Excerpt from President Hackney's Statement to Appropriations Committee, House of Representatives

Making the Case for Penn in Harrisburg

In the current year, the University of Pennsylvania is receiving a total of $28,539,000 in appropriations from the Commonwealth. For 1986-87, the University is asking an increase of 10.8 percent in its total allocation to help meet anticipated rises in costs. The requested total of $31,631,000 reflects a 13 percent increase for the three items benefiting the School of Veterinary Medicine and 9.5 percent increases for all other line items. It is a dollar increase of $3,092,000. The Governor has recommended an increase of three percent in each line item, for a total appropriation of $29,394,000.

Following are some of President Sheldon Hackney's program emphases in a message sent to legislators.

Students and Financial Aid: The shrinkage in the college-age segment of the population has not yet been reflected in the quantity or quality of applicants to the University of Pennsylvania. To assure that these applicants will be able to matriculate at Penn, however, has required a steadily increasing outlay of University funds for student aid, and the development of innovative plans to help students finance their education.

Applications for admission to the undergraduate schools have increased in each of the past four years. They reached a record high for the class entering this fall, and our yield rate continues to improve. The current freshman class of 2,220 is as strong in the "objective" measures of quality as any in recent years—the average combined SAT scores were 1270. Forty-four percent are women, and 20.3 percent are members of designated minority groups, up from 17.9 percent last year. The percentage of the class that is from minority groups has increased in each year since 1981.

At the graduate and professional levels, demographics have a less direct influence on enrollments than do economic factors. Thus applications to the graduate programs of the Wharton and Engineering Schools have set new records, and interest in other graduate degree programs has increased in the last several years.

Nationally, considerable attention has been devoted to countering demographic trends by attracting "non-traditional" constituencies, and Penn, with a long history of meeting the needs within its local community and offering continuing professional education, has been attentive to its programs in these areas. The College of General Studies, founded in 1894, offers students of all ages programs leading to the Associate's and Bachelor's degrees, part-time graduate study, and pre-professional programs; the Wharton Evening School, in its eighty-second year, offers programs leading to the Associate's and Bachelor's degrees in Business Administration; the Wharton School's graduate offerings have for 11 years included a two-year Executive MBA course for middle-level executives; and the Wharton School is now developing a Center for Lifelong Education and Career Development at which executive education programs will be offered as an intergal part of the School's mission. In the area of health affairs, the Medical, Dental, Nursing, and Veterinary Schools continue to provide the continuing education that has become critically important to practitioners in these fields.

The Faculty: The strength of the faculty is of paramount importance in determining the quality of the University of Pennsylvania. The faculty are responsible for conducting the educational process, attracting research funding, and producing results. National surveys and peer reviews in the academic community periodically attest to the distinction of the University of Pennsylvania faculty. Most recently, 21 of Penn's graduate departments were highly ranked by the Conference Board of Scholarly Societies. In a recent year, eight Penn professors received Fulbright Awards, another seven received Guggenheim Fellowships, and yet another seven were awarded Presidential Young Investigator Awards, which were established by the White House Office of Science and Technology. The University annually ranks among the national leaders in federal awards for research, and this is a valued endorsement; the awards are made on the recommendation of disinterested and expertly critical reviewers. National recognition of this sort redounds not only to the faculty and the University, but also to the Commonwealth as a center of intellectual vitality.

To attract and retain distinguished professors and promising young teachers requires substantial investments, not only in salaries but in facilities, equipment, and other aspects of the academic environment. It is neither easy nor cheap in the best of times, but a congruence of circumstances in the 1980's has made it more difficult, more expensive, and in the long run more important. In some burgeoning fields (e.g., computer science and management) the opportunities in private industry have forced salaries above the affordable range for most colleges and universities. Consequently, there is a shortage of qualified people willing to work for the rewards to be found in an academic setting.

Facilities: The facilities of a great university—its libraries, laboratories, classrooms, student residences, and faculty studies—must be scaled to the requirements of its people. The replacement value of Penn's 117 buildings is set at $1.7 billion. Among the additions to the University's physical plant that are scheduled in the near future are a $5.6 million Plant Sciences Building, the School of Medicine's clinical science research building, the Wharton School's Executive Education Center, and a $6 million addition to the Engineering School.

Much of the University's building activity is, however, in the form of renovation. Measuring their lives in centuries, universities are in constant need of renewal and adaptation to advances in learning and teaching. Urgent maintenance needs totaling more than $140 million have been identified. These needs exclude programmatic enhancements and, of necessity, they will be addressed at very slow rates because funds are difficult to identify.

The University Library, with 3,193,000 volumes, is the Commonwealth's largest research library. Its excellence is a factor in bringing outstanding scholars and scientists to Penn; it nourishes their work and opens new worlds to younger colleagues and students. To keep pace with the demands upon it, its operating budget has been increasing at a rate of about $900,000 per year, and it is now engaged in the first phase of a five-year, $7.8 million program to upgrade its computer cataloguing facilities, increase its endowment for acquisitions, and modernize some of its open stacks. A $1.5 million foundation grant has enabled the Library to launch the first phase—development of an on-line catalogue system that will bring the 14 campus libraries into one electronic network and also give them access to the national Research Libraries Information Network.

Throughout the University, of course, the rapidly evolving demands and possibilities of the computer are generating radical and expensive change.

Computer Technology: Managing the computer's expanding role in teaching and research was clearly foreseen as one of the principal challenges of the 1980's, but few observers accurately predicted its scale and scope. It is now clear that the computer's effect on higher education will be little short of revolutionary. It is changing not only the way in which subjects are taught, but what is taught. It has altered the very nature of research in areas from religious studies to medicine. It may well transform the pattern of student life that has gone basically unchanged for well over a century. It places new strains on the resources of the institutions and increases the vulnerability of their always fragile fiscal structure.

Penn nevertheless has been moving confidently toward the establishment of a multi-million-dollar network that will link the several academic

and administrative mainframe computers with a number of middle-sized minicomputers and thousands of desktop or personal microcomputers. In the past year, the process was accelerated by a gift of $6 million in equipment from one manufacturer and agreements with that company and several others to make microcomputers available at discounts of up to 67 percent. A survey taken two years ago showed there were 1,000 microcomputers on campus; there are about 4,000 now, and it is anticipated that there will be 10,000 within three years.

As noted earlier, the cost of installing the network to connect these machines will be in the neighborhood of $20 million. The investment in hardware is all but impossible to calculate, and it will generate an ongoing need for software and other services at about three or four dollars for every dollar spent on hardware.

The required investment of time and talent, as well as money, will be tremendous. It must be made, however, if Penn is to continue to produce men and women equipped to find the answers to the questions of their times.

Research: Penn's research effort, as mentioned earlier, is one of the nation's largest and most distinguished. In fiscal 1983, Penn ranked thirteenth among the nation's universities in expenditures for research and development. Despite the national decline in federal commitments since then, 1985 brought $156,600,000 in new awards to Penn, an increase of almost $8 million over the previous year. The surge in new awards has continued, and will almost certainly place Penn among the top ten universities this year.

Many of the projects are described as "computer-intensive," even in the liberal arts, and the fruits of the enterprise are rich and varied. Some examples:

Computer imaging systems have been developed to assist in medical diagnosis and surgical planning. They can create three-dimensional "pictures" of the spine and skull—images that can be rotated in any direction and even sliced open electronically. Work is proceeding on systems that will locate narrowing coronary vessels, and others that will identify tumors or injured areas of the brain.

Two Penn physicists are engaged in work that suggests the existence of a new state of matter—"quasi-crystals" with atomic arrangements differing from the two recognized forms of solid matter, amorphous solids and crystals. Ultimately, this may lead to new materials with unusual structural and electronic properties.

The Decision Sciences Department produced a program for planning delivery routes that would chart the most efficient ways for a company's trucks to arrive at specified locations at specified times of day, taking into account local traffic conditions, detours, and disturbances.

The Center on Risk and Decision Processes is constructing a research model to examine long-term problems in such areas as the transportation, storage, and disposal of hazardous materials.

The Institute of Neurological Sciences, recently re-named the David Mahoney Institute in recognition of a $2.75 million gift from the Penn Trustee and former chairman of Norton Simon, Inc., focuses the talents of more than 100 faculty members in the health sciences and the School of Arts and Sciences on the study of the brain. The Institute expects to learn more about the brain in the next decade than has been learned in the past century.

This list is, of course, merely illustrative of the range of investigations constantly in progress. The great bulk of the funding comes from external sources and is designated for specific purposes. While the University can to some degree influence the choices made by its benefactors, there is a growing need for funds that can be freely allocated by the University itself. There is need for seed money for innovative projects with the promise of drawing outside sponsors as they demonstrate their value, and there is a need to support those activities of enduring scholarly importance, particularly in the liberal arts, that have not attracted external support. Toward these ends, the University has established a Research Foundation and a Research Fund. The Foundation offers modest awards, particularly to young faculty, in support of such research costs as equipment and publication expenses. The Fund makes grants of up to $50,000 to faculty for proposals that are "unique, excellent, and have potential for making seminal contributions in the areas they address."

The Specific Requests for Penn

General Instruction

The University requests $14,500,000, which is $864,000 more than the Governor recommended.

This is the appropriation that is central to the University's capacity to sustain its educational and research endeavors. The funds help to support all of the undergraduate schools; such University-wide resources as computing networks and libraries; and the full spectrum of graduate and professional programs (including Arts and Sciences, Wharton, Engineering, Law, Nursing, Social Work, Education, and Fine Arts), except Medicine, Veterinary Medicine, and the Dental Clinics.

Thus the health of the total enterprise—all the activities and aspirations outlined in the preceding pages—is dependent on the adequacy of this line item. The requested increase will enable the University to move toward three goals identified through the strategic planning process as those holding highest priority—undergraduate education, student financial aid and assistance, and research excellence.

In undergraduate education, Penn will focus on encouraging even greater interaction among its several schools, strengthening the links between the liberal arts and the professions, expanding programs of instructional computing, and developing new opportunities for undergraduate research. An Undergraduate Education Fund has been established, and the University proposes to allocate $10 million in gifts from alumni of the undergraduate schools, over a five-year period, to fund specific educational initiatives originating in the schools.

For student financial aid and assistance, Penn's goal is to ensure continued availability of aid for those with demonstrated need and also to provide reasonable financing for all middle-income students and families who find the cost of a Penn education to be a major burden. Nearly $4 million of the Commonwealth appropriation are allocated directly to these efforts.

In pursuit of research excellence, which is a key element in attracting outstanding students and faculty, Penn will expand its internal Research Fund and augment it with other internal "banks." The University is contemplating major investments of general University funds totaling more than $50 million over five years in computing and libraries; research facilities and equipment; and strengthening doctoral programs.

Medical Instruction

The University requests for Medical Instruction an increase of 9.5 percent or $347,000, which would produce a total of $4,005,000 in 1986-87 for this item.

In spite of the increase for Medical Instruction, the School of Medicine again was forced to raise its tuition and fees for the current academic year by 8.3 percent to $13,580, which makes it one of the more expensive medical schools in the country. National trends have affected applications to the School of Medicine, which for the last entering class stood at 5,367 compared to 6,501 four years ago. Even so, there was no difficulty in filling the entering class of 155 students with people of exceptionally high quality. Most of them, however, must assume a heavy burden of debt to complete their studies. This inevitably discourages some highly talented students from attending this great medical school, the first in the country, and forces them to go elsewhere for their medical education, depriving Pennsylvania of their talent.

The School of Medicine continues to be one of the nation's major centers of biomedical research and a pioneer in the development of new medical technologies, working with the School of Engineering and other scientists on campus. In fiscal year 1984, for example, the School ranked seventh across the nation in research grants awarded from the National Institutes of Health, ahead of such institutions as Harvard, the University of California at Los Angeles, Duke University, and the University of Chicago. NIH awarded the School $47.9 million in research grants in that year and $52.4 million for all purposes, including training. Grant and contract support in dollars awarded from all sources came to $75.5 million in 1984-85.

The research strengths of the School of Medicine attract outstanding biomedical students and significant research support to the Commonwealth. For example, the Howard Hughes Medical Institute has recently become affiliated with the School of Medicine and the Hospital of the University of Pennsylvania and will create a significant research presence in the School's Clinical Research Building, which will be completed in 1989. In addition, the National Cancer Institute has awarded the University $2.5 million to construct a state-of-the-art cancer research unit in the new building. Thus, the School's research and patient care facilities provide a rich educational

environment for medical students. The funding from the Commonwealth contributes in very important ways to maintaining the strength of the School's educational component.

School of Veterinary Medicine

In 1985-86, the School of Veterinary Medicine received an appropriation totaling $10,793,000, an increase of 13.2 percent over the previous year. The University is extremely grateful for this vote of confidence by the Commonwealth. This year, the University of Pennsylvania requests for the three items benefiting the School of Veterinary Medicine a total appropriation of $12,196,000. This would be an increase of $1,403,000, or 13 percent.

Pennsylvania animal agriculture, including dairy, swine, beef, and poultry farming, generates annual sales in excess of $2 billion. The overall agribusiness industry in the Commonwealth accounts for nearly $25 billion in sales and employs 900,000 people. The health of this industry and its animals is heavily dependent on Penn's School of Veterinary Medicine and the services of its graduates, who comprise 72 percent of the veterinary practitioners in the Commonwealth.

Expansion of the nation's food supply, to accommodate both a growing population and the export market, requires more efficient use of existing resources; farm land is constantly being lost to development. To a great extent this expansion will depend on more effective control of animal diseases and new biological technologies that are being developed by Penn's Veterinary School. The School's pioneering research, both basic and clinical, and its training of new veterinarians are vital to the preservation and advancement of the Commonwealth's animal industry.

In addition to the obvious agricultural benefits provided to this Commonwealth by the Veterinary School, there are significant direct contributions to human medicine. At Penn, these contributions are even more pronounced than at veterinary schools that developed at land grant universities. Penn's Veterinary School was an "offspring" of the University's Medical School, and a continuing close relationship has contributed to the Veterinary School's standing as the world's foremost center for comparative medicine and mammalian genetic engineering.

As a private institution, Penn's Veterinary School has long operated under severe constraints. Except for Penn and two smaller veterinary schools, all American schools of veterinary medicine are state-owned and receive from state appropriations more signicant portions of their budgets for operations as well as construction funds for classrooms, laboratories, and clinical facilities. Penn's Veterinary School performs for Pennsylvania all of the services that the other schools deliver to their states, but at far less cost to the taxpayers.

Veterinary Instruction For 1985-86, the Commonwealth granted an increase for veterinary instruction of 5.5 percent or $332,000. The University requests for 1986-87 an increase of 11.7 percent for a total request of $7,117,000 for veterinary instruction.

A great proportion of the Veterinary School's recent increase in instructional costs is attributable to the opening of the new Veterinary Medical Teaching Hospital in the University's Academic Health Center in West Philadelphia, and to the expansion of the George D. Widener Hospital and other teaching facilities at New Bolton Center. The new facilities are already returning rich rewards in improved clinical instruction and patient care. They have, however, imposed on the School additional costs of approximately $2 million a year in operating expenses and debt service.

The new facilities incorporate the most advanced biomedical equipment and technology and provide near-perfect settings for the integration of teaching, research, and patient care.

Veterinary medical care and instruction are inherently costly because they must deal with many species. Because of this and the need to incorporate the rapidly emerging new technologies into its clinical and basic science teaching program, the Veterinary School will always have vital needs for funding above the level that simply covers current operations. The Commonwealth continues to be an essential partner in meeting these funding needs for the School.

New Bolton Center For the Veterinary School's rural campus, New Bolton Center, the University requests an appropriation of $3,341,000, an increase of 17.6 percent.

New Bolton Center, near Kennett Square in Chester County, embraces nearly 1,000 acres and more than 70 buildings, including barns, stables, and farm facilities to house and care for cattle, horses, and other domestic animals. The animal population at the Center includes more than 500 cattle, 100 horses, a herd of swine, beef cattle, a flock of sheep, and a herd of goats.

The Center also includes a clinic and hospital for large animals, research laboratories, an orthopedic and rehabilitation center, a bovine leukemia research unit, a poultry diagnostic clinic, and dormitory and conference facilities. All of these capital investments have been financed without Commonwealth assistance, through private funding; they are in effect a gift by generous donors and by the University to the Commonwealth's animal industry.

The primary missions of the Veterinary School at New Bolton Center are teaching, research, and service. Students are regularly assigned to New Bolton Center on a rotating basis. While in residence, they work in the clinics and laboratories and accompany members of the clinical staff on professional calls to farms in the area, thus gaining field experience in the diagnosis, control, and treatment of disease. Continuing education for practicing veterinarians, an innovation when it was introduced at Penn, enables them to remain current on the latest techniques.

The large animal hospital at New Bolton Center treated 5,622 patients in fiscal 1984-85; the clinical staff also made more than 4,000 field visits. This represents an increase of 14.4 percent over the previous year's total and is an excellent example of the increasingly vital service role that the Commonwealth support allows. The Center is also the site of intensive research activity on animal reproduction and nutrition, infectious diseases, including zoonoses (diseases transmissible from animals to man), and bovine leukemia. Basic discoveries resulting from investigations at New Bolton Center are leading to improved health not only of animals, but of humans as well.

The New Bolton Center faculty is establishing a fully-staffed computer facility which physically links and functionally integrates the academic and service operations of the Center, communicates with the University and state-wide agricultural and diagnostic computer network systems, and provides veterinary practitioners and farmers with access to computerized diagnostic and herd health management information systems.

Computer work stations are being installed in each of the academic sections, clinical service units, administrative offices, and students' classrooms to be hardwire networked into an integrated system of central processing, data storage, and communication units of sufficient size and power to meet projected computing requirements in the foreseeable future.

Software is being developed to automate the operations of hospital services, including medicine, surgery, anaesthesiology, radiology, clinical laboratory, microbiology, pathology, pharmacy, and outreach services. These services include field service, nutrition, reproduction, epidemiology and health economics, and the poultry diagnostic unit. All services involved with a clinical case or herd health problem would enter information into a common data base. These data would then be accessible for case management, for disease surveillance, and for retrospective statistical analysis, and would be compatible with Commonwealth diagnostic information systems. Teaching applications will include computerized tutorials of topics in veterinary medicine, interactive video, and expert systems programs for diagnostic and therapeutic management. Research applications will include computerized literature searching, experimental design, data capture and reduction, statistical and mathematical analysis, and generation of scientific reports.

This facility will enable New Bolton Center to assume a leadership role in the integrated applications of computer technology in large animal veterinary medicine. It will significantly enhance the faculty's ability to communicate knowledge to veterinary students and practicing veterinarians, improve and expand the School's capability for serving the agricultural community, and facilitate the discovery of new knowledge related to the diagnosis and management of diseases of domestic animals.

In its Centennial fund raising campaign, the Veterinary School is seeking to add to the hospital facilities at New Bolton Center a contagious disease isolation unit, expected to cost $4,449,000, and an intensive care unit, already funded, costing $1,750,000. Thus, the latest advances in medical knowledge will continue to be made available to the Commonwealth's animal owners, and to its veterinary students and practitioners. These and other new facilities, to be financed entirely through private contributions, will greatly enhance the quality and volume of services to Pennsylvania farmers and breeders.

Unfortunately, the costs of such advanced treatment procedures, which are comparable to those for human patients, are beyond the means of many large-animal owners, particularly farmers, who are not protected by Blue Cross or analogous coverages. Thus, the hospital services at New Bolton Center continue to operate at a deficit. For this reason, and to ensure a continued thorough education for students in large-animal medicine, the University requests a renewed upward adjustment of Commonwealth support for New Bolton Center.

Food and Animal Clinics/Services: For this item, the University and the Veterinary School request an increase of 10 percent, for an item total of $1,738,000.

The Veterinary School's Food Animal Program encompasses five interrelated areas—the Food Animal In-patient Clinics, the Poultry Diagnostic Laboratory, the Field Service or Ambulatory Clinic, the Section of Nutrition, and the Section of Epidemiology and Animal Health

Economics. The latter activity is a program intended to deal with infectious diseases and to improve the efficiency of food-animal production, in part through studies to detect declines in metabolism and reproduction in particular strains of animals before clinical disease signs become manifest.

The Epidemiology and Animal Health Economics Section has also established new health care delivery systems which provide special services to veterinarians and to dairy, beef, sheep, swine, and poultry farms. Its activities are being coordinated with organizations outside the University such as the Bureau of Animal Industries, the Pennsylvania Department of Agriculture, the Animal Industries Liaison Committee, and the Pennsylvania Veterinary Medical Association.

Clinicians of the Food Animal In-patient Clinics, the Field Service, and the Poultry Diagnostic Laboratory, all based at New Bolton Center, help to maintain the Veterinary School's outstanding reputation in maintaining the health of food animals. The Section of Nutrition is constantly working to develop improved ways of treating and preventing nutritional and metabolic diseases.

A diagnostic and consulting service to investigate and solve disease outbreaks and to minimize economic losses to the Commonwealth's livestock farmers, poultrymen, and horse breeders is available on short notice. Clinicians, pathologists, nutritionists, and laboratory diagnosticians are often called upon to deal with undiagnosed outbreaks of disease in the field. The Poultry Diagnostic Laboratory made the initial diagnosis of the recent outbreak of avian influenza, and, working with the Pennsylvania Department of Agriculture, served as one of the most important diagnostic laboratories throughout the course of the epidemic.

All of these functions are nourished and sustained by the Commonwealth's support of the Food and Animal Clinics and Services, and the Commonwealth's animal agriculture is the stronger for them. We trust that this support will continue, and grow.

Dental Clinics

The University requests for support of its dental clinics in 1986-87 an appropriation of $930,000, an increase of $81,000, or 9.5 percent, over the current year.

The clinics of the School of Dental Medicine provide quality care each year for some 18,000 people, many of them persons of low income who cannot afford to pay even the reduced fees that are charged. This situation contributes to the deficit operation of the clinics which is currently estimated at more than $1 million annually.

The Dental School's general instructional clinics were renovated in 1984, and the specialty clinics in children's dentistry and periodontics were refurbished in the summer of 1985. The payback of the cost of these projects has added over $300,000 in new expenses to the clinic costs, and this additional expense will continue in each of the next nine years.

One result of this deficit is constantly rising tuition and fees for dental students, which were limited to five percent increases in each of the past two years, but will still total $16,820 for first-year students. These costs are among the highest in the nation and more than twice those of the Commonwealth's other dental schools. For an unmarried first-year dental student, total one-year costs are now about $30,000, including room, board, tuition, fees, and the purchase of professional instruments.

The Dental School has maintained a strong faculty, deeply engaged in both basic and applied research, that continues to attract more support for research than any other dental school in the country. Faculty are integrally related to the three research centers located at the School. Each of these is complementary and characterized by the integration of efforts of basic clinical science researchers. First, the Center for Oral Health Research (COHR), one of five centers of its kind funded by the National Institutes of Health, focuses on fundamental research in biological processes that are pertinent to the diagnosis and treatment of dental diseases. Scholars at the COHR are involved in research that addresses basic problems in disciplines such as molecular biology, microbiology, immunology, and virology. Next, the General Clinical Research Center (GCRC) deals with research that can be directly related to patients. GCRC faculty investigate such problems as the comparative effectiveness of new health products or treatments for dental disease. Finally, the recently-approved Periodontal Research Center blends both of the above approaches by focusing the talents and expertise of both basic and clinical science researchers on a specific clinical entity, namely juvenile periodontitis, a rapid form of gum disease that affects teenagers and adolescents. New knowledge thus acquired better equips the School's students to practice the most modern dentistry and benefits the patients in the clinics.

Through its contribution to the dental clinics, the Commonwealth helps to assure a continuing flow of new dentists trained in the most advanced dental science and techniques; it also helps to supply the highest quality of dental care to many of those least able to afford it.

The Dental School recently augmented its outreach programs by assuming responsibility for the Dental Clinic at both Children's Hospital of Philadelphia and The Graduate Hospital. Faculty, students, and residents are involved in the delivery of dental care at both of these hospital dental clinics.

Cognitive Sciences and Artificial Intelligence

The report that was issued by the Governor's Commission on the Financing of Higher Education introduced the concept of differential funding for new initiatives, special projects, and special programs related to the educational and economic development of the Commonwealth. Included in the Governor's budget are recommendations for the funding of several differential funding projects at the public universities of the State System of Higher Education and the State-related universities. As is the case with the other universities that have been selected as appropriate targets for differential funding, the University of Pennsylvania is engaged in a broad array of teaching and research endeavors that fit within this new funding concept. In particular, the University believes that its effort to develop and improve its educational and research program in cognitive sciences and artificial intelligence is worthy of receiving a differential funding appropriation from the Commonwealth at a level of $1,950,000.

The University's cognitive sciences program has already received substantial support, including important graduate fellowship funds from the federal government. These funds will provide for the education of 50 professionals in a field that was entirely undeveloped less than five years ago. Penn's cognitive sciences effort draws on other distinguished University programs in a variety of disciplines such as computer science, linguistics, psychology, philosophy, and the biomedically related neurosciences. The current effort is to build and integrate new programs in this area throughout the University's educational offerings, including the establishment of undergraduate courses in artificial intelligence, joint majors combining cognitive sciences with other undergraduate disciplines, and doctoral programs.

The development of a high quality cognitive sciences program at Penn will have a major economic impact on the Delaware Valley and the Commonwealth as a whole by putting our region in the forefront of the effort to understand how humans learn and how those processes can be programmed into machines that emulate learned responses. Through the Ben Franklin Partnership program, the University is already working on sensing technology to develop devices that comprehend their environment and then use that information to perform additional tasks. As this technology is made available to improve manufacturing processes, the educational component of Penn's effort will become essential in providing expertise in the use of such technology. Hence, Penn's mission must include both research and education. Support from the Commonwealth for the University's program in this important and growing field of study will help to ensure the success of this mission.