPANIC GRADUATE REPRESENTATION

Figure E



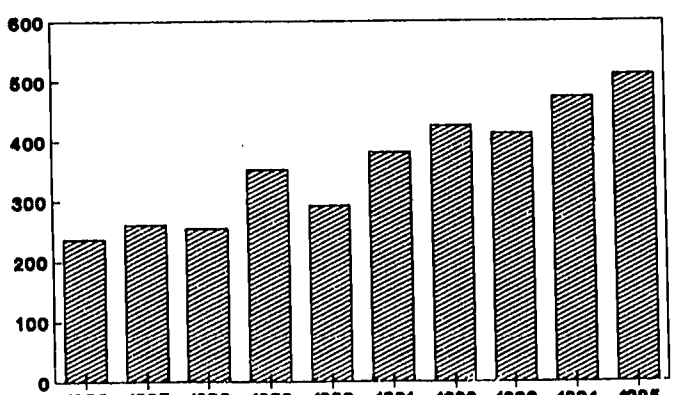
Black Master's Recipients

Figure F



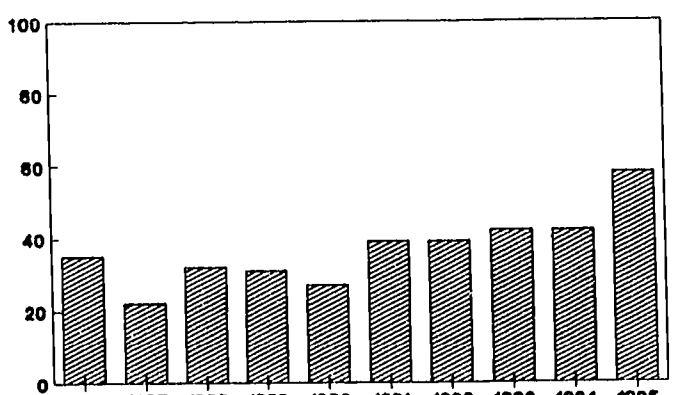
Black Doctoral Recipients

Figure G



Hispanic Master's Recipients

Figure H



Hispanic Doctoral Recipients

recipients. As shown in Table 8, foreign students are found in all types of programs with somewhat greater participation in science, mathematics, and engineering fields. In the past year, foreign students comprised more than half of all doctoral recipients at Illinois institutions in fields such as engineering, computer science, and agriculture. National data indicate that admission criteria for foreign students are more rigorous than for domestic students and foreign students often have advanced quantitative and conceptual skills that contribute to university research projects. Nationally, about 80 percent of non-resident aliens are on temporary visas. According to the most recent survey of 1993 doctoral recipients by the National Research Council, about 55 percent of non-resident aliens with temporary visas that received doctoral degrees in 1993 intended to remain in the United States. Temporary residents can extend their stay in the United States after receiving the degree, but they can not remain indefinitely without a change in visa status.

Graduate students are found in many different types of institutions, as shown in Tables 9 and 10. The greatest number of students are at the major research universities, such as the University of Illinois at Urbana-Champaign, Northwestern University, and The University of Chicago, which have some of the largest graduate programs in the United States. The University of Illinois at Urbana-Champaign, for example, ranked second in the nation in annual Ph.D. production in the most recent federal survey. Many colleges and universities in the state have increased graduate program capacity over the past decade. A few private institutions, such as Concordia University, Aurora University, and National-Louis University, have enlarged substantially their master's programs, contributing to more rapid private sector growth. Public and private institutions experienced comparable expansion in doctoral programs with the largest increases occurring at the University of Illinois at Chicago and specialized private institutions such as Rush University.

While some universities in Illinois are highly selective, enrolling students from across the United States, generally there is broad access to graduate study in the state. This accessibility was recently demonstrated in a study conducted by the Ohio Board of Regents which examined the degree production per 1,000 population in states similar to Ohio. As shown in Table 11, the study indicated that Illinois had the highest percentage of master's and doctoral degrees awarded per 1,000 population of the seven states examined. Illinois' production of degrees per 1,000 population was higher than the national average at all program levels (associate degree through the doctoral degree), except the baccalaureate.

Graduate Program Cost and Resources

Examining the costs, resources, and benefits of advanced study is far more complex than examining the financial components of undergraduate education, largely because of the research and service responsibilities associated with graduate programs. Graduate education can be expensive, particularly in doctoral programs, where faculty work closely with students, often meeting in small group seminars or individually, such as in the supervision of a dissertation. Graduate faculty are among the most distinguished and well paid within their disciplines, another factor contributing to high cost. Graduate students also invest substantial time and resources in the pursuit of their degree, foregoing other career opportunities. The National Research Council indicates that, on average, recent Ph.D. recipients received their degrees 11 years after receipt of their bachelor's degree. From a state or institutional perspective, the cost of graduate programs is partly offset by the external resources that they receive from federal and private research grants. Also, many graduate students serve as teaching or research assistants. These service responsibilities help reduce undergraduate education and research personnel costs, although large universities do use other means to achieve efficiencies.

Information pertaining to graduate student costs and faculty resources at public universities is presented in Tables 12 to 15, and below in Table A. Again, these data demonstrate the relative expense of graduate education. They also indicate substantial institutional differences even among similar types of universities. For instance, the ratio between undergraduate and graduate expenditures

is much different at Northeastern Illinois University than at Eastern Illinois University. Over the past decade, growth in graduate expenditures and staff resources at public universities has exceeded growth in undergraduate expenditures and staff, with the largest increases at the University of Illinois at Chicago and Northeastern Illinois University.

Table A

GRADUATE AND UNDERGRADUATE EDUCATION AT PUBLIC UNIVERSITIES
INDICATORS OF DEMAND AND RESOURCE ALLOCATION
FISCAL YEAR 1995

Indicators	Undergraduate	Graduate	Undergraduate/ Graduate Ratio
Enrollment*	140,518	46,120	3.05
Degrees	30,170	11,326	2.66
Faculty Staff-Years	6,506	2,763	2.35
Expenditures**	$378,019,000	$227,556,000	1.66

* Fall 1995
** Departmental Expenditures

Source: Board of Higher Education Surveys, Cost Study, and Faculty Credit Hour Study

Since a graduate degree, particularly at the doctoral level, takes years to complete, and a significant number of students fail to finish their course of study, another cost perspective is presented by measuring cost per degree. Table 16 shows the average cost for a master's degree and a doctoral degree in selected fields at public universities. The table computes costs per degree by field based upon a five-year average of degrees and departmental costs (excluding the allocation of indirect costs). The table indicates not only the greater cost of doctoral education compared with master's education, but the substantial cost variation by field at each level. In some fields, higher cost reflects the small number of doctoral students enrolled per program, while in other fields resource needs, such as state-of-the-art technology, are a significant factor contributing to higher cost.

Graduate programs directly contribute to the state's economic development both by supplying trained professionals to the labor pool and through research applications. The most recent information on federal expenditures indicates that Illinois universities received $375 million in 1992 in federal funding for science and engineering research and development. Illinois institutions receiving the most support included the University of Illinois at Urbana-Champaign ($111 million), The University of Chicago ($99 million), Northwestern University ($79 million), and the University of Illinois at Chicago ($47 million). These four institutions ranked among the top 65 universities in the United States in federal research and development funds. Also, IIT Research Institute received $87 million, while an additional 26 colleges and universities in the state received a total of $39 million in federal funds. These funding totals provide only a partial indication of higher education's involvement in federally supported research and development projects. For example, The University of Chicago operates Argonne National Laboratory, a federally funded center for energy research, and a number of universities in Illinois participate with other institutions across the country in research at Fermi Laboratory in Batavia, a federally funded center for the study of high energy physics. College and university faculty and staff also are involved in smaller scale federal projects sponsored by independent nonprofit associations such as health research institutes and museums.

The National Science Foundation (NSF) indicates that colleges and universities now represent a greater share of total research and development funding throughout the United States. This growth

reflects an increase in industry-university partnerships and is part of a changing pattern in research and development funding. The NSF reports that "industry has replaced the Federal Government as the Nation's largest source of research and development support, even as industry's share of the research and development performance total has fallen considerably. State and industry funding of university research has expanded greatly in recognition of the contributions of such research to economic development and commercial competitiveness. The focus of federal research and development funding also is shifting, moving away from defense and toward civilian strategic concerns. These changes are likely to continue and even accelerate in the future."

Graduate Program Configuration and Capacity at Public Universities

Since the beginning of the P•Q•P initiative in 1991, the Board of Higher Education has encouraged colleges and universities to build upon programmatic strengths by reinvesting resources through the elimination of weaker programs. To aid in this process, Board staff conducted a statewide analysis of instructional units at public universities in 1992. Since then, some program eliminations and restructuring have occurred. Board staff also has continued to annually review graduate programs under the statewide program review schedule. As part of this report on graduate education, staff again has reviewed public university program configuration and capacity at the master's and doctoral levels. Appendix II offers a detailed examination, by field, identifying those fields where public universities should consider program eliminations or other program modifications.

The analysis presented in Appendix II focuses on key program measures such as program major enrollment, degree production, costs, and centrality. Much of this information is summarized in Tables 17 and 18 with rankings established for each measure based upon averages for the past three fiscal years. Low, moderate, and high categories for each measure are established. Thus, the reader can examine the rankings for each measure of a particular field (for example, student demand, costs, degree production, and centrality in the field of education) or compare rankings by field for a single measure (for example, the fields with low, moderate, and high cost). To examine occupational demand, the field analyses gathered information from various sources including the National Research Council, the Illinois Department of Employment Security, and professional associations.

To briefly summarize the study's findings at the master's level, programs in highest demand are closely associated with professional occupations--architecture and urban planning, business, public affairs and social work, and health. Student demand for education also is high, but numerous programs keep demand per program moderate. In general, costs are highest for those programs with sophisticated equipment or where other resources are needed to maintain high quality. High-cost programs include engineering and technology, biological sciences, physical sciences, health, and visual and performing arts. It is less clear why programs in ethnic and area studies and philosophy and religion have high costs. Centrality, or the degree to which a program serves non-majors, also is an important measure of a program's priority. Among master's degree programs, agriculture, ethnic and area studies, communications, foreign languages, English, and mathematics ranked high on centrality.

To briefly summarize the study's findings at the doctoral level, student demand is greatest for the one doctoral program in the growing field of computer science. Student demand also is high for engineering, library science, physical sciences, psychology, and public affairs and social work. Unfortunately, occupational demand for many of these fields has been shrinking, due in part to the high number of graduates. National data and studies by professional associations indicate that there is an over-supply of Ph.D. recipients in engineering, foreign languages, English, mathematics, philosophy, physical sciences, psychology, and social sciences and history. In general, universities should reduce capacity in these fields. Recent statewide analyses in English, mathematics, philosophy, and psychology make specific recommendations for program reduction.

Major Issues

Because of the size and scope of graduate education, there are always countless issues of varying complexity and importance. This paper focuses on emerging and fundamental issues of purpose, structure, size, and equity.

Program Purposes, Objectives and Structures

In the past two or three decades, a transformation has occurred in graduate education at the master's level. Historically, the master's degree, apart from its professional development role in teacher education, was largely a stepping stone to the doctorate. Master's education was a way of introducing students to advanced study through a learning experience that was more independent, involved greater interaction with faculty, and focused on the creation of new knowledge through research. In recent decades, however, master's programs have proliferated with greater emphasis on professional preparation and the application of knowledge. Since 1980, more than 80 percent of all master's degrees in the United States have been awarded in professional fields such as education, business, engineering, and nursing.

In a review of master's education in 1986, Judith Glazer, a dean at St. John's University, voiced the opinion that master's education had undergone a paradigm shift from the arts and sciences to a professional degree model. She concluded that master's education now "is linked to the needs of the student and the demands of the marketplace and driven by externally imposed standards, and it emphasizes practice rather than theory, skills rather than research, training rather than scholarship...the master's degree is overwhelmingly professional, it is largely terminal, and it is practice oriented".

Some have argued that changes in master's education have produced "a silent success" which has enhanced skills and knowledge, enabling individuals to better contribute to their professions and advance their own careers. Whatever the validity of this opinion, diversity and growth at the master's level has raised its own set of problems and issues. Questions have arisen over the traditional role of the master's degree as a first step toward the doctorate and proposals have been advanced for uncoupling the two forms of study. Also, the number of types of master's programs (now organized in over 600 subfields) and differing curricula--many of which eschew the thesis in favor of internships and other academic options--have complicated the process of academic oversight and ensuring quality. To cite one example, traditional measures of program quality used in program review, such as faculty scholarly productivity and reputation, have less meaning when the purpose of the program and the intent of students is professional preparation and certification. Finally, some have argued that master's education continues to rely too much upon traditional means of instruction and should make greater use of distance learning and other appropriate technology to reach part-time and place-bound students.

If master's education has changed at a rate that has taxed higher education, concerns have arisen that doctoral education may suffer from the opposite problem; that is, existing structures seem overly rigid and unwilling to adapt to new economic and social demands. Phillip Griffiths, Director of the Institute for Advanced Study, in Princeton, New Jersey, has convincingly described the context and issues facing many doctoral programs.

> Current change in the conduct of science presents challenges for the traditional departmental structure found in most universities. The organization of science is becoming more flexible, and the boundaries between fields are becoming more permeable. Employers are seeking scientists and engineers who not only are well grounded in their fields but who also can communicate, collaborate, and work across disciplines. Adherence to disciplinary boundaries might be appropriate if the only mission of graduate programs were to produce the next generation of academic researchers. But

new Ph.D.s must be prepared to meet a variety of challenges in fields as wide-ranging as industrial and technological development, health care, environmental protection, secondary-level education, and urban planning and development.

To meet this challenge, universities must add an important new emphasis on broadening students' horizons, enhancing their ability to find a rewarding career in a world of changing employment, without undermining their mission of exposing students to the great depth and power of academic research.

Other scientists voice similar concerns and ideas. For instance, Kenneth A. Ross, a professor of mathematics and president of the Mathematical Association of America, has called for a change in the content and structure of doctoral training in mathematics. He argues that most Ph.D. programs emphasize formulary proofs at the expense of concepts and insights, and, ultimately, fail to accommodate the needs of engineers and research scientists in non-mathematics fields, who are using more sophisticated mathematics in their work. He concludes that "the research-and-development world seeks creative researchers and people with the flexibility to adapt techniques and ideas to new situations. Unfortunately, many mathematics Ph.D.s are not adept at solving problems that arise in the real world."

Proposals about how doctoral programs in science, engineering, and mathematics might become more flexible and useful were advanced in April 1995 by a committee representing the National Academy of Science, the National Academy of Engineering, and the Institute of Medicine. Their study entitled *Reshaping the Graduate Education of Scientists and Engineers* recommended that versatility should be promoted on two levels. "On the academic level, students should be discouraged from overspecializing.... On the level of career skills, there is value in experiences that supply skills desired by both academic and non-academic employers, especially the ability to communicate complex ideas to nonspecialists and the ability to work well in teams. Off-campus internships in industry or government can lead to additional skills and exposure to authentic job situations." The committee also recommended creating more varied doctoral programs with institutional content and structure based on local interests and strengths, and also produced a number of student-related recommendations such as attracting more minority and female students, reducing time-to-degree, and providing better career information.

While there has been no comprehensive study of doctoral education in the social sciences and humanities, similar issues about student training and preparation have received attention. For instance, many universities have instituted instructional training programs for teaching assistants. At some universities, these programs have been broadly conceived addressing general topics about teaching and future professional roles. Such professional preparation is needed since many Ph.D. recipients will teach at comprehensive institutions, liberal arts colleges, and community colleges that have different missions than the research university. Contemporary discussion about the scope and the content of research also has implications for doctoral programs. Ernest Boyer's book, *Scholarship Reconsidered: Priorities of the Professoriate*--widely circulated on many college campuses--has advocated recognition and support for a broader definition of research or scholarship under a new nomenclature: the scholarship of discovery, the scholarship of integration, the scholarship of application, the scholarship of pedagogy. Boyer's ideas have mainly generated discussion about enhancing the professional role of teaching. If fully embraced, however, they have considerable relevance for the curricula and culture of doctoral study not only in preparing graduate students to undertake pedagogical research but also in preparing them in the scholarship of integration and application. The pursuit of these forms of scholarship is invaluable for students whose future responsibilities will involve teaching students the fundamental precepts and development of their disciplines.

Student Placement and Program Capacity

The overproduction of Ph.D.s in some fields has been of sufficient duration to become a part of American folklore, such as the cab driver with the Ph.D. in philosophy. Less well understood is that in the past decade, the oversupply of doctoral graduates has spread to other fields taking on new importance for doctoral education as a whole. This issue has significance since most individuals who undertake doctoral work are intelligent, well motivated, and represent a valuable human resource. While few Ph.D.s do not find employment, many remain underemployed for years, or assume positions that do not use the skills and knowledge that took them years to acquire.

National research and employment information from professional associations shows that a declining percentage of doctoral graduates find academic positions, a trend which has occurred in all fields, as shown in Table 19. It is estimated that only about one third of all new Ph.D.s in the fields of science, mathematics, and engineering will enter the tenure track system. In this competitive environment, more Ph.D. recipients are taking post-doctoral appointments, partly to keep alive the possibility of securing academic employment. Also, the application process for academic positions has become increasingly problematic. Cary Nelson, a professor of English at the University of Illinois at Urbana-Champaign, has noted that "the reality of looming unemployment on the street makes graduate study increasingly embittered for graduate students and increasingly conflicted for all involved. Those who complete the Ph.D. enter into a job search that is brutal and demeaning for all except a few. And it may go on forever. For those who do not simply give up, five or six years of post-Ph.D. job searching is commonplace. Still longer searches are not unusual."

Many doctoral recipients have some difficulty securing employment even outside of academia. Recent surveys of doctoral graduates by the American Institute of Physics, the American Mathematical Society, and the American Chemical Society have demonstrated declining placement rates in these professions. While most Ph.D. recipients will eventually secure employment, some are poorly suited for their positions. *Reshaping the Graduate Education of Scientists and Engineers* notes that their staff had received "broad criticism from many such employers concerning graduates' immediate suitability for entry jobs--criticism that is often based on a belief that students are too specialized, in view of the variety of tasks that they will confront, and that it is hard for them to adapt to the demands of nonacademic work."

Various reasons exist for the current overproduction of Ph.D.s. One factor is strong student demand with a large number of qualified individuals continuing to apply for admission in many fields. Another explanation lies in the fact that graduate students constitute a labor resource for undergraduate instruction and research programs. William F. Massy and Charles A. Goldman in *The Production of Science and Engineering Doctorates in the United States* have developed a model that simulates future supply and demand for doctoral students in science and engineering fields which is partly based upon institutional teaching demand and "needs for research determined by sponsored project volume." The results of this model predict a significant oversupply of doctorates in the United States with 22 percent of future Ph.D. recipients failing to find suitable employment.

Difficulties faced by students in securing appropriate placement suggests that there is an overcapacity in doctoral education. This general conclusion is confirmed in the analysis of programs at public universities presented in Appendix II and reinforces the need for more vigorous review and action in eliminating graduate programs and reducing program size and scope. When undertaking further review, public universities should consider problems associated with overcapacity, along with eliminating programs that have experienced low enrollment and degree production. Tables 20 and 21 indicate the sizeable number of programs at public universities that are underutilized. Programs that suffer from overproduction or underproduction lack vitality and can not successfully achieve their program objectives.

Financing and Student Tuition

The financing of graduate study differs substantially from the funding of undergraduate education, a reflection of their disparate purposes, forms of instruction, and student and professional roles. One major difference centers on the importance and place of research at each level. While instructors who teach undergraduates are informed by research activities and are expected to keep current in their fields, most undergraduates do not directly participate in research. On the other hand, in graduate programs, particularly at the doctoral level, close work with faculty in ongoing research constitutes an essential part of a student's education. In sciences and engineering, research often requires state of the art technology, with the financing and quality of such programs often depending upon the ability of an institution or department to secure external funding.

The philosophy for funding undergraduate education starts from the premise that society benefits when a student receives a college education and, therefore, the state should assume a significant share of undergraduate education costs with grants also helping needy students who cannot afford tuition payments. A common corollary of this philosophy is that students should assume a greater amount of educational cost, through higher tuition payments and loans, as their course of study becomes more specialized and their potential grows for capitalizing upon their educational investment. Partly for this reason, states offer little financial aid to promote access to graduate and professional study. The distribution of financial aid is left to the discretion of institutions who allocate fellowships and tuition waivers on the basis of merit, in exchange for service such as assistantships, or according to the contributions that a student may make to research activities.

Given the traditional approach to financing higher education outlined above, it is surprising that undergraduates at Illinois public universities pay a higher percentage of instructional costs than graduate students and that undergraduate and graduate tuition rates are near parity. As shown in Table 22, public university undergraduate tuition represented 47 percent of instructional cost in 1995 (from 30 percent at Southern Illinois University at Edwardsville to 58 percent at University of Illinois at Urbana-Champaign) while graduate student tuition represented 29 percent of instructional cost (from 17 percent at Southern Illinois University at Carbondale to 34 percent at University of Illinois at Urbana-Champaign). At two of the University of Illinois campuses, graduate tuition was $600 to $750 higher than undergraduate tuition, but at many public universities little difference exists in the two charges. At Northern Illinois University, Illinois State University, and the University of Illinois at Springfield undergraduate tuition is higher than graduate tuition. Table 23 shows that graduate tuition has increased slightly less than undergraduate tuition over the past nine years, and has risen much faster than the Consumer Price Index and slightly faster than growth in Illinois per capita income.

Another significant aspect to financing graduate education is that many institutions waive significant amounts of tuition revenue. As show in Table 24, public universities most often award waivers as part of teaching or research assistantships. Reliance upon assistantships as a form of graduate aid is common practice among universities in the United States, with the National Research Council reporting that recent Ph.D. recipients received about half of their financial support through such university funding. The availability of this support varies by field. For instance, doctoral students in education, many of whom are employed and enrolled part-time, rely less on such assistance and instead use personal resources as their primary means of support.

Tables 25 to 27 show the amount of tuition revenue actually collected from undergraduate and graduate students at public universities in fiscal years 1990 and 1995. When compared with the information on tuition rates in Table 22, it can be seen that both undergraduate tuition and revenue represented the same percentage of instructional cost (47 percent) in 1995, while graduate tuition revenue represented 14 percent of instructional cost, or about half the amount assessed through tuition (29 percent). Interestingly, the relationship between graduate tuition revenue and instructional cost varied considerably among the public universities, even among similar types of institutions. Also,

graduate tuition revenue as a percent of instructional cost rose from 11.6 percent in 1990 to 14.3 percent in 1995 increasing most rapidly at Chicago State University, Governors State University, and the University of Illinois at Springfield.

New Models for Doctoral Programs

At its most basic level, doctoral education has two goals: the production and organization of knowledge and the training of students. Traditionally, these goals have been achieved with minimal tension. Programs have focused upon the production of research and the advancement of knowledge, while at the same time offering students a quality learning experience through their involvement in research. For various reasons, this traditional approach has lost some strength and relevance. Most importantly, many Ph.D. recipients are leaving to take positions within and outside academe that have markedly different cultures and needs than their degree-granting institutions. Within academe, many have found jobs at comprehensive institutions, liberal arts colleges, and community colleges whose missions are primarily, or exclusively, instructional. Outside academe, many have assumed positions in applied research which require more broad-based and flexible skills than in pure research positions. As a result of these experiences, there is a growing body of opinion that seeks fundamental changes in doctoral education.

One of the strengths of the American system of higher education is its diversity. Individuals can choose from a wide variety of programs and institutions to meet their educational needs. Doctoral education, however, does not offer or promote the kind of diversity found at other educational levels. While there are a large number of programs offering doctoral degrees, their organizational structures and curricula reflect insufficient variation, especially when contrasted with their diverse clienteles and outcomes. Many doctoral programs have difficulty articulating nonresearch objectives. This is the case not only for large research universities, but also for universities that have substantial nonresearch agendas, that is, institutions with regional missions that train many students who do not take research positions. The success of a university in meeting the needs of such students is too often an implicit rather than an explicit part of its program, thereby, making the quality of its efforts difficult to measure and strength.

As many writers have commented, a starting point for improving doctoral education and developing new models is placing greater emphasis upon student outcomes. This approach naturally stresses the placement experience of recent graduates as to the suitability of employment and long-term professional achievement. However, greater focus on student outcomes also has implications for many program aspects such as admission, curriculum, faculty, and program culture. It may lead, for example, to changes in research training, the creation of externships, or even modifications in the types of students admitted to a program. To illustrate the latter point, few institutions put limits upon the number of foreign students. While this may be an acceptable approach for a doctoral program that has a strong research orientation and highly values quantitative or conceptual skills, a program whose focus is the preparation of faculty for teaching at community colleges and small private schools may have different admissions criteria. At a minimum, the latter situation would require careful consideration of a foreign student's application to ascertain whether the student is well suited or likely to seek the kind of positions around which preparation is structured.

The quality of a graduate program, in large part, resides in its faculty. Universities seeking to establish a new model for doctoral education, therefore, necessarily must be concerned about staffing practices and rewards and incentives. Number of publications, citations in refereed journals, research grants, and national awards are some traditional measures of faculty quality. These indices are insufficient, however, in determining whether a faculty member can properly prepare students for nonresearch positions. In making such a judgement, other factors also demand attention, such as individual interests and the type of research in which a faculty member is engaged. Thus, a faculty member with a broad research background and active pedagogical pursuits might have more to offer

graduate students who will assume teaching positions than would a faculty member with more narrowly focused research interests.

The success of efforts to build new models of doctoral education ultimately will depend on enacting effective quality standards. The traditional model has been in existence for many years and retains considerable inertia. While certain conditions--such as the increasing difficulty of securing grant support--may nudge programs in new directions and while prestigious groups and thoughtful people may call for change, unless universities and governing and coordinating boards can develop more diverse program criteria, the prospects for success of new models will remain highly problematic. In the absence of standards that address individual program goals and interests, judgements about an institution's quality will likely continue to reflect only the results of the latest national reputational ranking of research universities.

A P•Q•P Agenda for Illinois Graduate Education

Without doubt, graduate education has been one of the major success stories of American and Illinois higher education. It also is apparent that changing conditions and needs require careful consideration of priorities and use of resources in order to maintain the high quality of graduate programs in this state. To realize this goal, this report has reviewed the appropriateness of program capacity and configuration in major fields at Illinois public universities, while also examining issues that have relevance for program purposes, structure, size, and financing. Based on this review, a number of proposals are advanced for Illinois higher education to pursue in the coming year, with colleges and universities asked to report to the Board of Higher Education on these matters by August 1997.

First, public universities should review their existing graduate programs in light of the analysis in this report. An examination of critical characteristics of graduate programs, such as enrollment and degrees awarded, costs, and occupational demand, suggests that excess capacity exists in a number of fields including social science, visual and performing arts, engineering, foreign language, English, mathematics, and philosophy. Public universities are asked to review the analysis and conclusions for each major field and to carefully consider program changes in response to these recommendations. It is anticipated that universities will include in their 1997 P•Q•P submissions reports of actions taken, such as program eliminations and reductions or expansions in program size and scope.

Second, in the coming year Illinois higher education will reexamine conditions of purpose, organization, and practice in graduate education. Staff proposes below new policies on graduate education that are intended to establish a framework and principles to guide this review. Adoption of these policies, which would replace existing policies, should facilitate the improvement of graduate education by more clearly articulating and differentiating program objectives, capitalizing upon diverse institutional strengths and interests, and better meeting student and societal needs. Illinois colleges are asked to include in their August 1997 P•Q•P submissions plans for implementing and ensuring that graduate education programs are based on the Board policies described below.

Third, public universities should include in their 1997 P•Q•P reports plans for the next three years for financing graduate education. Public universities now submit to the Board of Higher Education each year a report on undergraduate financing and their anticipated tuition rates for the coming years. Public universities are now asked to examine their graduate student tuition rates and their policies and practices for waiving graduate tuition with this same thoroughness. University plans for establishing future tuition rates and waiver policies should consider factors such as students' benefits from graduate education and ability to pay, inflationary indicators, instructional costs, and institutional resource needs.

Recommendations

The staff presents the following policies on graduate education for the Board's examination. These policies will be considered for adoption in fall 1996.

Need. Strong graduate education programs contribute to the cultural, social and economic well being and progress of citizens of the state. The Board of Higher Education and colleges and universities should seek to ensure that graduate programs are available in Illinois and that new needs are identified and addressed. At the same time, since graduate education programs are expensive, especially at the doctoral level, the Board and universities should carefully review new program proposals and existing programs to ensure that they address important needs in the state and can effectively meet these needs. New doctoral programs at public universities should be approved only when need can be clearly established based on an examination of existing doctoral capacity, student demand, occupational trends, and the importance of anticipated outcomes associated with the program.

Quality. Given the direct and indirect impact that graduate education has upon social and cultural life, economic development, and professions in the state, it is essential that graduate programs be of high quality. Graduate programs should be able to evaluate and demonstrate the quality of all major objectives. Standards used to measure these objectives are described in the Board's Resource Allocation and Management guidelines (RAMP) and commonly include faculty reputation, faculty awards, research production and citation, external grants, student placement, and student achievement. Programs also should be able to evaluate and demonstrate the quality of distinctive program objectives.

Objectives. Institutions should develop graduate programs in areas appropriate to their missions. Whenever possible and appropriate, a program's resources, curricula, and faculty should support other graduate and undergraduate programs. Programs should seek to capitalize upon unique institutional strengths and to make distinctive contributions in articulating and fulfilling major objectives. Program objectives should also address the educational goals of students and career opportunities available to them.

Research. One of the major purposes of graduate education, especially at the doctoral level, is the production and advancement of knowledge through research. Institutions should monitor their graduate programs to ensure that research is of high quality and makes appropriate contributions to the discipline, university, and society. A program's research focus should support major program objectives. Thus, programs that are preparing students to assume non-academic positions and/or academic positions at primarily teaching institutions should ensure that research preparation is broadly focused and adequately prepares them for future career roles.

Professional Education. One of the major purposes of graduate education, especially at the master's level, is preparing students for professional practice. In fulfilling this responsibility, programs should ensure that students receive the appropriate mix of academic preparation and introduction to professional standards for practice. Given the importance to the state of high standards of professional practice, the Board of Higher Education and colleges and universities should ensure that programs also are available to part-time and place-bound students, and should use different educational formats, such as distance-learning, to meet the diverse educational needs of students.

Preparation for Careers. A central responsibility of graduate education at all levels is preparation for careers. Program preparation should be responsive to the types of positions that graduates assume. Doctoral students preparing for non-academic positions should have

opportunities for externships, when appropriate, as well as coursework and experiences that develop the skills and abilities needed for research in the private sector. Doctoral students preparing for academic positions should have opportunities to develop teaching skills and to consider broad issues associated with professional and teaching practices.

Admissions. Institutions should admit students to graduate programs whose background and academic preparation indicate that they can satisfactorily complete all program requirements and whose educational goals match program objectives. Results of completion and time-to-degree studies and graduates' placements should be used to assess the effectiveness of program admission policies and practices. Programs should closely monitor the placement and achievement of foreign student graduates to ensure that they are meeting program objectives.

Curriculum and Faculty. A graduate program's curriculum and faculty should support its program objectives. Faculty expertise should be well-suited to advance the research objectives of the program and should include expertise in the scholarship of discovery, pedagogy, application, and integration, with the degree of emphasis in each scholarship area appropriate to the objectives of the program.

Viability. Graduate programs should be of sufficient size and scope to ensure program viability.

APPENDIX I

EXISTING BOARD OF HIGHER EDUCATION POLICIES ON GRADUATE EDUCATION

1. Doctoral programs offered by Illinois public and private universities are important to the State's future economic, social, and cultural development. Illinois' commitment to doctoral-level education is appropriate in terms of both scope and capacity. However, it will continue to be necessary to make adjustments in the numbers of programs offered and in the expansion or contractions of programs across the various fields of study as new student interests and occupational opportunities emerge and as economic, social, and technological priorities change.

2. New doctoral programs in public universities will be approved only when need can be clearly established based on an examination of existing doctoral capacity, student demand, occupational trends, and the importance of anticipated research and public service outcomes that are associated with the program.

3. Scholarly quality, as determined through program reviews and comparisons with other programs across commonly accepted quality standards, will be given special consideration in the review of existing doctoral programs. Public university governing boards offering doctoral programs with serious academic deficiencies, will be advised that such programs are no longer educationally and economically justified. On the other hand, doctoral programs of distinctive quality and scholarly merit will be supported independent of mission considerations because of the importance of the long-run scientific, social, and cultural contributions made by such programs.

4. When a program review concludes that a doctoral program has potential for responding to future needs, additional resource commitments and/or programmatic realignments designed to overcome quality deficiencies will be supported if the university's doctoral mission statement provides a definitive basis for determining that the program is central to the university's long run priorities for doctoral education.

APPENDIX II

ANALYSIS OF PUBLIC UNIVERSITY PROGRAM CONFIGURATION AND CAPACITY

This appendix describes the configuration and capacity of graduate programs at public universities. Selected measures include student demand, degree production, costs, and centrality. Tables 17 and 18 present a summarization of the data.

Agriculture and Natural Resources. Between 1993 and 1995, five public universities offered 16 master's programs in agriculture, forestry, and environmental science. Since 1993, one of these programs has been eliminated, the M.S. in Agricultural Education and Mechanization at Southern Illinois University at Carbondale. The remaining programs are characterized by moderate student demand, degree production, and costs. These programs also serve students in other programs, as 41 percent of the credit hours generated during fiscal years 1993 to 1995 were generated by non-majors. At the doctoral level, six programs are offered at the University of Illinois at Urbana-Champaign. These programs also have moderate student demand and degree production and low costs. No capacity adjustments seem necessary at this time, although, as described in the *Statewide Analysis for Public University Program Review in 1996-1997: Synopsis* (July 1996), universities should ensure that specializations and options within agriculture and environmental science programs at all levels remain current with ever-changing occupational needs.

Architecture and Urban Planning. The University of Illinois at Urbana-Champaign and the University of Illinois at Chicago together offer a total of five master's programs in architecture and urban planning. The Urbana-Champaign campus also offers a Ph.D. in Regional Planning. The master's programs are characterized by high student demand and degree production, and moderate costs. Centrality also is moderate with 13 percent of credit hours being generated by non-majors. The lone doctoral program at Urbana-Champaign has low student demand and high costs. The program produced an average of two graduates per year between 1993 and 1995. Information from the Illinois Department of Employment Security (IDES) indicates there will be few openings for urban and regional planners in the next decade. Programs in these areas should assure that program size is consistent with the opportunities available to graduates and make adjustments accordingly. The University of Illinois at Urbana-Champaign should direct particular attention to the high cost of its doctoral program.

Biological/Life Sciences. In the last three years, the public universities have offered 33 master's programs in the biological and life sciences and 24 doctoral programs. Since 1993, three of the master's programs have been eliminated. Master's programs are characterized by low student demand, high costs, and moderate centrality, while doctoral programs have moderate demand, low costs, and low centrality. Previous reviews of the biological sciences expressed concerns about high costs and low enrollment in specialized areas. Costs have recently decreased, but many specialized programs continue to have low enrollment. In their reviews of graduate education, universities should use the framework and principles described in this report to analyze programs with low enrollment and high costs. There are some indications that occupational demand is weak for new biologists. Although a high proportion of NRC respondents in 1993 had secured employment or postdoctoral work at the time of degree, three-fourths of these were postdoctoral work, which are short-term assignments.

Business. Eleven public universities offer 28 master's programs and three universities offer 10 doctoral programs in business. There have been no recent eliminations. The programs are characterized by high student demand and moderate costs at the master's level and moderate demand, but high costs at the doctoral level. Indeed, costs for business doctoral programs are higher than any other discipline. Enrollment in some specialized doctoral programs is very low, indicating opportunities for consolidation. In their reviews of graduate education, universities should provide plans for reducing costs and achieving efficiencies in low-enrollment programs. Employment

opportunities should be good for graduates of business programs. Seventy-two percent of the respondents in the NRC study indicated that they had secured employment at the time of degree, higher than respondents in any other field.

Communications. During the last three years, seven public universities offered 12 master's programs in communications and two universities each offered a Ph.D. These programs serve non-majors well, and have high centrality. The programs are also characterized by moderate costs, student demand, and degree production. In 1993, due to concerns about graduates' occupational opportunities, the Board of Higher Education recommended the elimination of three master's programs. Since then, two programs have been eliminated. Universities should continue to carefully monitor the placement of master's and doctoral students after graduation and adjust capacity accordingly.

Computer Science. Seven universities offer eight master's programs in computer science. The University of Illinois at Urbana-Champaign also offers a Ph.D. in Computer Science. The master's programs have moderate student demand, costs, and centrality, as well as high degree production. The Ph.D. program at Urbana-Champaign has very high demand. An average of 213 students were enrolled in the program between 1993 and 1995, almost twice as high an enrollment as any other doctoral program. Degree production also is high. According to a study by the National Research Council (NRC), 62 percent of Ph.D. graduates from computer science programs had jobs or postdoctoral commitments at the time of the degree, higher than many other fields (*Summary Report 1993: Doctorate Recipients from United States Universities*). The state of Illinois alone anticipates a need for 71 computer science faculty per year for the next 10 years, and although there will be over 2,000 annual openings for computer systems analysts, many of these jobs will be filled by baccalaureate graduates. Occupational supply and demand in this area is in balance.

Education. Education programs at the master's and doctoral levels serve the greatest proportion of Illinois graduate students at public universities. Approximately 19 percent of public university master's students and 20 percent of public university doctoral students are enrolled in education programs. Public universities offered 127 master's programs--11 of which have been eliminated since 1993, and 34 doctoral programs--6 of which have been eliminated since 1993. Specific areas of study include bilingual/bicultural education; English as a second language; curriculum and instruction; educational administration; continuing education; educational leadership; higher education; school business management; instructional technology; educational psychology; special education; gifted education; guidance and counseling; early childhood, elementary, and secondary education; and programs in specific topic areas. In general, these programs have moderate demand, degree production, and centrality. Costs are moderate at the doctoral level and low (among the lowest of all programs) for master's programs.

In July 1995, Board of Higher Education staff completed a statewide analysis of graduate programs in education. That analysis found that programs designed to serve teachers of specific fields in high school (for example, M.S.Ed. in Physical Sciences) were small and Board staff recommended that such programs be consolidated. The results of the universities reviews of these programs will be submitted with the FY1988 RAMP. Occupational demand for students completing master's degrees or advanced certificates is difficult to determine since some students earn the degree for professional development within education and others are seeking to enter education for the first time. Universities should assure that the specializations offered are consistent with current needs of educators for professional development and advanced study. The NRC study of doctoral recipients showed that a relatively high proportion of doctoral recipients in 1993 had employment at the time of degree.

Engineering and Technology. During 1993 through 1995, eight public universities offered 34 master's programs in engineering (an additional four programs were in engineering technology)

and three universities offered 24 Ph.D. programs. Since 1993 four master's programs and four Ph.D. programs have been eliminated. The currently active programs are characterized by moderate demand and high costs at the master's level, and high demand and moderate costs at the doctoral level. Centrality is moderate at the master's level, but low at the doctoral level. Specialties in master's and doctoral programs include aeronautical and astronomical, agricultural, bioengineering, ceramic, chemical, civil, electrical, industrial, materials, mechanical, mining, nuclear, geotechnical, and theoretical engineering. For many years, graduates with advanced engineering degrees were in high demand. Recently, however, an excess of graduates has saturated the job market. According to IDES, demand is greater for civil, electrical, industrial, and mechanical engineering than it is for the other specialties. Nonetheless, opportunities for all engineers are not as great as they once were. The NRC survey of doctoral recipients in 1993 revealed that only 50 percent of respondents had definite plans for employment or postdoctoral study at the time of degree, lower than any other field. The National Academy of Engineering reports that almost all recent Ph.D.'s eventually find full employment, but that it is taking longer for individuals to find such jobs. Universities should continue to reduce capacity in those specialties where demand is low, and should continue to monitor the need for engineers and technologists in ever-changing industries.

English Language and Letters. The 12 public universities offer a total of 21 master's programs in English language and literature, and five institutions offer eight doctoral programs. Overall, the programs have moderate student demand and degree production, low to moderate costs, and moderate to high centrality. A recent Board of Higher Education staff report (November 1995) thoroughly examined trends in graduate English programs and reported that some doctoral programs should reduce capacity in the face of a tight academic job market. In response, Illinois State University, Northern Illinois University, and Southern Illinois University at Carbondale have submitted to the Board of Higher Education plans to improve quality and reduce enrollments in doctoral programs. Board of Higher Education staff, with the advice of an outside consultant, is currently reviewing the plans.

Ethnic and Area Studies. Three campuses offer five master's programs in area and ethnic studies. The programs had high costs and low student demand and produced an average of 40 graduates from 1993 to 1995. However, the programs have high centrality, serving many non-majors. Duplication of programs is not an issue since each of the programs has a different area of focus. Previous statewide analyses have expressed concern over the ability of individual programs to offer advanced coursework for such small programs. In their reviews of graduate education, universities should direct particular attention to the justification of programs with low demand and high costs, using the framework and principles described in this report.

Foreign Language and Linguistics. During 1993 through 1995, six public universities offered 19 programs in foreign languages and linguistics and two universities offered nine doctoral programs. All but six of the programs are at the Urbana and Chicago campuses of the University of Illinois. Since 1993, one master's program has been eliminated. The programs are characterized by low student demand and degrees, moderate costs, and moderate to high centrality. These programs help to support undergraduate general education and language requirements. However, previous statewide reviews of foreign language programs expressed concerns about the ability of small programs to provide adequate advanced coursework for graduate programs. In general, foreign language programs have smaller enrollments than linguistic programs; programs in Portuguese and Italian are especially small. The NRC reports that 57 percent of Ph.D. recipients in foreign languages in 1993 had secured employment at the time of the degree. In their reviews of graduate education, universities should give particular attention to the justification of small programs, especially when costs are high.

Health Professions. Since 1993, three master's and one doctoral program in the health sciences have been eliminated. Currently, ten public universities offer 39 master's programs and three universities offer 11 doctoral programs in the health professions, which includes communication disorders, speech and hearing sciences, health services administration, medical laboratory technology,

nursing, public health, art therapy, occupational therapy, physical therapy, rehabilitation, nutrition and dietetics, pharmacy, and veterinary science. Overall, these programs are characterized by moderate to high student demand, high costs, moderate degree production, and low centrality. In January 1995, an update of the implementation of health policies reported that capacity needs to increase in nursing (nurse practitioner), physical therapy, occupational therapy, and physician assisting. In addition, recent meetings of a task force recommended expansion of speech-language pathology programs. Progress in these areas should continue where not already addressed. In their reviews of graduate programs, universities should give particular attention to the high cost of providing health education.

Home Economics. Five public universities offer 11 master's programs and the University of Illinois at Urbana/Champaign offered two Ph.D. programs in home economics. Programs in home economics include foods and nutrition, consumer economics, textiles, and family and child studies. Overall, the programs are characterized by low demand, low to moderate costs, and moderate to high centrality. Student and occupational demand for some specializations of master's programs is extremely low. The recent statewide analysis of programs in home economics (*Statewide Analysis for Public University Program Review in 1996-97: Synopsis*, July 1996) resulted in recommendations that universities should phase out specialties in which student and occupational demand is declining. Each university should specialize in only one or two areas of home economics.

Library Science. Between 1993 and 1995, three master's programs and one Ph.D. program were offered by public universities. Since 1993, one of the master's programs has been eliminated. The master's programs have moderate demand, high degree production, and low costs. In the Ph.D. program, student enrollment is high, but degree completion is low. In July 1995, Board staff concluded that there is a slight surplus of librarians for jobs in traditional areas, but that there may be non-traditional opportunities for librarians in private corporations and consulting firms. Program capacity should be maintained.

Mathematics. Between 1993 and 1995, public universities offered 15 master's and six doctoral programs in mathematics. Since 1993, one program at each level has been eliminated. The remaining programs are characterized by moderate student demand, degree production, and cost. Centrality at the doctoral level is high. In recent years the job market for mathematicians with Ph.D.'s has become tighter. In the summer of 1994, the American Mathematical Society surveyed that year's degree recipients and found that, nationwide, 14 percent were unemployed, the highest percentage ever reported. A recent Board of Higher Education report (November 1995) identified serious concerns with the Ph.D. programs at Southern Illinois University at Carbondale and Northern Illinois University. The two universities have submitted reviews of their programs to the Board of Higher Education. Board staff, with the advice of an outside consultant, is currently reviewing the plans.

Philosophy and Religion. Public universities currently offer four master's programs and three doctoral programs in philosophy. One master's program was eliminated in 1993. Compared with other graduate programs, these programs have low demand and degree production, high costs, and low centrality. Previous reviews have expressed concerns about the ability of small programs to offer sufficient advanced coursework and recommended reduction of capacity. Data from the American Philosophical Association (APA) also suggests that capacity should be reduced due to fewer academic jobs for philosophers in recent years. In fiscal year 1995, APA advertised 428 jobs and 1,004 candidates used the Association's placement service, indicating that there are more than twice as many candidates as there are jobs. In their reviews of graduate education, universities should describe how Ph.D. candidates are prepared for the teaching role at an array of educational institutions, should report placement rates in academic and nonacademic jobs, and should specify plans to reduce capacity. Attention should also be given to the high cost of small programs.

Physical Sciences. Since P•Q•P recommendations in 1993, one master's program in physics has been eliminated. The public universities currently offer 25 master's programs and 13 doctoral

programs in the physical sciences, which includes astronomy, atmospheric science, chemistry, geology, and physics. Master's programs are characterized by low student demand, high costs, and moderate centrality. Doctoral programs have high student demand, moderate costs, and low centrality. In their reviews of graduate education, universities should direct particular attention to the justification of master's programs with low demand and high costs, and should provide plans for achieving efficiencies.

As with many other fields, opportunities for recent Ph.D. recipients have become more limited. Only 61 percent of degree recipients in 1993, nation-wide, had secured employment or postdoctoral study at the time of degree, and most of these were postdoctoral opportunities. Several professional associations have reported that recent Ph.D. recipients are encountering a tighter job market. This may be due, in part, to an influx of scientists to the United States after the collapse of the Soviet Union. The American Chemical Society surveyed recent graduates in the summer of 1994 and found that 17 percent were unemployed at time of the survey, compared to five percent in 1992. The American Institute of Physics reported that between 1981 and 1992, the percentage of doctoral recipients who take more than six months to find a job has increased from eight percent to 23 percent. Universities should carefully monitor occupational demand within the specific fields and reduce capacity where necessary.

Psychology. Between 1993 and 1995, ten public universities offered 17 master's programs and five universities offered five Ph.D. programs in psychology. Since 1993, one of the master's programs has been eliminated. One of the doctoral programs is a Ph.D. in School Psychology. The master's programs have moderate student demand and low costs while the doctoral programs have high student demand and moderate costs. Centrality is low to moderate. Similar to many other fields, there may be an oversupply of Ph.D. recipients in psychology. A survey by the American Psychological Association of doctoral degree recipients in 1993 indicated that although 72 percent of new psychologists nation-wide were working full-time soon after receiving the degree, 30 percent of them perceived themselves to be underemployed. In the recent Board report, *Statewide Analysis for Public University Program Review in 1996-97: Synopsis*, universities were asked to examine their objectives for preparing graduate students for academic, counseling, and clinical occupations and report their success in placing students in desired positions.

Public Affairs and Social Work. From 1993 through 1995, public universities offered 12 master's programs and four doctoral programs in public affairs and social work. One of the programs, a master's in community development, was eliminated in 1993. The remaining programs are characterized by high demand and low costs. They also have moderate to high centrality. No capacity adjustments seem necessary at this time.

Recreation and Leisure Studies. Public universities offer six master's programs and two doctoral programs in recreation and leisure studies. At both levels the programs have moderate student demand and centrality. Costs are moderate at the master's level, but high at the doctoral level. P•Q•P analyses in 1993 cautioned that occupational opportunities had not kept pace with student demand. In their reviews of graduate education, universities should direct particular attention to the justification of programs with low occupational demand and high costs, including a discussion of the principles described in this report.

Social Sciences and History. Before P•Q•P adjustments in 1993, there were 52 master's programs and 20 doctoral programs in the social sciences and history. Since 1993, two of the master's and one of the doctoral programs have been eliminated. Remaining programs at both levels in anthropology, economics, geography, sociology, political science, and history are characterized by moderate student demand and costs. Recent evidence from the NRC study of 1993 doctoral recipients indicates that the job market is tight. Approximately 55 percent of graduates in history, political science, and anthropology/sociology had secured jobs or postdoctoral assignments at the time of degree. Sixty-four percent of economists had a job or a postdoctoral assignment. Overall capacity

should be reduced and universities should seek ways to reduce costs when several related programs exist on the same campus.

Visual and Performing Arts. Between 1993 and 1995, public universities offered 44 master's programs and four doctoral programs in the visual and performing arts. Specific areas of study are dance, design, theater, film, photography, art, art history, music, and arts management. Consistent with previous Board recommendations to reduce capacity at the master's level, five of the master's programs have been eliminated since 1993. Collectively, these programs have moderate student demand and moderate to high costs. Although projections from the Illinois Department of Employment Security suggest that average annual job openings in Illinois are sufficient to meet the number of Ph.D. graduates, universities should monitor occupational opportunities closely since other fields in the humanities currently show an oversupply of graduates.

Table 1

MASTER'S PROGRAMS OFFERED AT ILLINOIS INSTITUTIONS
BY DISCIPLINE

Discipline	Number
Education	263
Health Professions	127
Business and Management	119
Visual and Performing Arts	91
Social Sciences/History	80
Biological/Life Sciences	70
Engineering	63
Theology/Religious Vocation	57
Physical Sciences	44
Psychology	42
Foreign Languages	42
English Language/Letters	36
Public Administration	30
Mathematics	24
Computer and Information Sciences	21
Communications	18
Philosophy and Religion	14
Home Economics	14
Agriculture	11
Area/Ethnic Studies	10
Programs in Other Disciplines	82
Total	1,258

Source: IBHE Program Inventory

Table 2

DOCTORAL PROGRAMS OFFERED AT ILLINOIS INSTITUTIONS
BY DISCIPLINE

Discipline	Number
Biological/Life Sciences	68
Education	60
Social Sciences/History	40
Engineering	35
Foreign Languages	34
Psychology	32
Health Professions	30
Physical Sciences	27
Theology/Religious Vocation	27
Visual and Performing Arts	22
Business and Management	21
English Language and Letters	14
Philosophy and Religion	10
Programs in Other Disciplines	52
Total	472

Source: IBHE Program Inventory

Table 3

MASTER'S PROGRAMS OFFERED AT ILLINOIS INSTITUTIONS

Sector	Number
Public Universities	
University of Illinois at Urbana–Champaign	123
University of Illinois at Chicago	73
Southern Illinois University at Carbondale	59
Northern Illinois University	55
Southern Illinois University at Edwardsville	37
Illinois State University	33
Western Illinois University	32
Northeastern Illinois University	25
Eastern Illinois University	24
University of Illinois at Springfield	23
Governors State University	21
Chicago State University	15
Total	520
Private Universities	
Northwestern University	111
University of Chicago	88
Loyola University	87
DePaul University	62
Roosevelt University	62
National–Louis University	34
Illinois Institute of Technology	32
Saint Xavier University	28
Bradley University	20
Olivet Nazarene University	15
Trinity Evangelical School	15
Aurora University	14
Concordia University	14
Finch University of Health Sciences/Chicago Medical School	14
Columbia College	11
Rush University	11
All Other Universities*	120
Total	738
All Institution Total	1,258

* 34 universities offer from 1 to 9 master's programs

Source: IBHE Program Inventory

Table 4

DOCTORAL PROGRAMS OFFERED AT ILLINOIS INSTITUTIONS

Sector	Number
Public Universities	
University of Illinois at Urbana–Champaign	84
University of Illinois at Chicago	47
Southern Illinois University at Carbondale	28
Northern Illinois University	16
Illinois State University	8
Total	183
Private Universities	
Northwestern University	83
The University of Chicago	74
Loyola University	53
Illinois Institute of Technology	14
Rush University	10
Finch University of Health Sciences/Chicago Medical School	9
DePaul University	5
National–Louis University	5
All Other Universities*	36
Total	289
All Institution Total	472

* 20 universities offer from 1 to 4 doctoral programs

Source: IBHE Program Inventory

Table 5

NATIONAL RESEARCH COUNCIL RATINGS OF
DOCTORAL PROGRAMS AT ILLINOIS INSTITUTIONS
MAJOR FIELDS, 1993

Field	Quality Rating			
	Programs in First Quartile	Programs in Second Quartile	Programs in Third Quartile	Programs in Fourth Quartile
Biological and Life Sciences	15	4	7	8
Chemistry	3	1	0	3
Computer Sciences	2	2	0	1
Economics	2	1	2	1
Engineering	10	6	5	3
English Literature & Languages	3	3	2	3
Geosciences	2	1	0	1
History	3	2	1	1
Mathematics and Statistics	5	1	1	2
Music	2	1	0	0
Pharmacology	1	1	1	2
Philosophy	2	2	1	1
Physics	2	1	2	0
Political Science	2	1	0	1
Psychology	3	1	3	2
Sociology	2	2	1	1
Total	59	30	26	30

Source: National Research Council, Research–Doctorate Programs in the United States

Table 6

MASTER'S DEGREES CONFERRED BY ILLINOIS INSTITUTIONS*
BY DISCIPLINE, FISCAL YEARS 1984 TO 1995

Discipline	1984	1988	1990	1992	1994	1995	Change Number	Change Percent
Business and Management	5,077	5,071	5,894	6,160	6,786	6,769	1,692	33.3 %
Education	3,560	4,209	4,466	5,660	5,901	5,861	2,301	64.6
Health Professions	1,022	1,075	1,283	1,260	1,508	1,448	426	41.7
Public Administration	854	891	918	1,185	1,359	1,361	507	59.4
Engineering	876	847	918	966	1,089	1,097	221	25.2
Social Sciences/History	677	747	723	829	827	807	130	19.2
Visual/Performing Arts	627	634	626	686	797	745	118	18.8
Psychology	362	440	502	536	648	650	288	79.6
Computer & Information Science	344	660	732	623	681	588	244	70.9
Communications	461	521	513	426	468	513	52	11.3
Theology/Religious Vocations	552	472	497	595	546	512	(40)	(7.2)
English Language/Letters	290	457	470	529	506	479	189	65.2
Biological/Life Sciences	272	289	275	313	397	381	109	40.1
Physical Sciences	280	302	299	290	320	339	59	21.1
Library Sciences	193	227	285	333	339	315	122	63.2
Mathematics	215	272	238	270	256	258	43	20.0
Architecture/Design	180	172	189	194	223	224	44	24.4
Foreign Languages	168	86	68	194	238	193	25	14.9
Law	104	81	86	114	159	192	88	84.6
Parks and Recreation	104	34	23	141	155	160	56	53.8
Protective Services	108	111	132	118	134	140	32	29.6
Liberal/General Studies	23	38	35	80	101	113	90	391.3
Agricultural Sciences	97	63	78	92	74	99	2	2.1
Philosophy and Religion	68	164	161	114	75	98	30	44.1
Home Economics	85	81	129	76	96	90	5	5.9
Natural Resources	48	14	14	38	55	75	27	56.3
Engineering Related Technology	64	41	55	69	79	65	1	1.6
Area/Ethnic Studies	66	38	39	39	55	58	(8)	(12.1)
Multi/Interdisciplinary	61	33	33	36	55	42	(19)	(31.1)
Marketing/Distribution	0	9	0	46	49	39	39	—
Agribusiness/Production	50	41	49	25	23	20	(30)	(60.0)
Other	0	25	26	0	0	0	0	—
Total	16,888	18,145	19,756	22,037	23,999	23,731	6,843	40.5 %

* Also includes advanced certificates

Source: IBHE Degrees Conferred Survey

Table 7

DOCTORAL DEGREES CONFERRED BY ILLINOIS INSTITUTIONS BY DISCIPLINE, FISCAL YEARS 1984 TO 1995

Discipline	1984	1988	1990	1992	1994	1995	Change 1984–95 Number	Change 1984–95 Percent
Education	323	373	372	392	351	412	89	27.6 %
Engineering	179	267	300	342	316	316	137	76.5
Theology/Religious Vocations	192	150	194	201	258	311	119	62.0
Psychology	146	207	246	226	262	298	152	104.1
Social Sciences/History	221	196	213	214	247	274	53	24.0
Physical Sciences	175	201	233	271	220	232	57	32.6
Biological/Life Sciences	184	200	206	198	229	223	39	21.2
Health Professions	62	63	136	110	115	117	55	88.7
English Language/Letters	44	82	69	84	103	105	61	138.6
Business and Management	73	50	57	69	43	87	14	19.2
Computer & Information Science	33	54	73	80	67	76	43	130.3
Mathematics	27	46	60	75	58	74	47	174.1
Foreign Languages	47	24	46	61	55	73	26	55.3
Visual/Performing Arts	64	58	37	60	69	62	(2)	(3.1)
Philosophy and Religion	39	43	27	32	41	47	8	20.5
Public Administration	35	37	39	43	46	45	10	28.6
Agricultural Sciences	30	44	44	49	35	39	9	30.0
Parks and Recreation	8	6	19	8	18	13	5	62.5
Communications	17	12	18	26	14	10	(7)	(41.2)
Agribusiness/Production	4	12	7	7	5	7	3	75.0
Library Sciences	6	6	2	3	3	5	(1)	(16.7)
Multi/Interdisciplinary	2	3	3	16	5	3	1	50.0
Architecture/Design	0	2	3	3	3	3	3	—
Home Economics	2	5	4	9	6	1	(1)	(50.0)
Law	0	0	2	1	2	1	1	—
Natural Resources	1	0	0	1	0	1	0	0.0
Area/Ethnic Studies	0	11	0	0	0	0	0	—
Liberal/General Studies	3	0	1	1	0	0	(3)	(100.0)
Total	1,917	2,152	2,411	2,582	2,571	2,835	918	47.9 %

Source: IBHE Degrees Conferred Survey

Table 8

DOCTORAL DEGREES CONFERRED AT ILLINOIS INSTITUTIONS
BY DISCIPLINE, RACE, AND ETHNICITY, FISCAL YEAR 1995

Discipline	White Non-Hispanic		Black Non-Hispanic		Hispanic		Asian or Pacific Islander		American Indian or Alaskan		Non-Resident Alien		Unknown		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Agriculture	16	34.8 %	1	2.2 %	1	2.2 %	0	0.0 %	0	0.0 %	28	60.9 %	0	0.0 %	46	100.0 %
Architecture	3	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	3	100.0
Biological/Life Sciences	122	54.7	5	2.2	3	1.3	21	9.4	1	0.4	70	31.4	1	0.4	223	100.0
Business and Administrative Services	44	50.6	1	1.1	1	1.1	6	6.9	0	0.0	34	39.1	1	1.1	87	100.0
Communications	5	50.0	0	0.0	0	0.0	1	10.0	0	0.0	3	30.0	1	10.0	10	100.0
Computer Science	32	42.1	0	0.0	0	0.0	6	7.9	0	0.0	38	50.0	0	0.0	76	100.0
Education	260	63.1	45	10.9	9	2.2	4	1.0	2	0.5	82	19.9	10	2.4	412	100.0
Engineering	113	35.8	3	0.9	1	0.3	27	8.5	0	0.0	168	53.2	4	1.3	316	100.0
English Language/Letters	86	81.9	3	2.9	1	1.0	0	0.0	0	0.0	11	10.5	4	3.8	105	100.0
Foreign Languages	41	56.2	2	2.7	3	4.1	1	1.4	0	0.0	24	32.9	2	2.7	73	100.0
Health Professions	80	68.4	4	3.4	1	0.9	3	2.6	2	1.7	24	20.5	3	2.6	117	100.0
Home Economics	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	1	100.0
Law and Legal Studies	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	1	100.0
Library Sciences	1	20.0	1	20.0	0	0.0	2	40.0	0	0.0	1	20.0	0	0.0	5	100.0
Mathematics	37	50.0	0	0.0	1	1.4	2	2.7	0	0.0	34	45.9	0	0.0	74	100.0
Multi/Interdisciplinary Studies	1	33.3	0	0.0	0	0.0	0	0.0	0	0.0	2	66.7	0	0.0	3	100.0
Natural Resources	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0
Parks and Recreation	11	84.6	0	0.0	0	0.0	0	0.0	0	0.0	1	7.7	1	7.7	13	100.0
Philosophy and Religion	35	74.5	1	2.1	1	2.1	1	2.1	0	0.0	5	10.6	4	8.5	47	100.0
Physical Sciences	124	53.4	0	0.0	3	1.3	23	9.9	0	0.0	80	34.5	2	0.9	232	100.0
Psychology	246	82.6	11	3.7	7	2.3	5	1.7	2	0.7	18	6.0	9	3.0	298	100.0
Public Administration/Services	29	64.4	2	4.4	2	4.4	0	0.0	0	0.0	10	22.2	2	4.4	45	100.0
Social Sciences and History	151	55.1	7	2.6	3	1.1	17	6.2	1	0.4	92	33.6	3	1.1	274	100.0
Theology and Religion Vocations	180	57.9	10	3.2	21	6.8	6	1.9	0	0.0	91	29.3	3	1.0	311	100.0
Visual and Performing Arts	54	87.1	2	3.2	0	0.0	2	3.2	0	0.0	3	4.8	1	1.6	62	100.0
Total	1,672	59.0 %	98	3.5 %	58	2.0 %	127	4.5 %	8	0.3 %	821	29.0 %	51	1.8 %	2,835	100.0 %

Source: IBHE Degrees Conferred Survey

Table 9

TRENDS IN MASTER'S DEGREES AT ILLINOIS INSTITUTIONS*
FISCAL YEARS 1984 TO 1995

	1984	1988	1990	1992	1994	1995	Change 1984-95 Number	Change 1984-95 Percent
Public Universities	8,308	8,529	8,803	9,703	10,388	9,968	1,660	20.0 %
University of Illinois at Urbana-Champaign	2,042	2,120	2,166	2,329	2,586	2,520	478	23.4
University of Illinois at Chicago	1,094	1,149	1,136	1,398	1,442	1,495	401	36.7
Northern Illinois University	1,226	1,187	1,318	1,366	1,413	1,206	(20)	(1.6)
Southern Illinois University at Carbondale	698	731	735	716	776	794	96	13.8
Illinois State University	524	565	610	658	672	654	130	24.8
Western Illinois University	450	612	499	641	656	632	182	40.4
Southern Illinois University at Edwardsville	648	539	588	649	674	623	(25)	(3.9)
Northeastern Illinois University	322	350	396	474	562	524	202	62.7
Eastern Illinois University	363	386	459	456	562	501	138	38.0
Governors State University	372	385	373	385	443	474	102	27.4
Chicago State University	334	261	269	372	321	307	(27)	(8.1)
Sangamon State University	235	244	254	259	281	238	3	1.3
Private Institutions**	8,580	9,616	10,953	12,334	13,611	13,763	5,183	60.4
Northwestern University	1,634	1,802	2,235	1,986	2,092	2,194	560	34.3
The University of Chicago	1,529	1,647	1,733	1,646	1,733	1,831	302	19.8
National-Louis University	530	851	1,094	1,833	2,020	1,742	1,212	228.7
DePaul University	948	1,086	1,168	1,407	1,392	1,434	486	51.3
Loyola University of Chicago	751	812	953	1,028	1,271	1,132	381	50.7
Illinois Institute of Technology	362	472	465	527	548	579	217	59.9
Roosevelt University	661	449	423	503	469	469	(192)	(29.0)
Concordia University	76	133	214	198	320	382	306	402.6
Keller Graduate School of Management	268	199	241	302	353	380	112	41.8
Rosary College	195	178	176	339	312	367	172	88.2
Aurora University	38	115	170	232	281	323	285	750.0
All Other Private Institutions	1,588	1,872	2,081	2,333	2,820	2,930	1,342	84.5
All Institution Total	16,888	18,145	19,756	22,037	23,999	23,731	6,843	40.5 %

* Also includes advanced certificates
** Institutions with more than 300 degrees in 1995

Source: IBHE Degrees Conferred Survey

Table 10

TRENDS IN DOCTORAL DEGREES AT ILLINOIS INSTITUTIONS FISCAL YEARS 1984 TO 1995

	1984	1988	1990	1992	1994	1995	Change 1984–95 Number	Change 1984–95 Percent
Public Universities	914	1,112	1,218	1,357	1,232	1,358	444	48.6 %
University of Illinois at Urbana–Champaign	542	646	707	775	666	761	219	40.4
University of Illinois at Chicago	112	148	182	202	232	245	133	118.8
Southern Illinois University at Carbondale	152	165	170	206	174	168	16	10.5
Northern Illinois University	71	92	109	121	108	117	46	64.8
Illinois State University	29	49	43	47	43	58	29	100.0
Southern Illinois University at Edwardsville	8	12	7	6	9	9	1	12.5
Private Institutions*	1,003	1,040	1,193	1,225	1,339	1,477	474	47.3
Northwestern University	312	313	327	351	305	375	63	20.2
The University of Chicago	339	318	335	322	394	366	27	8.0
American School of Professional Psychology	27	40	47	45	81	108	81	300.0
Loyola University of Chicago	70	65	85	94	104	108	38	54.3
McCormick Theological Seminary	87	61	52	57	107	108	21	24.1
Trinity International University–Divinity	34	31	52	41	72	81	47	138.2
Illinois Institute of Technology	46	66	77	79	61	75	29	63.0
Rush University	8	5	3	37	30	34	26	325.0
All Other Private Institutions	110	141	215	199	185	222	112	101.8
All Institution Total	1,917	2,152	2,411	2,582	2,571	2,835	918	47.9 %

* With 30 or more degrees in 1995

Source: IBHE Degrees Conferred Survey

Table 11

DEGREES AWARDED PER 1,000 POPULATION FOR VARIOUS STATES
FISCAL YEAR 1993

	Doctoral	First Professional	Master's	Bachelor's	Associate
United States	42,206	76,068	370,973	1,179,278	519,098
Per 1,000 Population	0.164	0.295	1.439	4.575	2.014
Illinois	2,573	4,410	22,520	51,371	27,522
Per 1,000 Population	0.220	0.377	1.925	4.392	2.353
Ohio	2,002	3,221	15,761	51,651	19,874
Per 1,000 Population	0.181	0.291	1.425	4.670	1.797
Florida	1,534	2,322	13,100	43,124	39,276
Per 1,000 Population	0.112	0.170	0.958	3.153	2.871
Michigan	1,513	2,581	14,944	45,711	24,231
Per 1,000 Population	0.160	0.272	1.577	4.823	2.557
North Carolina	980	1,709	6,864	31,844	12,107
Per 1,000 Population	0.141	0.246	0.988	4.585	1.743
Pennsylvania	2,267	4,324	17,660	65,125	19,571
Per 1,000 Population	0.188	0.359	1.466	5.405	1.624
Texas	2,546	4,882	20,887	67,593	24,463
Per 1,000 Population	0.141	0.271	1.158	3.749	1.357

Source: Ohio Board of Regents

Table 12

PUBLIC UNIVERSITY UNDERGRADUATE AND GRADUATE EXPENDITURES AT THE DEPARTMENT LEVEL
FISCAL YEARS 1984 TO 1995

(in thousands of dollars)	1984		1990		1992		1994		1995		Change 1984–1995	
	Undergraduate	Graduate	Undergraduate	Graduate	Undergraduate	Graduate	Undergraduate	Graduate	Undergraduate	Graduate	Undergraduate	Graduate
Chicago State University	$ 8,041	$ 1,941	$ 12,382	$ 3,487	$ 10,361	$ 2,701	$ 13,860	$ 2,874	$ 14,074	$ 3,565	75.0 %	83.6 %
Eastern Illinois University	15,129	2,380	22,753	3,849	22,800	4,267	25,319	4,786	27,098	4,744	79.1	99.3
Governors State University	3,344	3,568	5,616	4,614	4,874	4,575	5,637	5,385	5,786	5,889	73.0	65.1
Illinois State University	28,395	6,464	36,767	8,022	35,790	8,894	39,806	7,684	40,678	8,073	43.3	24.9
Northern Illinois University	27,224	12,665	35,937	20,112	37,601	19,674	40,588	21,669	43,094	21,186	58.3	67.3
Northeastern Illinois University	10,447	3,052	14,731	4,972	14,325	5,322	15,208	6,093	15,881	6,282	52.0	105.8
Western Illinois University	17,333	4,147	22,804	6,195	22,993	6,332	25,956	6,800	27,442	6,983	58.3	68.4
Southern Illinois University	41,346	17,244	61,667	27,266	60,374	27,398	64,645	28,912	67,350	29,682	62.9	145.3
Carbondale	27,880	12,794	40,918	19,961	40,281	20,402	42,416	21,515	44,144	21,949	58.3	71.6
Edwardsville	13,466	4,450	20,750	7,305	20,093	6,996	22,230	7,397	23,206	7,733	72.3	73.8
University of Illinois	89,637	73,285	123,726	122,306	124,120	127,245	129,881	133,832	136,616	141,152	52.4	232.2
Chicago	26,507	14,774	40,324	34,791	39,565	36,581	41,958	39,182	42,719	42,204	61.2	185.7
Springfield	3,156	2,428	4,172	3,239	4,536	3,325	5,374	3,424	5,265	3,559	66.8	46.6
Urbana/Champaign	59,973	56,083	79,229	84,276	80,019	87,339	82,548	91,225	88,632	95,389	47.8	70.1
Total	$ 240,897	$ 124,746	$ 336,384	$ 200,824	$ 333,238	$ 206,408	$ 360,901	$ 218,033	$ 378,019	$ 227,556	56.9 %	82.4 %

Source: IBHE Public University Academic Discipline Unit Cost Study

Table 13

PUBLIC UNIVERSITY MASTER'S AND DOCTORAL EXPENDITURES AT THE DEPARTMENT LEVEL*
FISCAL YEAR 1984 TO 1995

(in thousands of dollars)	1984		1990		1992		1994		1995		Change 1984 – 1995	
	Master's	Doctoral	Master's	Doctoral	Master's	Doctoral	Master's	Doctoral	Master's	Doctoral	Master's	Doctoral
Chicago State University	$ 1,941	$ 0	$ 3,487	$ 0	$ 2,701	$ 0	$ 2,874	$ 0	$ 3,565	$ 0	83.6 %	NA
Eastern Illinois University	2,380	0	3,849	0	4,267	0	4,786	0	4,744	0	99.3	NA
Governors State University	3,568	0	4,614	0	4,575	0	5,385	0	5,889	0	65.1	NA
Illinois State University	5,458	1,006	6,574	1,448	7,286	1,608	6,504	1,180	6,812	1,261	24.8	25.4 %
Northern Illinois University	11,061	1,603	16,849	3,264	16,448	3,226	17,880	3,788	17,577	3,609	58.9	125.1
Northeastern Illinois University	3,052	0	4,972	0	5,322	0	6,093	0	6,282	0	105.8	NA
Western Illinois University	4,147	0	6,195	0	6,332	0	6,800	0	6,983	0	68.4	NA
Southern Illinois University	13,953	3,291	22,070	5,196	22,220	5,178	23,603	5,309	24,328	5,354	74.4	62.7
Carbondale	9,665	3,129	14,929	5,032	15,392	5,010	16,358	5,156	16,689	5,260	72.7	68.1
Edwardsville	4,289	162	7,141	164	6,829	168	7,244	153	7,639	94	78.1	(41.8)
University of Illinois	36,901	36,384	68,911	53,395	74,141	53,104	74,181	59,650	75,179	65,973	103.7	81.3
Chicago	9,233	5,541	22,820	11,971	25,492	11,090	25,278	13,904	26,437	15,767	186.3	184.5
Springfield	2,428	0	3,239	0	3,325	0	3,424	0	3,559	0	46.6	NA
Urbana–Champaign	25,240	30,843	42,851	41,425	45,325	42,014	45,479	45,747	45,183	50,206	79.0	62.8
Total	$ 82,462	$ 42,284	$ 137,521	$ 63,303	$ 143,293	$ 63,116	$ 148,106	$ 69,928	$ 151,359	$ 76,197	83.5 %	80.2 %

* Master's expenditures include costs for certificate and professional programs

Source: IBHE Public University Academic Discipline Unit Cost Study

Table 14

PUBLIC UNIVERSITY TOTAL FACULTY STAFF YEARS, UNDERGRADUATE AND GRADUATE LEVELS
FISCAL YEARS 1984 TO 1995

	1984 Staff Years		1990 Staff Years		1992 Staff Years		1994 Staff Years		1995 Staff Years		Change 1984 to 1995	
	Undergraduate	Graduate	Undergraduate	Graduate	Undergraduate	Graduate	Undergraduate	Graduate	Undergraduate	Graduate	Undergraduate	Graduate
Chicago State University	238	56	242	65	195	44	235	44	231	53	(3.0)%	(6.2)%
Eastern Illinois University	419	60	461	70	454	76	470	71	482	82	14.9	36.6
Governors State University	77	92	102	83	93	86	98	93	106	101	36.8	9.6
Illinois State University	647	125	738	119	700	133	717	106	718	109	10.9	(12.6)
Northeastern Illinois University	277	75	280	92	264	96	260	97	255	99	(7.8)	32.6
Northern Illinois University	791	265	802	299	807	308	760	306	774	294	(2.2)	11.0
Western Illinois University	437	86	419	87	411	87	387	81	399	92	(8.8)	7.5
Southern Illinois University	1,215	379	1,261	391	1,238	410	1,234	393	1,251	374	3.0	(1.3)
Carbondale	846	281	882	284	874	306	871	297	881	272	4.1	(3.3)
Edwardsville	369	98	379	106	364	104	362	96	370	102	0.3	4.5
University of Illinois	2,295	1,274	2,345	1,544	2,273	1,587	2,280	1,569	2,290	1,558	(0.2)	22.3
Chicago	666	257	718	459	677	474	697	468	701	485	5.2	88.5
Springfield	80	63	75	70	74	76	81	-74	76	69	(5.0)	8.9
Urbana-Champaign	1,549	954	1,552	1,015	1,522	1,037	1,501	1,027	1,513	1,004	(2.3)	5.3
Total	6,398	2,412	6,651	2,751	6,434	2,826	6,441	2,761	6,506	2,762	1.7 %	14.5 %

Source: IBHE Public University Faculty Credit Hour Study

Table 15

PUBLIC UNIVERSITY TOTAL FACULTY STAFF YEARS, MASTER'S AND DOCTORAL LEVELS*
FISCAL YEAR 1984 TO 1995

	1984 Staff Years		1990 Staff Years		1992 Staff Years		1994 Staff Years		1995 Staff Years		Change 1984 – 1995	
	Master's	Doctoral	Master's	Doctoral	Master's	Doctoral	Master's	Doctoral	Master's	Doctoral	Master's	Doctoral
Chicago State University	56	0	65	0	44	0	44	0	52	0	(7.9)%	NA %
Eastern Illinois University	60	0	70	0	76	0	71	0	82	0	36.6	NA
Governors State University	92	0	83	0	86	0	93	0	101	0	9.6	NA
Illinois State University	104	21	98	21	109	24	91	15	94	15	(9.6)	(28.6)
Northeastern Illinois University	75	0	92	0	96	0	97	0	99	0	32.6	NA
Northern Illinois University	234	31	258	41	261	47	259	47	252	42	7.7	4.7
Western Illinois University	86	0	87	0	87	0	81	0	92	0	7.5	NA
Southern Illinois University	308	71	321	69	328	82	321	72	313	62	1.6	(12.7)
Carbondale	214	67	217	67	226	80	227	70	212	61	(0.9)	(9.0)
Edwardsville	94	4	104	2	102	2	94	2	101	1	7.4	(75.0)
University of Illinois	680	594	912	632	968	619	908	661	875	683	28.7	15.0
Chicago	168	89	311	148	340	134	311	157	313	172	86.3	93.3
Springfield	63	0	70	0	76	0	74	0	69	0	9.5	NA
Urbana–Champaign	449	505	531	484	552	485	523	504	493	511	9.8	1.2
Total	1,695	717	1,987	763	2,055	772	1,966	795	1,960	802	15.6 %	11.9 %

* Master's level includes faculty staff -- years for advanced certificate and professional programs

Source: IBHE Public University Faculty Credit Hour Study

Table 16

AVERAGE COST OF A MASTER'S DEGREE AND A DOCTORAL DEGREE FOR SELECTED FIELDS AT PUBLIC UNIVERSITIES,

Discipline	Cost Per Master's Degree	Cost Per Doctoral Degree
Agriculture	$ 14,699	$ 32,185
Anthropology and Sociology	20,127	64,601
Architecture	17,106	156,556
Biological Sciences	26,524	34,965
Business	10,080	96,981
Chemistry	27,177	39,048
Communications	9,582	34,479
Computer Science	16,996	45,643
Conservation & Natural Resources	8,762	150,376
Diagnostic & Therapeutic Services	10,578	31,121
Economics	19,132	70,502
Education	7,847	29,540
Engineering	17,495	59,537
Foreign Languages	18,869	50,357
Geography	28,090	74,412
Geological Sciences	49,391	105,514
History	16,267	63,644
Home Economics	13,564	44,205
Letters	12,925	41,746
Library Sciences	6,020	145,154
Mathematics	19,051	76,609
Music	26,352	71,029
Nursing	15,053	46,366
Performing Arts (Except Music)	24,139	65,220
Physics	25,518	92,921
Political Science	18,271	55,653
Psychology	18,049	60,945
Public Administration	6,581	30,387
Recreation and Leisure	12,724	43,650
Visual Arts	25,883	109,463

Table 17

SELECTED MEASURES ON MASTER'S DEGREE AND ADVANCED CERTIFICATE PROGRAMS AT PUBLIC UNIVERSITIES
(AVERAGE 1993 TO 1995)

Discipline	Number of Campuses[1]	Number of Programs[2]	Eliminations since FY93	Demand by Program: FTE Majors per Program	Ranking[3]	Costs[4]: Costs Per FTE Major	Ranking[3]	Degree Production: Degrees per Program	Ranking[3]	Centrality: % Hours by Non-majors	Ranking[3]
Agriculture & Natural Resources	5	16	1	27.8	mod	$ 5,474	mod	11	mod	41 %	high
Architecture & Urban Planning	2	5		120.3	high	5,956	mod	39	high	13	mod
Biological/Life Sciences	12	33	3	18.3	low	7,065	high	7	low	14	mod
Business	11	28		111.9	high	4,662	mod	53	high	14	mod
Communications	7	12	2	26.1	mod	4,613	mod	15	mod	23	high
Computer Science	7	8		50.9	mod	5,492	mod	27	high	12	mod
Education	12	127	11	39.4	mod	3,849	low	17	mod	18	mod
Engineering & Technology	8	38	4	42.6	mod	7,695	high	23	mod	15	mod
English Language/Letters	12	21		36.9	mod	4,642	mod	17	mod	22	high
Ethnic and Area Studies	3	5		16.8	low	6,747	high	8	low	56	high
Foreign Language and Linguistics	6	19	1	16.4	low	5,353	mod	8	low	26	high
Health Professions & Services	10	42	3	64.5	high	7,502	high	17	mod	9	low
Home Economics	5	11		17.2	low	5,051	mod	8	low	20	mod
Library Science	2	3	1	76.6	mod	4,187	low	35	high	4	low
Mathematics	11	15	1	27.9	mod	5,347	mod	14	mod	25	high
Philosophy & Religion	4	5	1	16.0	low	7,967	high	6	low	10	low
Physical Sciences	10	26	1	19.9	low	8,523	high	8	low	14	mod
Psychology	10	17	1	51.5	mod	4,509	low	13	mod	13	mod
Public Affairs & Social Work	7	12	1	96.2	high	3,634	low	54	high	20	mod
Recreation & Leisure Studies	5	6		35.8	mod	5,885	mod	19	mod	17	mod
Social Sciences/History	12	52	2	23.8	mod	5,158	mod	10	mod	16	mod
Visual & Performing Arts	11	44	5	22.6	mod	7,296	high	6	low	7	low

Sources: Program Major Cost Study and Degrees Conferred Survey

[1] The number of campuses which offered the program in fiscal year 1995.
[2] The number of programs which had enrollment anytime since fiscal year 1993, even if phasing down.
[3] Approximately 50 percent of the programs fall within the moderate range on each measure.
[4] Departmental costs from Program Major Cost Study, averaged over three years.

Table 18

SELECTED MEASURES ON DOCTORAL DEGREE PROGRAMS AT PUBLIC UNIVERSITIES
(AVERAGE 1993 TO 1995)

Discipline	Number of Campuses[1]	Number of Programs[2]	Eliminations since FY93	Demand by Program: FTE Majors per Program	Ranking[3]	Costs[4]: Costs Per FTE Major	Ranking3	Degree Production: Degrees per Program	Ranking[3]	Centrality: % Hours by Non-majors	Ranking[3]
Agriculture & Natural Resources	1	6		52.7	mod	$ 5,995	low	7	mod	18 %	mod
Architecture & Urban Planning	1	1		22.0	low	10,111	high	2	low	33	high
Biological/Life Sciences	5	24		30.3	mod	6,457	low	5	mod	27	low
Business	3	10		25.5	mod	14,952	high	4	low	12	mod
Communications	2	2		25.7	mod	9,044	mod	5	mod	12	high
Computer Science	1	1		213.2	high	6,759	mod	34	high	7	mod
Education	5	34	6	37.1	mod	6,899	mod	9	mod	14	mod
Engineering	3	24	4	74.6	high	7,939	mod	10	high	32	low
English Language/Letters	5	8		52.3	mod	6,420	low	8	mod	13	mod
Foreign Language and Linguistics	2	9		20.7	low	7,752	mod	4	low	14	mod
Health Professions & Services	3	12	1	32.5	mod	14,645	high	5	mod	6	low
Home Economics	1	2		9.1	low	6,392	low	2	low	14	high
Library Science	1	1		78.0	high	6,276	low	3	low	23	mod
Mathematics	4	6	1	54.1	mod	9,146	mod	7	mod	9	mod
Philosophy & Religion	3	3		20.3	low	13,942	high	4	low	8	low
Physical Sciences	4	13		76.4	high	8,646	mod	9	mod	7	low
Psychology	5	5		81.9	high	8,270	mod	12	high	35	low
Public Affairs & Social Work	2	4		120.0	high	4,382	low	9	mod	13	high
Recreation & Leisure Studies	1	2		31.4	mod	10,296	high	8	mod	14	mod
Social Sciences/History	5	20	1	33.7	mod	8,299	mod	5	mod	10	mod
Visual & Performing Arts	1	4		50.2	mod	7,889	mod	6	mod	22	mod

Sources: Program Major Cost Study and Degrees Conferred Survey

[1] The number of campuses which offered the program in fiscal year 1995.
[2] The number of programs which had enrollment anytime since fiscal year 1993, even if phasing down.
[3] Approximately 50 percent of the programs fall within the moderate range on each measure.
[4] Departmental costs from Program Major Cost Study, averaged over three years.

Table 19

U.S. DOCTORAL RECIPIENTS
WITH POST-GRADUATE COMMITMENTS
EMPLOYMENT SECTOR
BY DISCIPLINE, 1973 TO 1993

Discipline	Academe*	Industry/ Self-Employed	Government	Other**
Physical Sciences***				
1973	49.5 %	29.0 %	18.6 %	2.9 %
1983	34.0	52.7	11.2	2.0
1988	36.1	50.1	11.9	1.9
1993	37.0	49.6	11.1	2.3
Engineering				
1973	24.8	51.1	20.0	4.0
1983	29.3	55.8	13.2	1.6
1988	28.6	55.5	15.0	0.9
1993	24.2	56.1	16.8	3.0
Life Sciences				
1973	63.5	13.6	16.6	6.3
1983	53.0	25.2	15.9	5.8
1988	52.2	23.6	16.7	7.6
1993	51.2	24.2	16.3	8.3
Social Sciences				
1973	69.1	5.2	14.4	11.2
1983	48.8	17.2	15.5	18.5
1988	44.9	19.5	14.2	21.4
1993	49.7	18.2	14.4	17.8
Humanities				
1973	92.0	1.4	1.7	4.9
1983	80.0	6.5	3.4	10.1
1988	79.3	5.8	3.7	11.2
1993	85.2	3.8	2.0	8.9
Education				
1973	59.8	1.8	9.4	29.0
1983	43.8	7.5	10.3	38.5
1988	43.7	7.3	9.0	39.9
1993	45.5	5.4	7.7	41.5
Professional/Other				
1973	80.4	6.4	6.4	6.8
1983	71.0	10.5	6.6	12.0
1988	73.5	8.1	6.6	11.8
1993	75.8	8.6	6.1	9.5
Total				
1973	64.3	11.5	11.6	12.5
1983	50.2	19.8	11.1	18.9
1988	49.7	20.4	10.8	19.1
1993	52.5	18.7	10.0	18.8

* Includes two and four-year colleges and universities and medical schools
** Mainly composed of elementary and secondary schools and nonprofit organizations
*** Includes mathematics and computer science

Source: National Research Council, Survey of Earned Doctorates

Table 20

MASTER'S DEGREE PRODUCTION AT ILLINOIS PUBLIC UNIVERSITIES BY PROGRAM AND DISCIPLINE

Discipline	Number of Programs by Average Degrees Awarded Per Program*								
	0	1-5	6-10	11-20	21-30	31-40	41-50	51+	Total
Agriculture	1	3	1	4	1	0	0	0	10
Architecture	0	0	1	1	0	2	0	1	5
Area and Ethnic Studies	1	1	1	2	0	0	0	0	5
Biological/Life Sciences	4	13	7	5	1	0	0	0	30
Business and Administrative Services	3	2	5	3	6	0	1	10	30
Communications	0	2	3	3	2	0	0	0	10
Computer Science	1	1	0	2	2	0	1	1	8
Education	20	9	11	23	14	11	8	15	111
Engineering	1	3	12	5	4	0	1	4	30
Engineering Related Technologies	0	0	1	2	1	0	0	0	4
English Language/Letters	0	2	7	7	3	1	1	0	21
Foreign Languages	2	10	2	3	0	1	0	0	18
Health Professions	10	7	5	14	4	2	1	2	45
Home Economics	1	5	3	1	1	0	0	0	11
Liberal/General Studies	0	0	0	1	0	0	0	1	2
Law and Legal Studies	1	1	0	0	1	0	0	0	3
Library Sciences	0	0	0	1	0	0	0	1	2
Mathematics	0	1	5	6	0	2	0	0	14
Multi/Interdisciplinary Studies	0	2	2	0	0	0	0	0	4
Natural Resources	0	1	3	1	0	0	0	0	5
Parks and Recreation	0	0	2	2	1	1	0	0	6
Philosophy and Religion	0	3	1	0	0	0	0	0	4
Physical Sciences	1	12	9	2	0	0	1	0	25
Protective Services	0	1	2	1	0	1	0	0	5
Psychology	1	0	2	3	3	3	0	0	12
Public Administration/Services	1	1	1	2	2	3	0	2	12
Social Sciences and History	0	15	20	13	1	0	0	1	50
Visual and Performing Arts	2	17	8	8	2	0	1	0	38
Total	50	112	114	115	49	27	15	38	520

* Average degrees awarded per program from 1991–95

Source: IBHE Degrees Conferred Survey

Table 21

DOCTORAL DEGREE PRODUCTION AT ILLINOIS PUBLIC UNIVERSITIES BY PROGARAM AND DISCIPLINE

Discipline	Number of Programs by Average Degrees Awarded Per Program*								
	0	1-5	6-10	11-20	21-30	31-40	41-50	51+	Total
Agriculture	0	1	2	2	0	0	0	0	5
Architecture	0	1	0	0	0	0	0	0	1
Biological/Life Sciences	1	17	6	1	0	0	0	0	25
Business and Administrative Services	5	3	1	1	0	0	0	0	10
Communications	0	1	1	0	0	0	0	0	2
Computer Science	0	0	0	0	1	0	0	0	1
Education	2	9	9	8	1	0	0	0	29
Engineering	2	8	5	4	0	0	0	1	20
English Language/Letters	0	3	3	2	0	0	0	0	8
Foreign Languages	4	4	1	1	0	0	0	0	10
Health Professions	1	7	2	1	0	0	0	0	11
Home Economics	0	2	0	0	0	0	0	0	2
Law and Legal Studies	1	0	0	0	0	0	0	0	1
Library Sciences	0	1	0	0	0	0	0	0	1
Mathematics	1	3	0	2	0	0	0	0	6
Natural Resources	1	0	0	0	0	0	0	0	1
Parks and Recreation	0	0	2	0	0	0	0	0	2
Philosophy and Religion	0	3	0	0	0	0	0	0	3
Physical Sciences	1	7	2	1	0	1	1	0	13
Psychology	1	0	1	2	1	0	0	0	5
Public Administration/Services	1	2	0	0	1	0	0	0	4
Social Sciences and History	2	14	1	2	0	0	0	0	19
Visual and Performing Arts	0	3	0	1	0	0	0	0	4
Total	23	89	36	28	4	1	1	1	183

* Average degrees awarded per program from 1991-95

Source: IBHE Degrees Conferred Survey

Table 22

ILLINOIS PUBLIC UNIVERITIES
UNDERGRADUATE AND GRADUATE TUITION
AND TUITION AS A PERCENT OF INSTRUCTIONAL COST, FISCAL YEAR 1995

	Undergraduate			Graduate		
	Tuition	Costs	Tuition % of Costs	Tuition	Costs	Tuition % of Costs
Chicago State University	$ 1,902	$ 5,581	34.1 %	$ 2,004	$ 6,017	33.3 %
Eastern Illinois University	1,902	4,669	40.7	2,004	6,755	29.7
Governors State University	1,902	6,242	30.5	2,004	6,729	29.8
Illinois State University	2,600	5,071	51.3	2,104	7,631	27.6
Northeastern Illinois University	1,902	5,787	32.9	2,004	7,410	27.0
Northern Illinois University	2,600	5,382	48.3	2,104	9,183	22.9
Western Illinois University	1,902	5,262	36.1	2,004	7,346	27.3
Southern Illinois University						
Carbondale	2,318	5,287	43.8	1,854	11,159	16.6
Edwardsville	1,778	6,031	29.5	1,906	8,787	21.7
University of Illinois						
Chicago	2,647	4,662	56.8	3,396	9,932	34.2
Springfield	2,373	6,624	35.8	1,922	6,185	31.1
Urbana–Champaign	3,025	5,237	57.8	3,640	11,410	31.9
Total	$ 2,439	$ 5,250	46.5 %	$ 2,777	$ 9,593	28.9 %

Source: IBHE RAMP and Discipline Cost Study

Table 23

UNDERGRADUATE AND GRADUATE WEIGHTED AVERAGE TUITION RATES COMPARED WITH THE CONSUMER PRICE INDEX AND ILLINOIS PER CAPITA INCOME FISCAL YEARS 1989 TO 1997

Fiscal Year	Weighted Average Tuition Rates				Consumer Price Index		Illinois Per Capita Income	
	Undergraduate	% Change	Graduate*	% Change	(FY83 = 100)	% Change	Dollars	% Change
1989	$ 1,707	—	$ 2,062	—	123.5	—	$ 18,398	—
1990	1,796	5.2 %	2,143	3.9 %	129.4	4.8 %	19,615	6.6 %
1991	1,798	0.1	2,156	0.6	136.4	5.4	20,390	4.0
1992	1,886	4.9	2,264	5.0	140.8	3.2	21,197	4.0
1993	2,211	17.2	2,556	12.9	145.2	3.1	22,153	4.5
1994	2,308	4.4	2,610	2.1	148.8	2.5	23,070	4.1
1995	2,439	5.7	2,777	6.4	153.2	3.0	24,185	4.8
1996	2,547	4.4	2,908	4.7	157.3 **	2.7	25,308 **	4.6
1997	2,672	4.9	3,056	5.1	161.6 **	2.7	26,472 **	4.6
1989–97 Increase	965	56.5 %	994	48.2 %	38.1	30.8 %	8,074	43.8 %

* Does not include tuition for professional schools.
** Projected.

Source: IBHE RAMP, Public University Academic Discipline Unit Cost Study, and Department of Commerce and Community Affairs

Table 24

PUBLIC UNIVERSITIES
TOTAL TUITION AND FEE WAIVERS
FISCAL YEAR 1995

	Number of Waivers			Value of Waivers (in thousands of dollars)		
	Undergraduate	Graduate	Total	Undergraduate	Graduate	Total
Statutory Waivers	4,710	412	5,122	$ 9,210.8	$ 1,269.2	$ 10,480.0
General Assembly	1,545	211	1,756	3,528.2	897.4	4,425.6
ROTC	682	6	688	1,317.5	10.9	1,328.4
Teacher Education: Special Ed.	619	138	757	1,422.0	179.6	1,601.6
DCFS	65	13	78	143.2	29.3	172.5
Children of Employees	1,314	-0-	1,314	1,372.7	-0-	1,372.7
Senior Citizens	16	11	27	13.4	6.3	19.7
Children of Veterans	469	33	502	1,413.8	145.7	1,559.5
Institutional Waivers	8,083	28,284	36,367	12,063.3	95,525.2	107,588.5
Graduate Assistantships	-0-	15,217	15,217	-0-	71,444.4	71,444.4
Faculty/Administrators	174	1,743	1,917	170.2	2,732.9	2,903.1
Support Staff	1,436	942	2,378	1,279.5	933.0	2,212.5
Dependents of Staff	77	3	80	108.5	1.9	110.4
Cooperating Teachers	92	2,922	3,014	67.1	1,770.2	1,837.3
Athletic	1,622	19	1,641	3,460.9	21.5	3,482.4
Academic	1,916	1,662	3,578	2,835.4	2,227.1	5,062.5
Other Talent	826	21	847	1,119.3	70.8	1,190.1
Student Service	534	46	580	580.5	43.5	624.0
Foreign Students	48	767	815	203.0	2,056.7	2,259.7
Out-of-State Students	304	1,009	1,313	815.1	2,518.5	3,333.6
Other	1,054	3,933	4,987	1,423.8	11,704.7	13,128.5
Total	12,793	28,696	41,489	$ 21,274.1	$ 96,794.4	$ 118,068.5

Source: LAC/BHE Survey

Table 25

ILLINOIS PUBLIC UNIVERSITIES
UNDERGRADUATE TUITION REVENUE AS A PERCENT OF INSTRUCTIONAL COSTS

(in thousands of dollars)	Fiscal Year 1990			Fiscal Year 1995			FY1990 – FY1995			
							Tuition Revenue		Instructional Costs	
	Undergraduate Tuition Revenue [1]	Undergraduate Instructional Costs [2]	Revenue as A Percent of Costs	Undergraduate Tuition Revenue [1]	Undergraduate Instructional Costs [2]	Revenue as A Percent of Costs	$ Change	% Change	$ Change	% Change
Chicago State University	$ 5,729.0	$ 25,223.6	22.7 %	$ 10,436.3	$ 29,187.8	35.8 %	$ 4,707.3	82.2 %	$ 3,964.2	15.7 %
Eastern Illinois University	14,828.5	41,343.3	35.9	17,966.5	45,283.9	39.7	3,138.0	21.2	3,940.6	9.5
Governors State University	3,139.1	11,921.1	26.3	3,415.9	11,750.3	29.1	276.8	8.8	(170.8)	(1.4)
Illinois State University	31,967.0	70,374.2	45.4	36,109.4	75,712.7	47.7	4,142.4	13.0	5,338.5	7.6
Northeastern Illinois University	10,715.8	30,084.6	35.6	11,848.2	31,946.8	37.1	1,132.4	10.6	1,862.2	6.2
Northern Illinois University	28,219.9	67,982.7	41.5	35,821.9	79,931.3	44.8	7,602.0	26.9	11,948.6	17.6
Western Illinois University	16,387.2	42,984.2	38.1	17,673.9	47,590.6	37.1	1,286.7	7.9	4,606.4	10.7
Southern Illinois University	41,368.1	109,667.4	37.7	50,883.7	121,054.0	42.0	9,515.6	23.0	11,386.6	10.4
Carbondale	29,177.6	72,175.9	40.4	36,908.5	78,122.1	47.2	7,730.9	26.5	5,946.2	8.2
Edwardsville	12,190.5	37,491.5	32.5	13,975.2	42,931.9	32.6	1,784.7	14.6	5,440.4	14.5
University of Illinois	89,862.5	198,375.7	45.3	122,754.7	217,741.3	56.4	32,892.2	36.6	19,365.6	9.8
Chicago	29,465.2	64,469.4	45.7	39,573.2	66,938.0	59.1	10,108.0	34.3	2,468.6	3.8
Springfield	2,801.3	9,346.7	30.0	3,540.5	11,359.7	31.2	739.2	26.4	2,013.0	21.5
Urbana–Champaign	57,596.0	124,559.6	46.2	79,641.0	139,443.6	57.1	22,045.0	38.3	14,884.0	11.9
Total	$ 242,217.1	$ 597,956.8	40.5 %	$ 306,910.5	$ 660,198.7	46.5 %	$ 64,693.4	26.7 %	$ 62,241.9	10.4 %

[1] Revenue deposited in the Universities Income Fund.
[2] Costs reported in the Discipline Unit Cost Study.

Sources: BHE RAMP and Discipline Unit Cost Study

Table 26

ILLINOIS PUBLIC UNIVERSITIES
GRADUATE TUITION REVENUE AS A PERCENT OF INSTRUCTIONAL COSTS

(in thousands of dollars)	Fiscal Year 1990			Fiscal Year 1995			FY1990 – FY1995			
							Tuition Revenue		Instructional Costs	
	Graduate Tuition Revenue [1]	Graduate Instructional Costs [2]	Revenue as A Percent of Costs	Graduate Tuition Revenue [1]	Graduate Instructional Costs [2]	Revenue as A Percent of Costs	$ Change	% Change	$ Change	% Change
Chicago State University	$ 1,389.2	$ 6,702.3	20.7 %	$ 2,172.9	$ 6,876.3	31.6 %	$ 783.7	56.4 %	$ 174.0	2.6 %
Eastern Illinois University	846.1	6,271.8	13.5	1,379.1	7,474.8	18.4	533.0	63.0	1,203.0	19.2
Governors State University	2,081.7	9,114.9	22.8	3,853.2	11,291.1	34.1	1,771.5	85.1	2,176.2	23.9
Illinois State University	1,430.1	13,423.3	10.7	1,523.8	14,147.8	10.8	93.7	6.6	724.5	5.4
Northeastern Illinois University	2,433.6	9,344.9	26.0	2,639.1	11,361.5	23.2	205.5	8.4	2,016.6	21.6
Northern Illinois University	3,861.1	32,236.8	12.0	4,280.0	34,753.4	12.3	418.9	10.8	2,516.6	7.8
Western Illinois University	2,082.8	10,040.3	20.7	2,364.7	10,880.0	21.7	281.9	13.5	839.7	8.4
Southern Illinois University	3,972.7	43,476.6	9.1	5,031.8	48,424.5	10.4	1,059.1	26.7	4,947.9	11.4
Carbondale	2,167.8	31,627.2	6.9	3,251.9	35,464.4	9.2	1,084.1	50.0	3,837.2	12.1
Edwardsville	1,804.9	11,849.4	15.2	1,779.9	12,960.1	13.7	(25.0)	(1.4)	1,110.7	9.4
University of Illinois	18,259.8	182,686.9	10.0	27,604.0	210,033.4	13.1	9,344.2	51.2	27,346.5	15.0
Chicago	7,634.1	51,999.9	14.7	10,580.9	61,461.7	17.2	2,946.8	38.6	9,461.8	18.2
Springfield	1,225.7	6,692.2	18.3	1,914.1	7,333.4	26.1	688.4	56.2	641.2	9.6
Urbana–Champaign	9,400.0	123,994.8	7.6	15,109.0	141,238.3	10.7	5,709.0	60.7	17,243.5	13.9
Total	$ 36,357.1	$ 313,297.8	11.6 %	$ 50,848.6	$ 355,242.8	14.3 %	$ 14,491.5	39.9 %	$ 41,945.0	13.4 %

[1] Revenue deposited in the Universities Income Fund.
[2] Costs reported in the Discipline Unit Cost Study.

Source: BHE RAMP and Discipline Unit Cost Study

Table 27

ILLINOIS PUBLIC UNIVERSITIES
FISCAL YEAR 1995 TUITION REVENUE AS A PERCENT OF INSTRUCTIONAL COSTS

(in thousands of dollars)	Fiscal Year 1995 Graduate Tuition Revenue [1]	Fiscal Year 1995 Graduate Instructional Costs [2]	Fiscal Year 1995 Revenue as A Percent of Costs	Fiscal Year 1995 Undergraduate Tuition Revenue [1]	Fiscal Year 1995 Undergraduate Instructional Costs [2]	Fiscal Year 1995 Revenue as A Percent of Costs	Fiscal Year 1995 Total Tuition Revenue [1]	Fiscal Year 1995 Total Instructional Costs [2]	Fiscal Year 1995 Revenue as A Percent of Costs
Chicago State University	$ 2,172.9	$ 6,876.3	31.6 %	$ 10,436.3	$ 29,187.8	35.8 %	$ 12,609.2	$ 36,064.1	35.0 %
Eastern Illinois University	1,379.1	7,474.8	18.4	17,966.5	45,283.9	39.7	19,345.6	52,758.7	36.7
Governors State University	3,853.2	11,291.1	34.1	3,415.9	11,750.3	29.1	7,269.1	23,041.4	31.5
Illinois State University	1,523.8	14,147.8	10.8	36,109.4	75,712.7	47.7	37,633.2	89,860.5	41.9
Northeastern Illinois University	2,639.1	11,361.5	23.2	11,848.2	31,946.8	37.1	14,487.3	43,308.3	33.5
Northern Illinois University	4,280.0	34,753.4	12.3	35,821.9	79,931.3	44.8	40,101.9	114,684.7	35.0
Western Illinois University	2,364.7	10,880.0	21.7	17,673.9	47,590.6	37.1	20,038.6	58,470.6	34.3
Southern Illinois University	5,031.8	48,424.5	10.4	50,883.7	121,054.0	42.0	55,915.5	169,478.5	33.0
Carbondale	3,251.9	35,464.4	9.2	36,908.5	78,122.1	47.2	40,160.4	113,586.5	35.4
Edwardsville	1,779.9	12,960.1	13.7	13,975.2	42,931.9	32.6	15,755.1	55,892.0	28.2
University of Illinois	27,604.0	210,033.4	13.1	122,754.7	217,741.3	56.4	150,358.7	427,774.7	35.1
Chicago	10,580.9	61,461.7	17.2	39,573.2	66,938.0	59.1	50,154.1	128,399.7	39.1
Springfield	1,914.1	7,333.4	26.1	3,540.5	11,359.7	31.2	5,454.6	18,693.1	29.2
Urbana-Champaign	15,109.0	141,238.3	10.7	79,641.0	139,443.6	57.1	94,750.0	280,681.9	33.8
Total	$ 50,848.6	$ 355,242.8	14.3 %	$ 306,910.5	$ 660,198.7	46.5 %	$ 357,759.1	$ 1,015,441.5	35.2 %

1 Revenue deposited in the Universities Income Fund.
2 Costs reported in the Discipline Unit Cost Study.

Sources: BHE RAMP and Discipline Unit Cost Study