Pregnant and parenting teens in central Massachusetts benefit from a mentoring, GED and college-prep study partnership program with Holyoke Community College.

SUCCESS begins with SUPPORT

Many young mothers and children are getting the support they need to be successful in school through programs that address their specific needs including tutoring, mentoring, career awareness, child care and more.

At Nellie Mae, we're committed to helping young people all over New England get the support they need to pursue a higher education. Through the Nellie Mae Fund for Education we provide grant assistance to school/college partnerships that increase college awareness, provide academic support, and establish a positive environment in which the students can grow.

For more information about the partnership programs supported by the Nellie Mae Fund for Education, please contact Sylvia Salas, Director, at 1-800-338-5626, ext. 2429.
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MEFA
Helping Families Afford A Massachusetts Education
Volume XIII, No. 1
Spring 1998

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The House that Jack Built

If ever an institution were, as Ralph Waldo Emerson surmised, “the lengthened shadow of one man,” the New England Board of Higher Education (NEBHE) is the shadow of Jack Hoy, who this year marks his 20th anniversary as the board’s chief executive.

John C. Hoy became president of NEBHE in 1978 after serving for a decade as vice chancellor for university and student affairs at the University of California, Irvine.

Roused in Yonkers, N.Y., the son of a sheriff, Hoy developed strong connections with New England before heading west to Irvine in 1969. He graduated from Wesleyan University and went on to serve there as dean for special academic affairs, dean of admissions and freshmen, and assistant to the president. (He also served stints as director of admissions at Lake Forest College and as the first dean of admissions at Swarthmore College.)

Upon returning to New England in 1978, Hoy wasted no time focusing NEBHE—and indeed the six-state region—on the vital relationship between higher education and economic well-being. He started by broaching stubbornly independent New England bankers, college presidents, labor officials, professors, publishers and business leaders to work together on a Commission on Higher Education and the Economy of New England. In time, the panel would issue the benchmark report A Threat to Excellence, calling for a variety of partnerships among New England colleges, secondary schools and businesses.


Displaying the prescience that has marked his tenure at NEBHE, Hoy in 1983 commissioned NEBHE’s monograph on Higher Education Telecommunications: A New England Policy Imperative—a full decade before the “distance learning” phenomenon swept over higher education.

As the region basked in the economic “miracle” of the mid-1980s, Hoy was one of the few voices urging leaders to resist complacency and to extend the benefits of the economic renaissance (which he reckoned to be temporary) to all New Englanders.

In 1987, he again persuaded leaders of business, government and education to prioritize the issues that would be critical to the region’s prosperity and helped set an ambitious agenda under the rubric of the Future of New England.

Around the same time, he helped establish the New England South African Student Scholarship Program, enabling New England colleges to support black South African students at “open universities” in South Africa—the beginning of a global outreach that would flourish at NEBHE near the end of the decade.

In 1988, Hoy appointed a Commission on Academic Medical Centers and the Economy of New England to explore the promise of emerging biotechnology industries and devise ways to encourage biotech manufacturing in New England—an obviously engaging challenge for the only humanist I know who actually reads the articles in Science magazine, molecular structures and all.

As the ’80s turned to the ’90s, Hoy took the show on the road, briefing legislators in the six-state capitals on the internationalization of higher education and the economy. He closed the decade by guiding another commission, this one charged with exploring legal education, law practice and the New England economy. As always, he pushed the members—mostly lawyers—to “stir the pot.” They ultimately conceded in their chief finding that growth in the legal profession has not worked to curb legal costs, reach more middle-class and poor people or ensure professional competence.

In the 1990s, Hoy committed the board to
forward-looking environmental education programs, created the New England Technical Education Partnership to improve New England’s two-year college programs and support emerging industries, and initiated NEBHE’s Regional Project on Telecommunications and Distance Learning to clarify the opportunities presented by rapidly advancing educational technologies. He has recently convened regionwide discussions of issues ranging from the impact of college arts programs on New England communities to the challenges of electricity deregulation.

All the while, a parade of colleagues and guests, distinguished leaders, Young Turks, do-gooders and charlatans streams into Hoy’s office with propositions of one sort or another. Hoy emerges from behind a desk strewn with newspapers, reports and family photos, sinks into a soft chair and lights his pipe as if to signal that he’s in no hurry. He wanders seemingly irrevocably into a recollection of Wesleyan days or his children’s antics on Cape Cod or higher education in Panama or sheep farming or the blues scene on Martha’s Vineyard, then—Zing!—What’s in it for New England higher education? What’s in it for New Englanders?

If there’s a good answer, he’s with you all the way, more than happy to raise a ragtag New England army to fight for your cause. If not, you get some damn good stories and infectious laughter—at no charge.

If illuminating and enhancing the relationship between higher education and economic welfare is Hoy’s craft, his commitment to expanded educational opportunity—particularly for disadvantaged populations—is pure instinct.

At Wesleyan, he quietly revolutionized the way America’s most selective higher education institutions recruit African-American students. In 1989, he returned to the theme, initiating NEBHE’s acclaimed Equity and Paradox project designed to ensure greater participation and success among African-Americans, Hispanics and Native Americans in New England higher education and the educated workforce.

My personal knowledge of Hoy’s leadership revolves primarily around this journal, which he created in 1986. Since then, he has zealously guarded CONNECTION’s integrity and shaped its content, often delivering to my desk story ideas scrawled in every direction on a series of well-worn napkins from Locke-Ober or notes scribbled right across the text of a magazine or newspaper clipping with no regard for the words beneath.

"J.O.H.—This deserves coverage in CONNECTION."

"J.O.H.—Let’s get the New England data on this and compare to U.S."

"J.O.H.—I admit this guy to Wesleyan."

Today’s NEBHE is indeed the house that Jack built.

Yet somehow, between all the initiatives and a dizzying schedule of conferences and speaking engagements, Hoy has patiently given his time to jumpstart careers and offer heartfelt support and practical advice to staff and colleagues in the midst of personal transitions, while raising a fabulous family of his own. It is a constant source of gratification—and occasional annoyance—to his staff that he refuses to shunt aside phone calls or give visitors the bum’s rush. His considerable intellect aside, it is Jack Hoy’s heart that seems bigger than life.

So here’s to the longest-serving president in NEBHE’s 40-year history—a man who has dedicated his professional life to the causes of expanded higher education opportunity, interstate cooperation and the economic development of New England. He has lived by the words of Theodore Roosevelt, which hung outside his office: “Far better it is to dare mighty things, to win glorious triumphs even though checked by failure, than to rank with those spirits who neither enjoy nor suffer much because they live in the gray twilight that knows neither victory nor defeat.”

John O. Harney is executive editor of CONNECTION.
**Stand and Deliver**
It happens every spring. Key players on the world stage descend on New England to offer the region’s graduating college seniors a few pearls of wisdom. Spring 1998 commencement speakers include statesmen, artists, entertainers and other heavy-hitters. A sampling:

**Statesmen**
President Clinton, Massachusetts Institute of Technology
Former President George Bush, University of Connecticut
German Chancellor Helmut Kohl, Brandeis University
U.N. High Commissioner for Human Rights and former Irish President Mary Robinson, Harvard University
Former U.S. Majority Leader and Northern Ireland peace broker George Mitchell, University of New Hampshire, University of Maine

**Washington Brass**
Acting U.S. Secretary of Veterans Affairs Togo D. West Jr., Vermont Technical College
General Anthony C. Zinni, commander in chief of U.S. Central Command, Maine Maritime Academy

**Governors, Senators**
Acting Massachusetts Gov. A. Paul Cellucci, Bridgewater State College, Framingham State College
U.S. Sen. Joseph I. Lieberman, Albertus Magnus College
Washington Gov. Gary Locke, Boston University

**Artists and Writers**
Filmmaker Peter Bogdanovich, Emerson College
Author and columnist James Carroll, Marhboro College
Columnist E.J. Dionne, Bristol Community College
Author and former Smith College President Jill Ker Conway, University of Massachusetts at Dartmouth
U.S. Poet Laureate Robert Pinsky, Fitchburg State College
Mystery writer Mary Higgins Clark, Regis College
Doomsbury creator Garry Trudeau, Tufts University
Monologist Spalding Gray, Rhode Island College

**Educators**
Paula P. Brownlee, retiring president of the Association of American Colleges and Universities, Saint Michael’s College

**Activists**
Nobel Peace Prize winner and anti-landmine activist Jody Williams, Marlboro College (baccalaureate ceremony)
Environmentalist William Drayton, founder of Ashoka: Innovators for the Public, College of the Atlantic
Barbara Whelan, co-founder of Bridge Over Troubled Waters, Aquinas College at Milton

**Television and Media Personalities**
Talk show host Oprah Winfrey, Wesleyan University
Actor and environmentalist Ed Begley Jr., University of Rhode Island
National Public Radio correspondent Charlayne Hunter-Gault, University of Massachusetts at Amherst
NBC News correspondent Maria Shriver, College of the Holy Cross

**Business and Professional Personalities**
GTE President Peter Dats, Southern Vermont College
Former J.P. Morgan Chair Dennis J. Weatherstone, Sacred Heart University
Lawyer Jan R. Schlichtmann, Endicott College

**Asian Crisis**
New England college administrators are plenty worried about how the Asian economic crisis may affect the region’s significant foreign student enrollment. In April, the New York City-based Institute of International Education (IE) launched a new student loan program to help selected Asian students continue studies on U.S. campuses in light of the economic crisis.

The so-called ASIA-HELP loan program is funded by a $7.75 million grant from the Vermont-based Freeman Foundation. The program will provide 1,400 zero-interest loans to academically talented and financially needy students from Indonesia, South Korea, Malaysia and Thailand, where currency values have plummeted.

Meanwhile, the IIE estimates that 90 percent of U.S. campuses have introduced delayed tuition schemes, expanded campus jobs or launched other strategies to help the Asian students.

Approximately 77,000 or 17 percent of all foreign students at U.S. colleges originate from those four countries, according to the IIE.

**Friends in High Places?**
Much has been said about New England’s waning political clout in Washington, D.C. But the six-state region’s representation on national higher education committees and boards outside Capitol Hill varies considerably. As a point of reference, New England is home to 5 percent of the U.S. population and just under 7 percent of U.S. colleges and universities.

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<tr>
<th>Organization</th>
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<tr>
<td>Association of American Colleges and Universities</td>
<td>Board of Directors</td>
<td>3</td>
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<tr>
<td>The College Board</td>
<td>Board of Trustees</td>
<td>5</td>
<td>18%</td>
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<tr>
<td>Council of Graduate Schools</td>
<td>Board of Directors</td>
<td>1</td>
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<td>Council of Independent Colleges</td>
<td>Board of Directors</td>
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doubled during the 1990s to an average of $4,741 in 1997-98. That dwarfs the national average public college tuition of $3,111.

But the brakes are on in most places. The University of Massachusetts announced it would cut in-state tuition by 5 percent for 1998-99—the third consecutive reduction.

Tuition and mandatory fees at the region’s private institutions, meanwhile, have grown by 56 percent since 1989-90 to an average of $16,725. The national average is $13,664.

Private institutions have also moderated their price hikes. Johnson & Wales University recently announced a plan to freeze tuition at the rate a student pays as a freshman, while Southern Vermont and Pine Manor colleges cut their rates.

But beware of private institutions boasting about their lowest percentage increases in years. The base has grown sufficiently that even Yale University’s agreeable-sounding 2.9 percent hike, for example, adds about $700 to each student’s annual bill, while Wesleyan University’s 4 percent hike adds $1,000 to the price.

RSP at 40

On the day President Clinton was preparing to give his sixth State of the Union address, New Hampshire Gov. Jeanne Shaheen and Rep. William Belvelin, chair of the House Education Committee, were talking about the union of the states.

Shaheen and Belvelin gathered with New Hampshire college officials and students at the Legislative Office Building in Concord to celebrate the 40th anniversary of the New England Board of Higher Education’s Regional Student Program (RSP)—a leading example of interstate cooperation in New England.

The RSP offers New England residents dramatically reduced tuition rates at public campuses in other New England states if they pursue majors that are not available at a public campus in their home state.

RSP participants pay 150 percent of in-state tuition, representing a deep and growing discount off rapidly rising out-of-state tuition.

This past academic year, more than 7,000 New Englanders saved an average of $4,000 each in tuition costs under the program for a total of about $32 million.

Plus, the RSP saves New England taxpayers millions of dollars by enabling state higher education systems to share, rather than

Comings and Goings

James Wright, provost and professor of history at Dartmouth College, was named president of the college, succeeding James O. Freedman, who will step down in July 1998 after 11 years at the helm.

Thomas R. Plough, former president of North Dakota State University in Fargo, was named president of Assumption College, succeeding Joseph H. Hagan, who was Assumption’s president for 20 years.

Roy Nirschel, former vice president for institutional advancement at the University of Miami in Florida and director of development at the University of Hartford in the early 1980s, was named president of Newbury College, succeeding Edward J. Tassinari, who founded the college in 1962.

Richard A. Kraus announced he would leave the presidency of Cape Cod Community College in the summer of 1998 after seven years on the job.

Badi Foster, an educator and business leader, became director of the Lincoln Filene Center for Citizenship and Public Affairs at Tufts University, succeeding Robert M. Hollister, who became dean of the Tufts Graduates School of Arts and Sciences.

Amos B. Hostetter Jr., co-founder of Continental Cablevision Inc. and former chief executive officer of Continental’s successor company, MediaOne, was elected chair of the Amherst College board of trustees.

Susan Bailis, a key figure in the elder care facility business, was elected chair of the Simmons College board.

Charles J. Beard, a partner with the Boston law firm of Foley, Hoag & Eilot, was elected chair of the Emerson College board.

Brian L. Hawkins, a former senior vice president for academic planning and administrative affairs at Brown University, became the first president of EDUCAUSE, a new entity created by the consolidation of Educom and CAUSE, the two national organizations devoted to issues relating to information technology in higher education.

Carol Geary Schneider, former executive vice president of the Association of American Colleges and Universities, became president of the association, replacing Paula P. Brownelee, who retired.

Consultant Judith A. Sturnick, former president of Keene State College and the University of Maine at Farmington, was appointed director of the American Council on Education’s Office of Women in Higher Education.

Former Federal Reserve Chairman Paul A. Volcker joined the boards of overseers of TIAA and CREF, which together provide retirement plans and other financial services for education and research workers.

Joel B. Russ, former president of the Chamber of Commerce of the Greater Portland (Maine) Region, became president of the Maine Science & Technology Foundation.
duplicate, high-cost academic programs available in neighboring states.

NEBHE held similar legislative briefings in the other five New England states.

Besides hauling the program’s savings, the briefings have highlighted some novel RSP offerings such as Northwestern Connecticut Community-Technical College’s (NCCTC) Collegiate Education for Deaf and Hard of Hearing Persons, established in 1974 as the only postsecondary program in Connecticut to provide full support services for students who are hearing-impaired.

A certificate program in deaf studies prepares students for job opportunities in educational and rehabilitation settings with deaf children and adults. An associate degree in interpreting for deaf people may form the first half of a “two-plus-two” bachelor’s program in communications or special education through Central Connecticut State University.

The community college offers interpreting, tutoring, career and academic counseling and the services of trained notetakers.

In 1990, NCCTC was awarded one of two federal grants to develop a specialized interpreter training curriculum. The school also is a site for the National Registry of Interpreters for the Deaf exam, which can usually be taken after two or three years of interpreting.

Moreover, the large population of deaf students at NCCTC offers opportunities for hearing students to practice interpretive skills such as American Sign Language as well as first-hand learning about “deaf culture.”

Clarification

The data-heavy Fall 1997 issue of CONNECTION contained a few items that need clarification. “Data Connection” reported erroneously that Wisconsin led the nation in concentration of technology employees per 100,000 residents. Actually, Massachusetts and Connecticut rank No. 1 and No. 2, respectively. Also, the fine print accompanying our enrollment tables implied that the enrollment figures did not include graduate students; they did. The FACTS 1998 issue of CONNECTION’s “Institutional Listings” included an erroneous description of Fisher College. The description should have read: “Founded in 1903, offers liberal arts and professional programs leading to associate degrees, continuing education.”

MORE WEB SITES

The Fall 1997 issue of CONNECTION featured a “Mini-Directory of World Wide Web Sites Related to Higher Education and Economic Development,” including addresses of more than 100 New England policy centers and institutes. Following are some additional Web sites of interest:

Arts and Culture
Connecticut Commission on the Arts, www.csnet.ctstate.edu/cca/
Museum of Fine Arts, Boston, www.mfa.org
New England Foundation for the Arts, www.nefa.org
New Hampshire State Council on the Arts, www.state.nh.us/nharts/
Vermont Arts Council, www.state.vt.us/vermont-arts/summary.html

Environmental Education
Association of University Leaders for a Sustainable Future, www.ulsf.org
MIT Sea Grant College Program (Massachusetts Institute of Technology),
web.mit.edu/seagrant/www

Education Resources
New England Research Center for Higher Education
(University of Massachusetts at Boston), www.nerche.org
Networked Digital Library of Theses and Dissertations, www.ndltd.org
Northeast and Islands Regional Educational Laboratory (Brown University),
www.lab.brown.edu
Parents for Public Schools, www.cpps.net

Public Policy Centers
Donahue Institute (University of Massachusetts), www.stw-clearinghouse.org

Other
Associated Grantmakers of Massachusetts, www.agmconnect.org
The Citistates Group (network of journalists and consultants), www.citistates.com/index.htm
Federal Reserve Bank of Boston, www.bos.frb.org
PRINCIPLES of SOUND RETIREMENT INVESTING

RECENTLY, MORNINGSTAR CALLED US CHEAP.
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All financial companies charge operating fees and expenses—some more than others. Of course, the lower the expenses, the better. That way more of your money goes where it should—towards building a comfortable future.

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Because of our size and our exclusive focus on serving the needs of educational and research communities, TIAA-CREF’s costs are among the lowest in the insurance and mutual fund industries.¹

In fact, Morningstar, Inc.—one of the nation’s leading sources of variable annuity and mutual fund information—says, “CREF’s size...enables it to realize a remarkable economy of scale.”²

According to Morningstar’s data, CREF’s “minuscule” 0.53% average fund expense charge was less than half that charged by comparable funds.³

The TIAA Traditional Annuity also charges no fees aside from a very modest operating expense of 1/4 of 1% of annuity assets. Interest and dividends are reported after all operating costs have been deducted. Standard & Poor’s calls TIAA’s costs “exceptionally low,”⁴

Of course, expenses are only one factor to consider when making an investment decision. While we’re committed to keeping our expenses down, we spare nothing in striving to provide top-quality investment choices, financial expertise, and personal service. Because that can make a difference in the long run, too.

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Ensuring the future for those who shape it.⁵

². Source: Morningstar, Variable Annuities/Life 11/8/96. 3. Of the 4,663 variable annuity funds tracked by Morningstar, the average fund had total fees combining annual expenses of 0.81% plus an insurance expense of 1.37%. Source: Morningstar, Inc., for periods ending February 28, 1998. 4. Standard of Poor’s Insurance Rating Analysis, 1997.

TIAA-CREF expenses are subject to change and are not guaranteed for the future. CREF is a variable annuity and its returns are not guaranteed. The value of your investment can go up or down, no matter what expense levels are. CREF certificates and interests in the TIAA Real Estate Account are distributed by TIAA-CREF Individual and Institutional Services. For more complete information, including charges and expenses, call 1 800 842-2733, extension 3505, for CREF and TIAA Real Estate Account prospectuses. Read them carefully before you invest or send money.
- Percentage of Boston children who live in neighborhoods where at least 40 percent of residents are poor: 7%
- Percentage of Hartford, Conn., children who do: 30%
- Percentage of urban adults who were victims of violent crimes in 1994: 5.7%
- Percentage of rural youths, ages 12 to 17, who were: 7.3%
- Approximate ratio of Providence police officers to Rhode Island state troopers: 2-to-1
- Rank of golf among corporate chief financial officers' favorite leisure activities (other than being with friends or family): 1
- Percentage of employers in Maine's lodging sector that offer health insurance benefits: 29%
- Duration of the 1980s "Massachusetts Miracle" in months of economic growth: 76
- Percentage of Yale University graduates who went to work straight out of college in 1971: 21%
- Percentage who did so in 1996: 65%
- Number of miles the average "carpool parent" travels each week: 15
- Number of hours the average "carpool parent" spends in the car each week, including waiting time: 7
- Number of Latino men and women who ran for elected office in Massachusetts between 1990 and 1994: 34
- Number who ran for office in Massachusetts during the previous two decades: 32
- Chance that a Latina woman candidate in Massachusetts won election: 1 in 2
- Chance that a Latino male candidate in Massachusetts won: 1 in 6
- Women as a percentage of U.S. college presidents: 17%
- Average number of years women college presidents have been in office: 5.4
- Average number of years male college presidents have been in office: 7.6
- Number of colleges and universities located in the Massachusetts 8th Congressional District: 48
- Number of entire states with fewer colleges than the Massachusetts 8th: 26
- Percentage of U.S. teachers who use the Internet in their teaching: 48%
- Rank of Emerson College among America's "most wired" small liberal arts colleges, according to Yahoo! Internet Life magazine: 1
- Percentage of U.S. college students who display or download pornography on their computers: 52%
- Percentage of college freshmen who consider "keeping up to date with political affairs" to be an important life goal: 27%
- Percentage who thought it was in 1966: 58%
- Percentage of freshman biology majors who go on to graduate in the field: 33%
- Percentage of freshman math majors who go on to graduate in the field: 24%
- Increase in health care costs between 1986 and 1996: 84%
- Increase in cost of academic journals during the same period: 148%
- Share of household charitable contributions that goes to religious organizations: 58%
- Share that goes to education: 9%
- To arts, culture and humanities: 3%

Sources: 1, 2 Education Week; 3, 4 University of New Hampshire; 5 Mayor Vincent A. Cianci Jr.; 6 Accountempo; 7 Maine Center for Economic Policy; 8 Massachusetts Benchmarks Project; 9, 10, 11, 12 Yale University; 13, 14, 15, 16 Maurice Gaston Institute for Latino Community Development and Public Policy, University of Massachusetts at Boston; 17, 18, 19 American Council on Education; 20, 21 U.S. Rep. Joseph P. Kennedy II; 22 MCI; 23 Emerson College; 24 Worcester Polytechnic Institute; 25, 26 Higher Education Research Institute, University of California, Los Angeles; 27, 28 Commission on Professionals in Science and Technology; 29, 30 Pew Higher Education Roundtable; 31, 32, 33 Independent Sector
Higher Education Subsidies

Why all college students pay less for their education than it costs to produce.

GORDON C. WINSTON

College students pay only a fraction of the cost of their education. Large student subsidies—paying two-thirds of the cost of the average U.S. college or university—are the central fact in the economics of higher education. Because prices (net tuitions) don’t cover costs, the economics of colleges and universities is different in fundamental ways from that of the for-profit business firms that shape our national intuition and define our common sense. So it is often the case that what’s true about colleges and universities and higher education is counterintuitive and what’s sensible is simply wrong.

Virtually all U.S. colleges and universities sell their primary product—education—at a price that is far less than the average cost of its production. The subsidy given to nearly every college student in the country is neither temporary nor small; nor is it granted only by public institutions. Student subsidies are a permanent feature of the economics of higher education; they represent a large part of total costs; and they are only slightly smaller in private than in public institutions. In total, student subsidies exceeded $82 billion in 1995.

In 1995, the average American college produced an $11,967 education that it sold to its students for $3,770, resulting in a subsidy of $8,197 a year. It’s as if cars that cost the dealer $20,000 to put on the showroom floor were routinely sold for $6,300. We expect normal, for-profit firms to grant negative subsidies—to earn a profit—by selling at a price greater than the costs of production. Nonprofit firms don’t do that.

Economic structure of colleges

Sources of revenue for colleges include 1) tuition and fee income and 2) non-tuition income from gifts, grants, appropriations and asset earnings.

All those who buy higher education get something that costs a lot more to produce than they pay for it—that is, net tuition and fee income is a good deal less than the average cost of producing the services that the student gets.

Subsidies are divided between “general subsidy” and individual student aid. A general subsidy is given equally to each student at a college wherever its sticker price is set below production cost. Financial aid is a further price reduction based on individual student characteristics, such as economic need or “merit,” which includes characteristics such as athletic or academic abilities or race.

Given non-tuition income, colleges must make the following choices:

A decision on size—total enrollment—that will influence non-tuition income per student. So, for instance, by restricting its student body to 1,300, Swarthmore has protected its per-student endowment income; if it had twice as many students, other things being equal, it would have half as much endowment income per student.

A decision on cost per-student and therefore on net tuition and fees. A school’s per-student non-tuition income fixes the difference between costs and price—its maximum subsidy—but it supports any combination of costs and price that maintains that difference. For example, with $10,000 in

This article is adapted from “College Costs: Subsidies, Intuition and Policy,” a working paper authored by Williams College economics Professor Gordon C. Winston for the Williams Project on the Economics of Higher Education. The piece, which was presented to the National Commission on the Cost of Higher Education in late 1997, appears in “Paying for College,” forthcoming from the American Council on Education and The Oryx Press. (Used with permission from the American Council on Education and The Oryx Press, 4041 N. Central Ave., Phoenix, AZ 85012; Tel: 800.279.6799.)
non-tuition income per student, one college could produce a $15,000-a-year education to be sold at a $5,000 average net tuition, while another could produce a $35,000-a-year education to sell at $25,000 net tuition.

A decision on mission and output mix that determines how much of a college's total spending will go to education. This decision involves urgent questions of identifying an institution's core activities, setting priorities and increasing the efficiency with which those activities are undertaken. The higher the share of instructional costs, the more the student is subsidized, other things being equal.

A decision on sticker price divides the overall subsidy into the general subsidy that goes to all students, undifferentiated (74 percent on average in 1995) and financial aid that goes to students with specific, desirable characteristics (26 percent in 1995). The same $10,000 average yearly subsidy can be given in equal amounts to all enrolled students through a sticker price set just $10,000 below instructional costs or—at the other extreme—it can be given through a sticker price set equal to costs, then offset selectively by individually targeted financial aid averaging $10,000 per student.

A decision on merit-based and need-based aid divides any individually differentiated subsidies—student aid—according to student characteristics, whether based on the student's economic circumstances or on other characteristics, such as academic, athletic or artistic merit or race.

These are strategic choices that all colleges and universities have to make about output, quality and pricing. And they simply have no parallel in for-profit firms. In any college, history will matter a whole lot—resources can be highly "illiquid" and traditions, cultures, alumni and faculties can be resistant to change. Furthermore, some public institutions are granted only limited discretion by state legislatures.

Problem with common sense

Most basically, understanding the structure of costs, prices, subsidies and financial aid among colleges and universities is essential to understanding the higher education "industry."

Paradoxically, the single most serious problem facing the understanding of higher education may well be common sense. Collectively, we have a well-schooled intuition based on a lot of experience with business firms. We've lived with ordinary business firms all our lives and from them absorbed a strong feeling for what makes economic sense and what doesn't. And anyone who takes Economics 101 will have that common sense reinforced by graphs and lectures and quizzes and a final grade. But unfortunately, what happens in colleges and universities—their economics—is counterintuitive in these terms; what's accurate is unfamiliar, and what's obvious is often just plain wrong.

For a business firm, income derives from the sale of the things the firm produces. That income goes to pay the costs of production and, if costs are less than sales income, what's left over is profit. So a car dealership earns money from the cars it sells and pays out some of that money as costs—such as the wholesale cost of the car, salaries, commissions, building maintenance, heating oil and so on—and keeps what's left as profit. A car sold for $25,000 that costs $23,000 to deliver to the customer brings a $2,000 profit to the dealer. Pretty routine stuff that my seven-year-old granddaughter has started to learn with a lemonade stand.

But only a fraction of a college or university's income comes from the sale of its product—from the price, or net tuition, student-customers pay for the educational services. Most has to come from somewhere else—from "donative" resources provided by alumni and taxpayers, from earnings from endowments and from the use of expensive buildings and equipment. Of course, the reason society makes donations to colleges and universities—and doesn't make them to the local Ford dealer—is that higher education is considered to be socially a Good Thing. So we encourage people to buy more of it by offering generous subsidies.

For a business firm, price is always greater than production costs and the difference is profit. For a college, price is always less than production costs and the difference is student subsidy.

The National Commission on the Cost of Higher Education, established by Congress in 1997, sought to figure out why a typical family's college costs (read "net tuition" or "price") have risen so much in the recent past.

From the perspective of the business intuition that most of us share, the answer looks pretty simple. Since the price has gone up, it has to be because costs went up or because profits went up. Colleges are nonprofit firms, so the place to look is costs; they must have gone up. And that leads directly to questions about increased waste, about rising administrative costs, a less productive faculty, elaborate buildings and equipment, a too-exuberant embrace of expensive technologies or the costs of increased regulation. This agenda is sensible from the business intuition perspective, but guaranteed to obscure the facts about colleges and universities.
In public higher education (where 80 percent of U.S. students are enrolled), tuition might have gone up because costs went up, but it might also have gone up because subsidies went down. And that's what appears to have happened. The taxpayers' revolt that restricted state appropriations (donative resources) has met an increase in enrollments and, together, these forces have reduced student subsidies in public higher education. That, of course, is a very different picture from the one that comes from business intuition. And if subsidies go down at a college, it means prices have to go up or educational spending and quality have to go down—or both. We've seen both. Students in public colleges are paying a higher price in 1995 than in 1987 to get a less costly, lower quality education with fewer and larger classes and more teaching assistants.

The more we rely on Economics 101, the more we'll miss what's going on.

Government support
A rash of appealing proposals—from President Clinton's national tax relief plan to the zero tuition plan proposed for Massachusetts community colleges and the original Hope Scholarship plan in Georgia—have offered direct government support of family tuition costs in the hope of easing the financial burden and increasing college enrollments. Business intuition says those measures make good sense—as with food stamps, the government will pick up part of the price, allowing people who can't afford higher education to buy it anyway.

But the reality of higher education offers a very different picture—one of both declining quality and rising tuition.

In the public colleges, where most students go, tuition covers 12 cents of every $1 of costs. So if a new student is induced by these policies to go to the average public college, for every $1 he brings in new tuition revenues, he'll give rise to $9 in additional costs. The question then is, "Who's going to pay the rest?"

The most realistic answer sees two unhappy outcomes. One is that spending per student—and hence educational quality—falls. The other is that trying to protect educational quality, colleges and universities will raise tuition so it covers more of the cost. That, of course, revives the old familiar charge that government efforts to help students always induce colleges to jack up their prices.

Since these plans are based on Georgia's Hope Scholarship program, it's instructive to look at what happened there. Between 1986 and 1994, colleges and universities in Georgia increased enrollments by 33 percent, while the average increase for the United States was 14 percent and for the Southeast, 23 percent. So the Hope program does appear to have encouraged more people to go to college. And Georgia disproportionately increased appropriations for its public colleges—by 17 percent against a more modest increase in the Southeast of 5 percent and a decrease of 2 percent nationally. But because its appropriations increased less than enrollment, even Georgia's appropriations per student went down by 12 percent and so did spending per student.

Are any colleges and universities winners under these tuition-support policies? Yes. Ironically, the very wealthy and selective schools that restrict enrollments in the face of long queues of would-be students—Harvard, Stanford and Swarthmore, for example—won't be induced to expand so they won't need extra resources. For them and their students, tuition-relief policies will only help pay their often considerable tuitions.

We're facing an increase in enrollments over the next decade estimated at 10 percent to 30 percent. That kind of increase in demand would be cause for dancing in the streets in any for-profit industry. But for higher education, it is cause, instead, for genuine panic. If it comes to pass that 3 million more students enter U.S. colleges and universities, they will bring with them an additional $11.3 billion in net tuition revenues, but they will also bring an additional $35.9 billion in costs—if quality is to be maintained at 1995 levels—and will require $24.6 billion in additional non-tuition resources. From somewhere. Our for-profit intuition doesn't prepare us for a dilemma like that.

Cross-subsidies
In business firms, a product is cross-subsidized if profits from another product or activity are used to offset losses on that one. So new car sales are cross-subsidized if profits from the service department are needed to offset losses on new cars. But in a college or university, subsidies are more complicated. That's frustrating because we'd like very much to find out if the rich students subsidize poor ones, or if undergraduate education subsidizes faculty research or Ph.D. programs, or if football subsidizes classics courses.

But because all college and university activities taken together are heavily subsidized, it's difficult to tell the difference between a genuine cross-subsidy—where one activity supports another (for example, football supports women's ice hockey)—and simple differences in the amount of subsidy given to two well-subsidized activities. "Robin Hooding" is a popular case in point where it is sometimes asserted (most recently in a Time magazine article last March) that colleges make a profit by charging high prices of their rich students in order to subsidize their poor students. But the fact is that all students are subsidized, even those who pay the full sticker price.

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The notion of educational opportunity for needy and deserving students conveys a certain sense of motherhood and apple pie, as well as Yankee sensibility. Yet student aid based on demonstrated financial need is under siege.

Financial need is defined as educational costs, less family ability to contribute to those costs.

A number of seemingly unrelated events over the past two decades have contributed to the erosion of need-based aid. Their cumulative impact raises great concern about higher education's—as well as state and federal government's—continuing commitment to a practice that has benefited thousands, if not millions, of students and society overall.

To begin with, 1979 ushered in a demographic plunge in the number of 17- and 18-year-olds which continued through the early 1990s. Enrollment was projected to drop by 25 percent to 30 percent at the lowest point on the curve. The unexpected infusion of older, nontraditional and part-time students prevented the rash of institutional closings predicted by some commentators. However, many selective colleges were determined to maintain—if not increase—their share of traditional college-age, high SAT scorers from a national pool that had been sharply diminished by the demographic decline as well as an unrelated 30 percent decline in students scoring above 600 on the verbal part of the SAT (then known as the Scholastic Aptitude Test) between 1972 and 1976.

This supply-and-demand imbalance greatly contributed to a rise in scholarships based on academic merit as opposed to financial need. In the early 1970s, only about 50 percent of U.S. colleges and universities, public and private, offered some non-need-based or merit scholarships; less than a decade later, 85 percent were offering such aid. And while most aid provided by institutions is still based on demonstrated financial need, the share of merit aid and other forms of non-need-based "discounting" is rapidly increasing—and at the expense of need-based aid.

Moreover, in the past few years, several states such as Florida, Georgia and Nebraska have more or less abandoned their commitment to need-based state aid by offering merit scholarships to keep their better students in state. Usually, the only requirements are that the student maintain a B average in high school and attend college in his home state. Because there is no means test, children of wealthy parents receive the same benefit as those from poor families. Other states such as Connecticut have considered similar strategies to prevent what they see as a state "brain drain." The state merit programs are
usually handsomely funded; Georgia spends $200 million a year on its Hope Scholarships. But the programs also have enjoyed very positive media attention and yielded enormous political capital, particularly when lottery revenues, rather than tax dollars, have been used for this purpose.

Compounding the demographic pressures and attendant shift to merit aid, college tuition has outstripped family ability to pay. While tuition at public and private colleges has risen by almost 50 percent in constant dollars since the early 1970s, median family income has grown hardly at all. Moreover, federal and state grant aid for students has increased only marginally since 1980. Colleges and their students have had to fill the growing gap between families' ability to pay and their own escalating charges. According to the College Board's Trends in Student Aid, the value of scholarships and grants provided to students by colleges and universities has more than tripled in constant dollars during the past 15 years to an estimated $11 billion in 1997-98. This has made up for a large portion of the shortfall in federal and state aid, significantly helping students and their parents meet escalating college costs.

Students, already contributing significantly to their costs through summer and part-time jobs, have shouldered much of the remaining difference with the help of expanded student borrowing limits enacted by Congress in 1992. But these expanded limits have created a new problem. Among bachelor's degree recipients from public institutions, federal student loan debt soared from $7,400 on average in 1993 to $11,950 on average in 1996, according to the U.S. Department of Education. Average debt for graduates of private institutions ballooned from $10,190 to $14,290. Many students owe more than $20,000 when they graduate.

In addition, many institutions have adopted aggressive market practices to attract desired customers while maximizing tuition revenue. This has seriously undermined the commitment to need-based aid. Enrollment management teams, using sophisticated econometric modeling and financial aid leveraging strategies, are rapidly replacing the traditional admissions and financial aid professional. Students, their parents and guidance counselors are courted by financial advisors and urged by commentators in the media to "negotiate" the price they'll pay—much as we would bargain for an automobile.

Institutions use "merit" scholarships to boost tuition revenue. For example, a college that charges $20,000 in tuition knows that it can realize $60,000 in additional revenue simply by replacing one $20,000 scholarship, which is need-based, with $5,000 merit awards to four students who could afford the full cost. While such a strategy works well for the institution and the four wealthier students, the financially needy student, with possibly stronger academic credentials, is left out in the cold.

There are still some institutions, mostly in New England, that have refrained from such behavior and continue to award student aid solely on the basis of demonstrated financial need. In other words, students are admitted on the basis of merit and aided on the basis of need. But some campuses such as Brown University have decided to forego "need-blind" admissions (i.e., admitting students regardless of their financial need) because they cannot fund all applicants with need who they would otherwise admit. The argument continues as to whether it is more ethical to deny admission to otherwise admissible students whose financial need cannot be met, or to admit such students but then deny them the requisite aid. Most institutions adopt the latter position because they then can say they are need-blind—a much ballyhooed but rather hollow principle if institutions can't fully meet the financial need of all their admitted students. Today, fewer than 50 colleges and universities can claim they both practice need-blind admissions and fully meet every student's demonstrated need.

**Middle-class shift**

Other events have also had an impact on institutional behavior and tuition charges in the past two decades. These include the Middle Income Student Assistance Act (MISA) of 1978, the more recent Tax Relief Act of 1997 and the U.S. Justice Department's 1991 closure of financial aid "overlap" groups.

MISA enabled all students to borrow federally guaranteed student loans, regardless of family income. Some experts contend that this greatly expanded resource for students without any means test encouraged institutions to raise tuition. The recent Tax Relief Act of 1997, which over the next five years includes more than $40 billion in tax relief for educational costs paid by middle-income families, has raised similar concerns.

Indeed, the California community college system recently proposed raising tuition, so those eligible for the federal Hope tax credit created by the legislation can enjoy the full $1,500 benefit. But what is most alarming is the fundamental shift away from the nation's four-decade commitment to direct funding of those most in need to tax credits for those who are already "in the system" and have long since paid their term bills.

Fearful of losing out altogether in the budget battle, higher education associations such as the American Council on Education chose not to oppose the education tax breaks, despite real concern that such action would move the student aid agenda from the sphere of direct educational appropriations and the U.S. Department of Education to tax-writing committees and the U.S. Treasury, whose concerns center on tax collection, not higher education. To be fair, the budget did increase the maximum Pell Grant to $3,000, up from $2,700, but this is still well below previously authorized levels. The administration's continuing efforts to eliminate Perkins Loans—the very first federal need-based program, created in 1958 as the National Defense Student Loan Program—is perhaps a portent of a diminished federal commitment to the neediest students.

For years, colleges with similar applicant pools consulted one another through so-called overlap groups to arrive at comparable family contributions and aid awards. The idea was to
ensure that students admitted to more than one of the institutions could choose a college for educational rather than financial reasons. At one point in the late 1960s, 43 overlap groups were functioning around the country. The most prominent and enduring of these were the Ivy and Pentagonal-Plus groups, consisting entirely of colleges in the Northeast: Brown, Columbia, Cornell, Dartmouth, Harvard, Princeton, the University of Pennsylvania, Yale and the Massachusetts Institute of Technology, as well as Amherst, Barnard, Bowdoin, Bryn Mawr, Colby, Middlebury, Mount Holyoke, Smith, Trinity, Tufts, Vassar, Wellesley, Wesleyan and Williams.

The Justice Department's 1991 consent decree signed by the eight Ivy League institutions prevented them and, by example, everyone else, from sharing financial aid or any other potentially competition-neutralizing information. The ruling fueled the market forces that had already begun taking hold in higher education. Though MIT later successfully defended its claim that the overlap activity safeguarded the social good of awarding aid first to those with the greatest need, the die already had been cast by the earlier consent decree. This decree had a chilling effect throughout higher education but particularly in New England where the principle of need-based aid found its first champions.

Indeed, the first need-based scholarship was established at Harvard in 1643, and by the early 1800s, a number of colleges had set up "charity funds" to be distributed among "indigent young men of merit." The Comparative Table of Expenses and Scholarship Aid in New England Colleges published in 1897 confirms that several New England colleges including the University of Vermont, Amherst, Bowdoin, Brown, Dartmouth, Wesleyan and Williams awarded aid on the basis of need. Later, New England financial aid luminaries, particularly John Monroe at Harvard, were instrumental in the 1954 creation of the College Scholarship Service (CSS), which standardized the forms and formulas used by colleges and universities across the country to determine family contribution levels—and implicitly—student financial need. CSS need-based aid guidelines became embedded in legislation establishing the federal student aid programs of the 1960s and 1970s, which found their strongest advocates in New England lawmakers such as Sens. Claiborne Pell of Rhode Island, Robert Stafford of Vermont and Edward M. Kennedy of Massachusetts.

Changing methodology

In 1992, Congress changed the formula for determining eligibility for federal aid, notably eliminating the counting of home equity as an asset, thus qualifying large numbers of middle-income students for government-subsidized loans and, in some cases, grants. Congress also created a free and simpler federal financial aid application form. Many colleges and universities—particularly public institutions with minimal resources of their own and those private ones competing directly with the publics—felt compelled to use only the new federal form and its accompanying methodology.

But many private institutions that rely heavily upon their own funds for financial aid elected to continue participating in the CSS and using its application form and methodology. This involved formulas that more rigorously and equitably determine family contribution levels, which, in turn, enabled institutions to more widely distribute limited resources to needy students.

Unfortunately, having two different methodologies has encouraged many institutions to use whichever one— institutional, federal or something in between—best serves their purpose of enrolling students with desirable characteristics, whether academic, athletic or revenue-enhancing.

Breakout

The worst fear after the Justice Department forced the termination of the original overlap groups was that at some point one of the former members would break from the pack, so to speak, thereby upsetting the competitive and financial equilibrium that had existed among the participating institutions.

Indeed, Princeton made that break early this year with its plans to eliminate loans altogether for students from families with incomes of $40,000 or less and to eliminate or reduce the amount of home equity counted in its determination of family ability to contribute to the cost of education.

Clearly, this double-barreled strategy reflects Princeton's concern about its ability to attract low-income students and makes it cost easier to bear for middle-income ones. But it also raises serious concerns about stepped-up competition for students, particularly minority students, and the unraveling of longstanding processes and principles for awarding financial aid.

Many institutions already practice differential packaging (changing the grant-to-loan ratio within a student aid package) to attract high achievers or low-income students. And
many financial aid officers routinely use their professional judgment to adjust the amount of home equity counted, but only on a case-by-case basis and in light of special family circumstances. What is new is the comprehensive thrust of the Princeton initiatives and the university’s ability to rather easily bear the considerable cost of liberalizing its aid policies. Very few institutions can even contemplate something similar. Not surprisingly, two of those who can, Yale and Stanford universities, quickly countered with their own versions of need assessment aimed at giving relief to middle-class families. Undoubtedly, others will follow—each with its own imprint and media spin.

Princeton hopes to attract more low-income students who would ordinarily attend public institutions. To be sure, the supply of high-achieving, low-income students interested in high-cost, private institutions is limited. And many, if not most, are students of color who are already in Princeton’s applicant pool. It is this reality that could set off a bidding war similar to that which precipitated the creation of the CSS in 1954.

The stakes are high; the consequences great. Those very selective institutions that compete to any extent with Princeton are firmly committed to maintaining their populations of students of color, who have clearly contributed greatly to the richness and quality of the academic, cultural and extracurricular life of these campuses. Yet, the number of African-American and Latino students with the academic credentials to attend these institutions is finite, known and already included in recruitment efforts. So a bidding war would not necessarily increase the number of minority students at these institutions; it would only redistribute them—and at a much greater cost to the institutions, which ultimately would be passed along to students and their families.

If the nation’s highest-profile institutions start matching one another’s financial aid offers on a case-by-case basis, the fundamental principle of equity in the awarding of need-based aid will have been abandoned by its very architects. Roommates from families with similar financial circumstances could have dramatically different student aid packages and costs. Moreover, if this plays out to any extent on the basis of race, it could exacerbate tensions involving affirmative action.

Meanwhile, the CSS Financial Aid Standards Committee—which includes representatives of several of the former overlap group institutions—has been working diligently to make the formulas used to determine a family’s ability to pay for college less onerous, particularly to middle-income families. The committee has recommended to almost 400 participating colleges—mostly four-year private institutions—the adoption of savings incentives, increased allowances for family living expenses and reduced contribution expectations for parents as part of a package of reforms aimed at easing the burden for families. Unfortunately, these changes cannot be incorporated before the 1999-2000 academic year—not in time to head off the unilateral initiatives announced by Princeton, Yale and Stanford—all CSS members.

New England state governments increasingly direct scarce student aid resources to academic high achievers, regardless of their financial need. The University of Connecticut recently unveiled four-year Deans Scholarships, worth up to $6,000 for state residents and $20,000 for out-of-state students who are in the top 15 percent of their high school classes and have combined SAT scores of at least 1200. Connecticut has created a variety of merit aid programs in an effort to plug New England’s most acute “brain drain.” For every Connecticut high school graduate who stays in the state to attend college, another heads out of state—one of the worst ratios in the nation.

To be sure, Princeton, Yale and Stanford are not typical CSS members. The many less selective and less well-endowed institutions that are CSS members depend on a uniformly fair and equitable methodology for the distribution of limited financial aid funds for needy students. The great concern is that the break in the dike created by a few institutions could have a cascading effect. At the same time, unilateral and arbitrary income and asset cutoffs will cause confusion among consumers and encourage abuses in the reporting of assets, particularly home values, which cannot be easily verified.

The college admissions and financial aid process is driven increasingly by political considerations and market forces. There will be winners and losers as institutions seek “market share” among students. Recent studies demonstrate that the ratio of non-need-based aid provided by colleges and universities and states is increasing much more rapidly than—and at the expense of—need-based aid. It has been estimated conservatively that unmet need nationally exceeds $5 billion—about half what colleges and universities currently spend on both need-based and non-need-based grant aid to undergraduates. A 1996 College Board survey shows a 50 percent rise in unmet need at both public and private institutions since 1988!

The gap between need and available financial aid seems destined to grow.

The Great Society programs of the 1960s dramatically expanded the goal of equal opportunity by targeting federal student financial aid to the neediest Americans. Access to higher education became a national priority. But the federal commitment has weakened at just the time that the ethnic and socioeconomic makeup of America’s high school graduates is changing profoundly. Over the next decade, there will be more high school graduates, but large numbers of them will be poor and poorly prepared for college. Clearly, this is no time for higher education or federal and state governments to renge on their commitment to needy students.

Philip G. Wick is director of financial aid at Williams College.
The Buck Stops Where?

Despite a welter of studies over the years, we are far from fully understanding the impact of higher education on the New England economy.

ALAN R. EARLS

Nowadays, it is taken for granted by most people that colleges and universities have a tremendous impact on local economies. But even in New England, with its legion of educational institutions, the case for higher education as both crucial industry and economic catalyst has not been convincingly documented, leaving ample room for controversy to erupt along a wide range of public policy fronts.

This may be partly a result of the relative newness of academia as a force in the economy. In 1954, for instance, when Yale University Press published its voluminous report titled The Economic State of New England, higher education wasn’t reckoned in the balance at all. In its more than 700 pages, the report discussed in considerable detail the tried and true industries of New England as well as new and promising sectors like electronics. It made no mention, even obliquely, of any relationship between higher education and the economy—an omission that is hard to fathom in 1998.

Nor did this same report even acknowledge the already-remarkable growth in the higher education sector as an employer and purchaser of goods and services.

In retrospect, however, it seems that the times were already changing. In the 1950s, influential organizations like American Research & Development—the nation’s pioneer venture capital firm, led by Harvard Business School Professor Georges Doriot—were promising that the future lay in the seeds which the universities were nurturing in their laboratories. Educators would be the midwives of the Space Age. It was becoming clear too that the campus growth occasioned by the first years of the GI Bill was not a temporary phenomenon, but rather the shape of things to come. And even then, the impact of the Baby Boom upon college enrollment could be discerned by anyone caring to look a bit toward the future.

Higher education’s expansion continued from the 1960s through the 1980s, and along with it came acceptance of the notion of colleges and universities as touchstones for economic growth. By the beginning of the 1990s, perceptions about the role of higher education in the economy had more than reversed themselves. In fact, despite the penuriousness of New England state legislators, higher education had achieved acceptance by the public and policymakers alike as a kind of panacea for all the region’s economic woes. Governors committed themselves to high-profile public-private research and training partnerships, lagging sectors of the economy were targeted for community college pro-
grams—even public policy itself was offered up as a worthy focus of academic attention.

In 1989, when Harvard economist Michael Porter assayed the future of the Bay State's economy in a report titled *The Comparative Advantage of Massachusetts*, colleges and universities were at center stage.

Yet despite its new state of grace, the role of higher education in the six-state region's economy remains ill-defined and ambiguous. No single definitive study has counted the cumulative flow of dollars emanating from the region's campuses. Nor has any quantitative study attempted to comprehensively measure the effect on New England—presumably positive—of expanded intellectual capital.

To be sure, the New England Board of Higher Education (NEBHE) and a handful of others have consistently illuminated aspects of higher education's economic role in the region through a well-developed body of commentary and data analysis on issues ranging from college endowment growth to commercialization of university research.

In addition, NEBHE recently reported that New England colleges and universities spent approximately $14 billion in 1995. Multiplying that by 1.8, an established and frequently cited multiplier for higher education, would yield a total economic impact of just over $25 billion—an impressive contribution, but still a small fraction of the region's gross state product, which is estimated at more than $1.3 trillion by the Bureau of Economic Analysis.

**Fuzzy impacts**

Other attempts have been made to gauge the economic impact of one or another axis of New England's academic enterprise. Alas, these have been limited in scope or parochial in spirit. Almost all have suffered from the daunting complexity of the task.

"Most of these studies aren't worth the paper they are printed on," declares Clare Cotton, executive director of the Association of Independent Colleges and Universities in Massachusetts (AICUM), a Boston-based nonprofit that represents private colleges in the state. In other words, statistics (tagged by Disraeli as the worst form of a lie) are too often employed to support predetermined conclusions which, in turn, often have a political objective.

Cotton notes that most economic impact studies make the convenient assumption that "your economic impact is where you want it to be," rather than where the money is actually spent.

Seven years ago, AICUM set out to publish a more rigorous economic impact study based on an elaborate econometric model at Boston College. In particular, the researchers sought to accurately separate *out-of-state* spending by the

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**Rumight Island Higher Education and the New Economy** explores the links between higher education and the economy of Rhode Island with a combination of summary economic impact data and examples of linkages between specific higher education activities and communities within the state.

The study, released in March 1998 by the Rhode Island Higher Education Council, the Rhode Island Independent Higher Education Association, the Rhode Island Office of Higher Education, and the Rhode Island Public Expenditure Council, estimates that higher education adds nearly $4 billion to the Ocean State's economy each year.

The study also notes that Rhode Island ranks fifth nationally (behind Connecticut, Maine, Massachusetts and New Hampshire) in higher education expenditures as a share of gross state product.

**The Colleges of Worcester: A Foundation for Economic Success**, released in December 1997 by the Colleges of Worcester Consortium and BankBoston, estimates that 10 Worcester-area colleges generate a $1.5 billion impact on the Massachusetts economy, including $1.15 billion in Worcester County alone.

The report also documents community services provided by area colleges ranging from Worcester Polytechnic Institute's Venture Forum, providing advice to technology-based companies, to the University of Massachusetts Medical Center's air ambulance.


The study notes, however, that 51 percent of New Hampshire students cannot afford a four-year public college without assistance, and 93 percent cannot afford the average tuition at a private four-year college without assistance. "As the importance of a well educated labor force increases, the accessibility and affordability of higher education opportunities for Granite State residents will become a critical policy issue," the report warns.
Massachusetts private higher education institutions—often a weak link in economic research.

"Still, the goal was to try to get a document that would help us," admits Cotton. "Most people react to the nonprofit world as being not for real—this was an attempt to say this is how many people we employ and what we spend." The results showed that the private colleges of the Bay State had a $10 billion impact within Massachusetts and an additional $2 billion outside the state.

Economist John Havens, a senior research associate at the Boston College Social Welfare Research Institute and chief researcher on the AICUM project, acknowledges difficulties involved in creating the report. "There are a lot of leakages from one region to another making it extremely difficult to accurately portray economic impact." Furthermore, he notes, even effects which one might wish to assign regionally—for instance assuming that paper purchases by colleges in Massachusetts have a positive impact on the paper industry in Maine and New Hampshire—might not be factually accurate, because paper comes from other regions as well.

As a result, Havens and his researchers ended up using a conservative multiplier of 1.2 to estimate the dollar impact of private Massachusetts colleges and universities—not the more widely used 1.8 or 1.9 multiplier.

Even when assumptions about spending impacts are on solid ground, "part of the impact in New England is actually from colleges in New York—and vice versa," he says.

But Havens adds that a meaningful assessment of New England higher education’s contribution to the region should go beyond expenditures. "The impact on the culture and society of New England—and on the broader economy—is very difficult to measure," he says, but certainly important and positive.

A 1997 study produced under the auspices of the BankBoston economics department sought to measure at least one facet of that broader impact on the economy, but only in relation to one—albeit, one mighty—institution. Titled MIT: The Impact of Innovation, the study, itself a reprise of a groundbreaking 1989 analysis, looked at the impact of innovations, innovators and entrepreneurs—regionally and nationally—whose origins could be traced back to the Massachusetts Institute of Technology. The report counted more than 4,000 "MIT-related" firms with global sales topping $232 billion.

The study is the first to measure the national job creation impact of a single institution, according to its authors. It also showed that while MIT benefited its home state with 125,000 jobs, the institution is indirectly responsible for even more jobs in California—about 162,000.

Ed Moscovitch, principal of Cape Ann Economics in Gloucester, Mass., and an author of the MIT study, says the effort was helpful in measuring one aspect of institutional

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**Curriculum for Success: The Impact of Higher Education on Connecticut’s Economy, Workforce, Quality of Life, and Future**, released in June 1997 by the Connecticut Independent College and University Institute of Research and Public Service, estimates that Connecticut’s private colleges generate a total impact on the Connecticut economy of $3.5 billion, including $1.5 billion in direct spending by the institutions, their students and campus visitors.

Moreover, the report notes that 150,000 alumni of private colleges live in Connecticut, earning $8.5 billion annually and paying $924 million in state and local taxes, while the 51,000 employees of Connecticut private colleges earn $1.7 billion a year and pay $144 million in state and local taxes.

**MIT: The Impact of Innovation**, released in March 1997 by BankBoston with support from the Massachusetts Institute of Technology, describes the role of MIT in the national economy, quantifies the job creation and annual economic contribution of MIT-related firms, and examines the nature of MIT-related companies, their founders, their characteristics and relationship to courses of study available at MIT.

The report begins with the not-so-modest assertion: "If the companies founded by MIT graduates and faculty formed an independent nation, the revenues produced by the companies would make that nation the 24th largest economy in the world."

Back in New England, the "analysis showed how the creation and ‘growing up’ of companies started by MIT founders has played a positive role in promoting rapid structural change in the Massachusetts economy."

**The Economic Impact of the University of Massachusetts**, released in March 1997 by the University of Massachusetts system’s Office of Economic Development, discusses the university’s impact on the economy, including specific examples of spinoff business and cultural programs.

According to the study: "Conservatively estimated, the $1.6 billion spent by the university, as it is re-spent and reverberates through the state’s economy, translates into $3.5 billion in annual economic activity and 25,700 jobs. ... That $3.5 billion amounts to an eight-fold return on the money the University of Massachusetts receives from Beacon Hill."
impact but concedes it fell short of being comprehensive. Moscovitch notes that factors such as educational attainment among local populations say more about higher education’s economic impact than direct measures such as institutional employment and purchasing or even job creation by alumni.

Stephen F. Knapp, principal of Monadnock Strategic Planning of Derry, N.H., focused on the relationship between degrees granted and jobs, rather than on direct employment or spending. In his recent report on The Status of Higher Education in New Hampshire, here again, the research revealed that the higher education enterprise was working with little factual data. “I became increasingly concerned about the economic aspects of matching jobs and skills,” Knapp says.

Another study, Rhode Island Higher Education and the New Economy, released recently by Rhode Island public and private higher education groups and the business-supported Rhode Island Public Expenditure Council, also looks at a range of higher education impacts in a moderate-sized region.

“It was essential for us to first document what role higher education plays in the economy,” explains Gary Sasse, the council’s executive director. Sasse says that while the data on higher education’s economic impact may not be complete, the study and the conference at which it was presented are starting points for linking higher education to a new and broader constituency in the Ocean State and forging consensus. “The feedback has been positive and it has helped in reinforcing the role of higher education,” he adds.

But for New England as a whole, questions remain: Does the region retain more than its fair share of the best and brightest graduates? Does higher education deliver value in comparable ways across the region? Will New England continue to be a Mecca for students? Does the region recognize higher education as a regional asset and protect it as such?

Answers are lacking, according to Larry Zabar, vice president of the New England Council, the region’s oldest business group. “People understand that we have world-class institutions,” he says. “They understand that those institutions can create direct links to new products. But after they get past the Gee Whiz factor, it is not clear how we compare to other regions or what actions we should take.”

Creating a comprehensive and satisfactory economic instrument to measure the vitality of the New England higher education enterprise will be difficult. But undoubtedly the region’s colleges and universities and its policymakers and business leaders—as well as the public—would be well-served by development of a broader range of agreed-upon indicators of higher education’s direct and indirect impact upon the six states.

*Alan R. Earls* is a writer based in Franklin, Mass. He is the former editor of *Industry* magazine.


“Brown is an economic engine that generates more than 3,000 jobs [and] nearly $200 million in spending... this directory does not revisit these contributions, but rather paints a picture of the lesser-known but equally important contributions Brown makes to the community at large.”

**Economic Impact, Yale & New Haven**, released in December 1993 by Yale University, describes Yale’s role as a “magnet” for funds and visitors from across the country as well as Yale’s impact as an employer, purchaser, and provider of municipal services.

The study estimates that Yale purchasing and payroll as well as spending by students and visitors injected at least $275 million into the New Haven economy in 1991-92. The study also estimates that 550,000 people who are not affiliated with Yale visit the university each year, pumping money into local restaurants, hotels and other businesses.

**The Economic Impact of Massachusetts Independent Higher Education (1989-90 Academic Year)**, released in September 1991 by the Association of Independent Colleges and Universities in Massachusetts, highlights the role of private colleges in Massachusetts as employers, purchasers, “importers” of grants and other funds, and providers of high-quality education (with tuition and fees covering only 39 percent of costs).

At the time of the report, the private institutions generated an estimated direct and indirect economic impact of $9.9 billion in Massachusetts and $12 billion nationally. “Viewed as an industry,” the report noted, “independent higher education in Massachusetts ranks with construction and manufacturing of electrical and electronic equipment among the top five industrial sectors in the state.”

CONNECTION/SPRING 1998 23
Reshaping Town-Gown Relations

JUDITH STEINKAMP

University of Massachusetts at Amherst Chancellor David Scott has observed that UMass and neighboring communities tend to arrive at town-gown relations much the way motorists arrive at a four-way stop sign, trying to work out the right-of-way without collisions, obscene gestures or road rage. But with each successful stop and go, Scott says, the campus and its neighbors develop a warmer relationship. Indeed, that relationship has progressed to the point that in February 1998, Scott and the Amherst Board of Selectmen announced that the Community Agreement they signed in 1995 need not be renewed. Both parties agreed that the partnership was strong enough that a formal written agreement was no longer necessary.

The UMass experience symbolizes the changing shape of town-gown relations in New England and beyond. State universities are reinvigorating their land-grant missions. Private urban universities are revitalizing local neighborhoods. All around, campus boundaries are increasingly permeable. And a rising premium is placed on communication between campus and host community, citizen participation at public meetings and collaborative planning efforts to solve mutual problems.

Sour start

In recent years, relationships between colleges and universities and their host communities have been sufficiently strained that town-gown relations have centered on PILOT (payment-in-lieu-of-taxes) and SILOT (services-in-lieu-of-taxes) programs, in which towns demand compensation from campuses in the form of lump-sum payments or in-kind services for services provided by the host community.

Many budget-strapped towns have grown wary of providing services to institutions that are immune to local zoning regulations and absolved from paying taxes; some have taken legal measures to capture municipal revenues from colleges. Notably, a Pennsylvania judge in 1994 revoked the tax-exempt status of Washington and Jefferson College in Washington, Pa., clearing the way for colleges to be taxed at the local level and chilling grantmaking by donors unsympathetic of the college's tax status. In 1996, a higher court restored the college's tax-exempt status, but the city of Washington has appealed to the state Supreme Court. In the meantime, the initial ruling's effects prompted the town of Carlisle, Pa., to challenge the tax-exemption of Dickinson College.

The phenomenon is hardly restricted to Pennsylvania. Similar petitions attacking the basic tax-exempt status of colleges and universities (as well as private secondary schools and hospitals) have been advanced in New England town meetings and state legislatures.

Institutions fear that changes in their tax-exempt status could chill private contributions because donors would no longer receive the tax deduction for gifts to nonprofit organizations. This prospect along with the threat of lawsuits has helped bring campus and community officials to the table.

In June 1996, UMass hosted a conference titled Shaping Our Common Destiny, at which town and gown officials found remarkably common ground.

At the conference, Old Dominion University and the city of Norfolk, Va., discussed mutual development of a new "College Town" located in a derelict area between the campus and a residential neighborhood. A representative from the Massachusetts Institute of Technology described the development of a homeless shelter on its campus to provide social services, including substance abuse and AIDS prevention programs.

Fitchburg State College explained how it became the agent of change in its host city by helping reitalize a main street leading to the campus, providing a neighborhood playground and instituting programs to refurbish or replace dilapidated student rental housing. The effort also created a multimodal train station, a new $5.6 million fire station and a promenade connecting the city and the campus. In return, the college
earned community support for construction of a student recreation facility for which it had been seeking approval for 25 years. The moral of the story, according to Fitchburg State President Michael Riccords, is that good things can be accomplished if a college builds its political base.

Generally speaking, however, municipal officials approached the 1996 UMass gathering interested primarily in hearing about successful ways to extract funds from burdensome institutions whose growth was perceived to be placing undue pressure on municipal services. They left focused on innovative ways to work with campuses to create economic development opportunities, attract light industry and take pressure off revenue-driven relationships.

Common destiny

A year and a half later, UMass invited some of the same institutions and others to provide a progress report on mutual planning efforts and to share tips on enhancing town-gown relationships.

As a result of the second UMass conference — and the direct participation of local legislators, town officials and the Five Colleges consortium, including Amherst, Hampshire, Mount Holyoke and Smith colleges as well as UMass-Amherst — the university has embarked on a comprehensive plan with its two host communities: Amherst and Hadley.

At a kickoff meeting in December 1997, officials from UMass and the towns of Hadley and Amherst compiled a list of issues of mutual concern ranging from tourism and economic development to child care.

More specifically, the group agreed to appraise the existing and future cultural facilities of the towns and campuses that attract visitors to the area as a regional destination; discuss mutually supportive commercial development projects; and consider the tax implications of private investment on the campuses. The group also planned to focus on housing issues ranging from ways to reduce noise and drinking at student housing to the future housing needs of staff, as well as traffic congestion and parking.

Based on the broad scope of the discussion, the committee suggested expanding the group to include other communities in the region that support the university and the Five Colleges network — encompassing a 20-mile radius around the UMass campus. The next step is a one-day conference planned for campus and community officials in the summer of 1998, with a follow-up event in the fall to include the entire community.

The new spirit of town-gown relations in the Pioneer Valley of Massachusetts is bearing fruit. The town of Amherst and Hampshire College have jointly planned a Cultural Village anchored by Hampshire College at the geographic center of the Five Colleges system and encompassing the Hampshire campus, the Atkins Farm retail corner and a residential neighborhood.

Together these entities, along with the Pioneer Valley Planning Commission, will consider cultural venues such as a performing arts center, artists’ studios, library, theaters and community center, as well as a hotel and conference center, while creating plazas, parks and recreation areas to preserve the scenic beauty and agricultural heritage of the apple orchard in which the village sits.

Economic development initiatives

At the State University of New York at New Paltz, a 1990 master plan called for construction of an arts building, an engineering building and a 5,000-seat field house. For the town of New Paltz (pop. 12,000), and the village where the campus is located (pop. 5,000), the prospect of further university development was cause for alarm: sewer and water capacity was already stretched and town officials feared a further diminished tax base. SUNY realized it needed to help the town expand its tax base if its development plans were to win approval.

The town and university created the New Paltz Development Corp. to foster economic development initiatives, capitalizing on the artistic focus of SUNY-New Paltz students. The partnership used industrial space abandoned by the downsizing IBM Corp. to create a business incubator, catering to graphic design, computer engineering, jewelry-making and other faculty interests. The town took up an industrial corridor where business tenants considered to be appropriate conceptual customers would enjoy fast-track town approvals. In exchange, the university has gotten much of what it wanted: the arts and engineering buildings have been built and plans are proceeding for the field house.

In New York City, the Fashion Institute of Technology (FIT) is developing another kind of incubator facility, which likens itself to a beehive with a community of 60 companies, 15 of which are housed in the hive, with 45 affiliates “buzzing around.” The institute assembled an advisory board of fashion industry leaders who have helped raise more than $4 million for the project. The institute projects that the incubator will create 575 jobs in the city with an annual payroll of $20 million, while the 60 companies will generate $10 million in taxes. Nonetheless, progress is slow due to a change in FIT’s leadership — underscoring a key tenet of town-gown relations: successful projects require passionate champions and continuity of leadership.

The Fashion Institute of Technology plan is modeled after the Mass Ventures incubator facility adjacent to the UMass-Amherst campus. The 40,000 square-foot Mass Ventures building was financed with a $13 million venture development fund used to set up university technology commercialization projects and foster regional economic development. The facility is completely leased and generating substantial tax revenue for the town. Plans for a second phase are on the horizon as UMass seeks appropriate tenants to anchor the project.
Going downtown

Several New England colleges have attempted to revitalize urban areas by locating new academic facilities in city downtowns. The University of New Hampshire, with its main campus in Durham, established a facility in Manchester. The University of Rhode Island, based in Kingston, opened a college of continuing education in downtown Providence.

UMass is also involved in discussions with the city of Springfield to extend the university's presence in the city. Last year, UMass allocated funds for a biomedical research program with Springfield’s Baystate Medical Center, while the university’s Center for Economic Development launched a $400,000 study of Springfield’s strengths and weaknesses in attracting biotech companies.

The rebirth of the Housatonic Community-Technical College in the abandoned Hi-Ho shopping mall in downtown Bridgeport, Conn., offers a shining example of how a college can contribute to the economic development and revitalization of a distressed city. The entire two-year college—including 2,600 students, 265 faculty and staff, library and collection of 4,500 art works—was efficiently relocated into its new 180,000 square-foot home in 1997 without disrupting classes or other programs.

The college faced extremely high rent in its previous location—a converted Singer factory. A failed shopping center was not what Housatonic officials had in mind when they began searching for a new site. But having examined nine site proposals without success, and at the urging of then-Connecticut Gov. Lowell Weicker and local leaders, the college reluctantly accepted the plan.

Bridgeport’s mayor, meanwhile, had previously committed to revitalizing the streetscape in this area in an effort to retain five businesses—a hotel and retail complex, office building, utility company, police training center and bank. The state urged him to think bigger and supported financing to develop Housatonic. The gamble paid off: once plans for the college were developed, all five businesses decided to stay.

The shopping center was transformed into a series of connected buildings with a magnificent two-story atrium gallery at its main entrance, displaying a portion of the college’s impressive art collection. Designers carved out a traditional green quad with sculpture garden. Careful design, ample lighting and security measures and almost total renovation of the area helped dispel the perception that the area was derelict and unsafe.

Moreover, Housatonic’s success has spurred $1.7 billion of further development in the form of a minor league baseball park, a paper recycling facility, an intermodal transportation center and a mixed-use development.

Planning partnerships

At the June 1996 Shaping Our Common Destiny conference, Trinity College introduced an ambitious plan called the Trinity Heights Initiative, to create a “Learning Corridor” along an adjacent 15-block area, including an abandoned bus garage. The surrounding blight had damaged Trinity’s image and ultimately affected enrollment.

Trinity President Evan Dobelle formed a partnership with the Southside Institutions Neighborhood Alliance (SINA), comprised of Hartford Hospital, Connecticut Children’s Medical Center, a housing advocacy group called the Institute of Living, and Connecticut public television and radio. This group set out to redevelop the area between the campus and the hospitals, with Trinity assuming the role of leader, facilitator, developer, broker and champion.

As the planning progressed, SINA acted as developer, in partnership with the city of Hartford, the state of Connecticut, the Learning Corridor Corp. and foundations—all of which contributed funding. Within six months of the plan’s inception, Dobelle had committed an initial outlay of $5.9 million, taking on the financial risk for this venture. Advisory groups were formed, creating an ever-expanding team and increasing stakeholder involvement.

Plans were approved to establish a green in the center of the old bus garage site, surrounded by a new Montessori and middle school, a high school and performing arts center, as well as a parking garage, auditorium and residential neighborhood. Interspersed are new plazas, shared facilities including a swimming pool, a library, social service sites and a job service facility. No wonder First Lady Hillary Clinton chose the Learning Corridor as the site to kick off new educational initiatives.

Neighborhood redevelopment

Clark University in Worcester, Mass., faced a choice similar to Trinity’s: build higher walls around the campus or reach out to improve the surrounding neighborhood. It chose the latter. With support from the U.S. Department of Housing and Urban Development’s Office of University Partnerships, the university has leveraged more than $35 million to revitalize a derelict neighborhood, and in the process, blurred the boundaries of the institution, provided social services and promoted scholarship among neighborhood children.

President Richard Traina spearheaded Clark’s effort in 1985 by seeking a $1 million dollar loan guarantee to finance local housing acquisitions and rehabilitation. Twelve years later, the initiative had created 100 units of affordable housing, restored several Victorian homes and launched an incentive program to encourage Clark faculty and staff to live in the neighborhood, as well as a loan pool to help homeowners make exterior improvements.

Jack Foley, executive assistant to the president at Clark, says he borrowed heavily from colleagues at Trinity and Yale University as he worked to develop Clark’s University Park Partnership.

Foley says the Clark revitalization effort features five critical components:
1. **Physical Rehabilitation.** To encourage faculty and staff to live in the neighborhood, the university provides $5,000 toward downpayments on homes ($1,000 of which is forgiven each year) as well as special annual bonuses worth 12 percent of salary and low-cost renovation loans.

2. **Public Safety.** To improve safety in the neighborhood, the partnership has helped develop a police substation and additional street lighting. A Neighborhood Alert Center works to enforce building and safety codes while monitoring absentee landlords.

3. **Education is the Key.** Clark contributes faculty and staff to support a magnet school, a center for adult learning and afterschool programs. The development of a charter school in the former high school provides a rigorous academic curriculum to prepare students for higher education, and Clark’s offer of free tuition to qualified students provides hope for neighborhood residents.

4. **Economic Development.** An industrial park, credit union (with economic development loan pool) and special center for entrepreneurship encourage business investment.

5. **Social and Recreational Programs.** The partnership offers free summer camps, youth programs, family swim nights and music lessons.

### Housing Incentives

Myriad housing issues color town-gown relations. At the University of Vermont recently, these issues centered on neighborhood disputes between established residents and students typically resulting from excessive drinking and partying, inordinate noise, increasing crime and drug use. The conversion of single-family homes to apartments in Burlington neighborhoods adjacent to the university precipitated student behavior problems, putting pressure on rents, creating added demand for city services and gobbled up parking spaces.

To address these issues, Gail Sampsonis, UVM’s government relations liaison, developed a Good Neighbor Program, featuring a hotline for neighbors to report disputes with students, as well as conflict resolution services through the Burlington Police Department. Indeed, the program’s success inspired UVM and the Burlington Police to produce a training video highlighting ways to resolve common problems between neighbors and students.

Based on this initial program, the UVM Student Senate Association in 1997 formally established the Community Coalition in which students bring together representatives of the university and the city to address town-gown issues. Because this is a student-based effort, it is critical that the mantle of leadership pass each year to another student who will carry on the initiative.

Face-to-face dialogues between students and neighbors break down stereotypes and create a positive relationship. New initiatives include a noise task force, which issues tickets for excessive noise; systems for dealing with alcohol abuse; limitations on the number of unrelated residents who may live in a single-family dwelling; and grants for more affordable housing. Though universities technically have no jurisdiction over students in residential neighborhoods, UVM’s vice president for student affairs supports the policies and implementation strategies developed by the SGA Community Coalition.

Ultimately, the focus on binge drinking and student behavior cannot be separated from issues of adequate housing, residential parking, increased traffic and demand for services. The image of the campus is intertwined with the appearance of the neighborhoods surrounding its edge. The development opportunities of the town and the region are linked with the economic viability of the university. Little surprise then that campuses and communities are forging innovative partnerships, planning together, building community and addressing their common environment.

As universities are increasingly perceived as drivers of economic development, they can be expected to assume complex roles ranging from facilitator or broker to leader and champion for change. For host communities, the result may be a new planning paradigm that takes pressure off revenue-driven relationships by generating economic development opportunities and revitalizing campuses, neighborhoods, downtowns and communities.

The overriding message conveyed in these case studies can best be summed up by the five “C’s” of improving town-gown relations. Develop a comprehensive strategy; achieve consensus and commitment from all parties; ensure continuity through changes in leadership and administration (best accomplished by community buy-in for the plan); and find a champion for change to provide the quality of leadership to make the project a reality.

*Judith Steinkamp is principal planner for master planning in the Office of Campus Planning and Space Management at the University of Massachusetts at Amherst.*
The California Higher Education Policy Center, which was recently reinvented as a national higher education policy center, has authored an important study of state governing structures for higher education.

The study, funded by the Pew Charitable Trusts and the James Irvine Foundation, focused on seven states: California, Florida, Georgia, Illinois, Michigan, New York, and Texas. The study is described in a report titled *State Structures for the Governance of Higher Education*.

*State Structures* places the seven states under study in four distinct categories:

**Federated Systems** feature institutional and multi-campus governing boards and a coordinating board with responsibility for higher education and four major work processes, namely: information management, budgeting, program planning and articulation. Illinois and Texas are examples of federal systems.

**Unified Systems** are characterized by a single governing board with responsibility for all degree-granting programs. Georgia is an example.

**Confederated Systems** have a planning or coordinating agency as well as two or more governing boards of multi-campus subsystems that are directly responsible for negotiating their individual budgets. Examples include California, Florida, and New York.

**Confederated Institutions** have institutional or multi-campus governing boards but no statewide agency with substantial responsibility for all of higher education. Michigan is in this category.

Applying this typology to New England, one might categorize Connecticut and Massachusetts as federated systems, Rhode Island and Maine as unified systems and New Hampshire as a confederated system. Vermont would fit the confederated institutions model.

The authors of *State Structures* contend that their classification system is more likely than traditional ones to explain the extent to which colleges and universities respond to state needs and the public policy objectives of elected officials.

**Findings**

The study found that federated and unified systems generally have the capacity to identify priorities, to shape institutional responses in terms of information management, budgeting, program planning and articulation and to use information to communicate progress.

In both federated and unified systems, the coordinating body was found to effectively link colleges to one another and to state government for purposes of assessing institutional performance, crafting budgets, coordinating educational programs and supporting collaborative programs such as transfer articulation agreements.

The study warned that both federated and unified systems depend upon central office leadership, supportive political leaders and steady increases in state funds to balance statewide interests and institutional concerns.

In contrast, confederated systems and confederated institutions were found to lack mechanisms to collaborate and share resources at the system level. More specifically, Florida, New York and California were found to have this capacity only at the subsystem level, and Michigan did not appear to have this capacity at all.

Furthermore, system design and governance structures were found to determine the range of strategies available to elected officials in their relationships with higher education...
institutions as well as the likelihood that officials would use such a strategy.

The study also found that in federated systems, elected leaders are more likely to identify priorities because they have mechanisms for pursuing them.

Elected leaders also think federated systems provide credible information on which to judge institutional performance. But unified or confederated systems with a small number of subsystem governing boards seem to invite management by strong governors and legislatures unless they are protected by constitutional autonomy.

Among the disadvantages of this direct involvement, the elected officials typically lacked the information needed to assess institutional performance, generally failed to communicate priorities and typically had few mechanisms for planning on a systemwide basis. On the plus side, confederated state structures have provided a degree of institutional independence that has resulted in the development of high-quality universities such as the University of California at Berkeley and the University of Michigan.

The California study drew the following conclusions:

- There appears to be a strong link between governance structure and affordability. Generally, families in states that have a systemwide mechanism for representing the public interest in budget decisions were found to pay a smaller percentage of institutional operating costs than those in states that lack such a mechanism.

- There is no evidence that one type of system necessarily has lower per-student costs than another.

- There is no evidence that certain governance structures attract stronger leaders than other structures, though the study’s authors noted that unified systems are affected most extensively by changes in leadership.

- State boards that are part of higher education and part of state government do a better job balancing the public interest against professional interests and institutional concerns than do governing boards of subsystems or institutions.

**Back in New England**

The report concludes that historical factors, system design and governance structures influence higher education performance in the seven states under study and that the findings should be tested for their applicability to other states.

Meanwhile, other studies appear to support the *State Structures* conclusions that federated systems such as those in Connecticut and Massachusetts and unified systems like Maine’s and Rhode Island’s effectively identify and gain support for appropriate priorities.

A recent report by SHEEO, the national organization of state higher education executive officers, for example, identified the top five priorities facing members as follows: adequacy of overall financial support; effectiveness and accountability; instructional technology and distance learning; tuition rates and overall student costs; and quality of undergraduate education.

In 1998, the federated systems of Massachusetts and Connecticut fared relatively well in terms of these priorities. In Massachusetts, the state appropriations for higher education increased by nearly 10 percent, while state financial aid funding grew by almost 9 percent. The state Board of Higher Education and University of Massachusetts trustees reduced tuition by 5 percent at UMass, state colleges and community colleges. Moreover, the board established an honors college at UMass-Amherst.

Connecticut public colleges, meanwhile, “walked away from the 1997 legislative session relatively unscathed and hopeful that the tide had turned,” according to the *Chronicle of Higher Education*. State appropriations for higher education for fiscal 1998 and 1999 increased by 8 percent, while student financial aid funds rose by 32 percent.

Legislators in Hartford also supported a college endowment matching program, in which the state provides public colleges with $1 for every $2 they receive from private donors. And Gov. John Rowland signed into law an early retirement incentive program for state employees, including college faculty and staff members.

The unified system of Rhode Island benefited from voter approval of a four-year, $1.2 million initiative to upgrade telecommunications technology at the state’s three public institutions, as well as a more than 3 percent increase in state support for college operations and a 4 percent rise in student financial aid—the largest increases in years.

In the case of Maine’s unified system, higher education officials prevailed in gaining increases in state appropriations of 2 percent for fiscal 1998 and 3 percent for fiscal 1999—the first significant increase in eight years. University tuition hikes were pegged at a relatively modest 4.4 percent for the 1997-98 academic year, while community college tuition rose 3 percent.

Maine has also developed a systemwide approach to communications technology and has facilitated credit transfer. The improved appropriations and initiatives in Maine are reflective of the California study’s conclusion that unified systems are affected more extensively than other structures by changes in leadership—in Maine’s case, the appointment of Chancellor Terrence MacTaggart, who has expertly avoided coercive centralization while asserting the central leadership demanded by the needs of the state and its higher education system.

While the recent experiences of New England’s two federated and two unified systems of higher education appear to support the conclusions reached by the California study, more research is needed on state structures here in New England.

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On-Line Musings

The following columns written by CONNECTON Executive Editor John O. Harney first appeared on BusinessToday.com, a Boston-based daily news service on the World Wide Web. Harney writes a monthly column on higher education and economic development for the on-line service.

College Finance and the Low-Income Family
(February 1998)

The shift in federal student financial aid from 80 percent grants in the mid-1970s to 80 percent loans today has been especially damaging to low-income families for whom the specter of huge loan debt is enough to kill college aspirations.

So news of Princeton University's plan to remove the loan component from aid packages awarded to students with family incomes under $40,000 is refreshing (even if some New England colleges have quietly practiced such "differential packaging" for years).

Generally speaking, low-income families have witnessed the steady erosion of their higher education buying power and, by extension, the dimming of their prospects in the knowledge economy.

Just 64 percent of 1992 high school graduates from low-income families had enrolled in college by 1994, compared with 93 percent of high school grads from high-income families, according to an analysis by the American Council on Education.

And a student from the top one-fifth of family income was about 10 times more likely than a student from the bottom fifth to earn a bachelor's degree by age 24, according to Iowa-based higher education expert Thomas G. Mortenson.

Moreover, the business imperatives of a newly competitive higher education marketplace—and the ongoing defunding of federal programs for the neediest Americans—suggest that the gap between "college families" and "non-college families" will only widen.

Consider:
• With one eye on the bottom line, many colleges have retreated from true need-blind admissions, in which students not only are admitted regardless of their economic circumstances, but are also assured sufficient financial aid to fully meet their need.
• Elite schools have pushed "early decision" programs in which a student generally must commit to a college before knowing what his aid package will look like. No poor kid can make that kind of gamble.
• Colleges increasingly direct scarce financial aid resources toward merit-based aid, rather than need-based programs. After all, for the $20,000 or so it might cost to offer one poor student a full scholarship, a college could recruit four wealthy students with merit scholarships worth $5,000 and still collect a $15,000 balance from each.
• The Clinton administration's affair with the middle class has come at the expense of low-income students. Exhibit A: recently enacted tuition tax credits and deductions. Tax breaks offer a doubly whammy. They help those who are better able to afford college more than they help the neediest students—and they divert finite federal resources away from need-based aid programs geared to low-income families.
• Students from low-income families increasingly are channeled into community colleges. Not that community colleges aren't the best choice for a lot of students; they are. But family economic circumstances shouldn't make them the only choice.
• Since Congress passed legislation requiring welfare recipients to get jobs after two years of receiving benefits, college enrollment among people on welfare has dropped significantly, according to a new report by The Education Resources Institute of Boston and the Institute for Higher Education Policy of Washington, D.C.

In short, the low-income students who live within a few blocks of virtually every one of New England's world-class campuses have very little chance of earning college degrees—and therefore little chance of ever getting good jobs in the knowledge economy. Now, that's a scandal.

Speaking of access, Massachusetts public institutions have won kudos recently for three straight years of reducing—not freezing, mind you—but actually cutting tuition for state residents.

Just one problem. Since tuition already covers only a small part of the cost of educating an undergraduate student, enrolling more students at a further discount raises costs far out of proportion to the new revenue it brings in, so a major commitment of non-tuition support—mostly state support—is required.

That's a tall order in a state that allocates only half as much of its budget to higher education, in percentage terms, as Alabama and Mississippi do.

Massachusetts ranks 46th nationally in higher education appropriations as a share of state tax revenue. Yet Massachusetts politicians will trot out tax-cutting plans this election year in an effort to win votes and garner support from a business community that likes to talk about the need for educated workers, but doesn't always like to pay for them.

Indeed, business executives rank education No. 1 among the quality of life issues to consider in making business location deci-
1997: The Year in Pictures

(January 1998)

As you know, columnists and commentators suffer from a seasonal disorder that compels them to spend the holidays recalling the five or 10 biggest stories of the disappearing year. You’ve probably already read more than you ever cared to about the best this and the top that of 1997.

So let’s not rehash the Big Stories of the Year in New England Higher Education. You caught those when they broke, anyway. It’s the little ones you may have missed.

To wit, a look back at a few campus initiatives that went largely unreported in the press, but collectively offer some sense of where New England higher education has been over the past 12 months—the Year in Pictures if you will.

- In southern Connecticut, 72-year-old Ann Passariello of North Branford pledged a half-million dollars to Sacred Heart University to establish a scholarship fund in honor of her late son Michael. The younger Passariello, it seems, was an average student in high school, but worked hard at Sacred Heart and became vice president of the family real estate development business. Fittingly, the scholarships in Michael’s name will be awarded not to students with knockout test scores, but to financially needy students with average abilities.

This story is important because colleges and government officials spent 1997 replacing need-based student aid bit by bit with merit-based aid. Officially, merit aid rewards smarts and offers motivation. But the bottom line is... well, the bottom line. Colleges know that for the $20,000 or so it costs to offer one poor kid a full boat, they could lure four wealthy kids with merit scholarships worth, say, $5,000 and still collect $15,000 in real money from each of them.

- On Boston’s North Shore, Salem State College acquired the Cat Cove Marine Laboratory and began transforming the former state lab into a cutting-edge aquaculture center. The Salem Harbor facility will include a marine biology lab for research and hands-on learning, a fish farm and an “aquaculture college.”

Academic sprawl is nothing new. But it’s worth noting that New England’s concentration of higher education resources served as midwife to the region’s important biotechnology and environmental technology industries. And many observers think aquaculture will be next. Whether displaced commercial fisherman from places like Gloucester will find good jobs in the industry remains to be seen.

- In Worcester, the College of the Holy Cross was awarded a three-year $350,000 grant by the Andrew W. Mellon Foundation to ensure that every Holy Cross faculty member has a World Wide Web page with a personal video introduction and various interactive features.

To be sure, the wiring of higher education really belongs with the Big Stories of ’97. What’s fascinating about the Holy Cross-Mellon snippet is the recognition at long last that undergrads raised on video games know more about information technology than their professors. Indeed, selected Holy Cross students will be enlisted to bring the profs up to speed. Observed Holy Cross President Gerard Reedy: “Students have the expertise and comfort level with technology.”

- In Durham, N.H., the University of New Hampshire received a $396,000 equipment grant from NASA to expand its Complex Systems Research Center, where researchers use satellite data to study climate changes and other systems back on Earth. New England campuses have captured snazzier and more lucrative science grants, but in this El Niño year, the UNH project provides a colorful image of New England’s fabled scientific research enterprise.

Enjoy it while it lasts. The region’s share of all R&D expenditures by U.S. universities plunged from 10.1 percent in the mid-1980s to 8.4 percent in 1995 and presumably lower in ’97.

- In Providence. Brown University introduced an annual scholarship honoring flamboyant mayor, Vincent A. Cianci Jr., to support students and projects that improve life in the resurgent city.

It’s one of the expanding variety of campus programs that might be packed under the heading of “town-gown initiatives.” Among others launched in ’97: Bristol Community College began providing mentors and other support for disadvantaged Fall River high school students who show promise as future teachers, New Hampshire College announced plans to educate low-income Manchester, N.H. residents on tenant and homeowner rights.

- In Boston, students at the New England School of Law began conducting research for the International Criminal Tribunal for the Former Yugoslavia, while in New Haven, Yale researchers collected information on war crimes by the Khmer Rouge—underscore the fact that the “town” in town-gown must be ever-more broadly defined.

Maine’s Colby College, meanwhile, received $6 million from a Swiss foundation to fund scholarships for international students, with an emphasis on victims of political oppression. And UNH began a program encouraging undergraduates to pursue research overseas in disciplines ranging from civil engineering to early childhood education.
Finally, in Castine, Maine, the Maine Maritime Academy coordinated a U.S. visit by marine oil-spill response officials from South Africa, Namibia and Mauritius.

A lot of campuses are involved in trade promotion. But this effort is refreshing for two reasons: One, exporting has not come easy to New England’s otherwise successful environmental technology industry. And two, the region’s overall trade record with Africa is dismal; the continent accounts for about 1 percent of New England exports.

Not exactly headline-grabbers on the scale of the latest assault on faculty tenure or the campus excess du jour. But it may turn out that in 1997, the real Big Stories of the Year in New England Higher Education came in small packages.

**Academic Programs:**
**If You Trim Locally, Share Regionally**
*(December 1997)*

In the name of efficiency, higher education policymakers in Massachusetts and elsewhere have taken to eliminating “low-demand” degree programs at state colleges and insisting that for every new academic program introduced, an existing one be scrapped.

This brand of downsizing sits well with business leaders and taxpayer groups who yearn for more business-like financial management in public higher education. But any pruning should be done carefully.

One problem is that neither budgetary considerations nor student preferences are very good indicators of an academic program’s worthiness—or even its currency. The University of Massachusetts at Amherst, you may recall, announced it would nix its Slavic languages and literature department the same week that U.S. troops were shipping off to Bosnia. The program was ultimately spared.

Corporate input is also of limited value in picking academic winners and losers. Businesses are notorious for misjudging their own future hiring needs. And too many liberally educated executives with degrees from places like Harvard and Williams might just as soon see public higher education become a job-training program for middle managers. The publics’ liberal arts programs would probably be the first to go.

Still, not every academic major at every public institution deserves continued support. Indeed, some programs are under-enrolled precisely because too many New England institutions are competing for a relatively small number of interested students.

These redundant programs might be logically targeted for elimination but only in the context of a New England-wide scheme to reduce duplication while preserving the extraordinary range of offerings available through public higher education to New England students of modest means.

It happens that a highly effective regional mechanism is already in place to help minimize duplication of programs and maximize student choices.

The New England Regional Student Program (RSP) has helped reduce duplication of majors at New England public campuses for 40 years, while saving Bay State students millions of dollars in tuition.

Administered by the New England Board of Higher Education, the RSP offers New England students dramatically reduced tuition rates at public campuses in other New England states if they pursue a major that is not available at a public campus in their home state.

Specifically, RSP participants pay 150 percent of in-state tuition, representing a deep and growing discount off rapidly rising out-of-state tuition. For example, the University of Connecticut’s tuition rate this year for out-of-state students is $12,676. But under the RSP, a Massachusetts resident could study, say, geophysics, at UConn for $6,236 in tuition.

In academic year 1997-98, more than 7,000 New England residents enrolled at out-of-state New England colleges through the RSP and saved an average of $4,000 each in tuition for a total of more than $32 million.

Moreover, the RSP saves New England taxpayers millions of dollars by enabling state higher education systems to share, rather than duplicate, high-cost academic programs available in neighboring states. In other words, because the UConn geophysics program is available to Massachusetts residents at a comparatively affordable price, Massachusetts is under less pressure to spend scarce resources on a geophysics program within its own public system.

All told, more than 800 academic programs—certificate, associate, bachelor’s, master’s and doctoral—are shared among the states.

Many of the degree programs available through the RSP at reduced tuition are highly relevant to the regional economy. These include bachelor’s programs in aquaculture at the University of Maine, biomedical engineering at the University of Rhode Island, Canadian Area Studies at the University of Vermont and meteorology at Plymouth State College in New Hampshire.

But the RSP also provides an efficient way to offer all New Englanders access to academic programs that might not be financially sustainable in each state—witness UConn’s bachelor’s program in puppetry.

Reducing duplication of high-cost academic programs is important. But a rich array of public higher education program offerings is needed to keep young New England talent here in the six-state region.
New England policymakers and college administrators should step up their cooperation across state lines to make sure that when they cut a program locally, they share a similar program regionally.

Minority Enrollment: Numbers Don’t Tell Whole Story
(September 1997)

When the national conversation on race begins—if it ever begins—New Englanders should be talking about minority enrollment in higher education. Issues of social justice aside, the region’s knowledge-intensive economy will thrive or wither based on the educational attainment of its increasingly multicultural workforce.

African-American enrollment at New England colleges and universities grew by 25 percent between 1990 and 1995, while Hispanic enrollment grew by 45 percent and Native American enrollment by 55 percent, according to a New England Board of Higher Education (NEBHE) analysis of federal data. In percentage terms, enrollment among all three groups grew faster in New England than in the nation as a whole.

But there’s little cause for bragging in this conversation. The region’s roughly 75,000 African-American, Hispanic and Native American students still represent just 9 percent of New England’s total college enrollment—significantly below their share of the region’s 18- to 24-year-old population, which was 12 percent in 1990 and growing.

Groups that were underrepresented on New England campuses in 1990 remain so today. And new groups of students need help, as well. For example, while Asian-Americans, broadly speaking, have not been underrepresented, very high percentages of Cambodian, Hmong and Laotian students have not even completed high school.

Moreover, minority underrepresentation has been particularly persistent in certain fields that are critical to New England’s economy. For example, African-Americans, Hispanics and Native Americans combined earned just 6 percent of the nearly 4,000 bachelor’s degrees awarded in engineering by New England institutions in 1995, according to data compiled by the National Action Council for Minorities in Engineering (NACME).

And although the number of engineering bachelor’s degrees awarded nationally to minorities reached a record 6,331 in academic year 1995-96, the rise probably will not be sustained. The reason is that engineering enrollment among minority freshmen has dropped by 10 percent since peaking in 1992-93. Unless “retention” rates are improved, these smaller freshman engineering classes will produce smaller classes of minority engineering graduates by the end of the decade.

Notably, NACME attributes the decline in freshman engineering enrollment among minorities to the high costs of an engineering education and the fact that just 6 percent of minority students graduate from high school with the sequence of math and science courses required to enroll in engineering schools.

But those barriers to minority participation—ever-increasing college costs and poor preparation at the K-12 level—are by no means unique to engineering.

Wealthy, suburban school districts—mostly white—send well-educated, motivated students rushing up the education pipeline. Their well-publicized college-going rates attract more upwardly mobile, educated white homebuyers and taxpayers.

Poorer, urban school districts—mostly minority—languish, as demoralized teachers and guidance counselors too often track students away from the college-prep path and therefore away from the good jobs in the knowledge economy.

Once upon a time, affirmative action policies could be counted on to help address such historical inequity—and they surely played a key role in the minority enrollment gains of the past half-decade or so. Now, of course, these policies are under assault.

A federal court ruling to ban affirmative action at Texas universities and a California state policy barring consideration of race in graduate admissions at public campuses have had an immediate and chilling effect on admissions of African-American and Hispanic students in certain programs.

For example, the University of California at Berkeley School of Law recorded an 81 percent drop in African-American admissions and a 50 percent drop in Hispanic admissions in the first year operating under the new rules (with negligible increases in average qualifications).

Some commentators have suggested that the Clinton administration, which supports affirmative action in its rhetoric, should respond by withholding some of the vast federal support enjoyed by those systems, but that seems unlikely.

In the meantime, college administrators in the affected states—and across the nation—have been left to find creative ways to encourage minority participation within the law.

In this, they should have the support of white students and families and, above all, employers. After all, pioneering New England campuses adopted affirmative action policies before they were required to, not only to give minority students a break, but also to provide a richer, more diverse educational experience for white students—a richness that may be found lacking in a new batch of Berkeley-educated lawyers and who knows how many other future graduates.
Entrepreneur Alain J. Hanover knows something about innovation. The founder and former CEO of the highly successful ViewLogic Systems Inc., who now heads InCert Software Corp., which he also founded, says the three most important determinants of a firm’s success are: a highly skilled workforce, proximity to university research and development (R&D) and access to venture capital.

Moreover, he suggests that these components are not only interrelated, in that the presence of one reflects the presence of the others, but also that they are mutually reinforcing. Says Hanover: “Industries cluster where complementary assets are already clustered.”

But the mix of factors that Hanover points to almost instinctively is not well understood by decision-makers and the public. As New England competes globally for the jobs, productivity and wealth of the “New Economy,” the region’s policymakers, business leaders, scholars and others need to identify the types of vital data that can be tracked over time to measure economic health and devise new conceptual frameworks in which to place that information.

For example, we know that academic and research institutions in Massachusetts depend more on the federal government for R&D funds than do their counterparts in any other state. Fully 72 percent of university research in Massachusetts is federally funded. We also tend to assume that such funding is an important catalyst for economic growth in the state. But we cannot effectively understand the downstream economic implications of investment in R&D without a policy-relevant, economic framework that aligns R&D funding, federal as well as industrial, with such variables as venture capital, labor force make-up, immigration patterns and investment in information infrastructure.

**Putting on the lights**

In the absence of this sort of framework, decision-makers have relied upon a “black box” approach to understanding how to measure and foster economic health, in which the process of translating resources or economic inputs—such as skilled labor, venture capital and R&D investment—into results or economic outcomes is shrouded in darkness.

Something happens inside the so-called black box to produce “innovation.” But what? To be sure, the black box metaphor is a caricature of a complex decision-making process. Yet, if we are to make wise decisions about how best to identify and leverage economic resources,
we need to turn on the lights in that box.

The Massachusetts Technology Collaborative (MTC) recently attempted to explore just what goes on inside the black box to translate resources into results such as the nine high-performance industry clusters—ranging from health-care technology to textiles and apparel—that drive the Massachusetts economy. What emerged was a new framework to provide policymakers and business leaders with a more comprehensive and integrated way to understand and monitor innovation and indeed the changing Massachusetts economy.

This non-linear dynamic framework, unveiled in the MTC's inaugural Index of the Massachusetts Innovation Economy published in late 1997, groups a series of 33 indicators into three main categories—resources, innovation process and results—to tell the story of how innovation is transforming the Massachusetts economy. (See sidebar.)

The old one-dimensional framework emphasizes adding to discrete resources or inputs in order to produce desired economic outcomes. But it neglects to underscore the dynamic interdependence between and among resources and innovation processes which produces positive economic outcomes. In this era of intensified competition, it is not enough to know which resources to support; it is essential to understand the mix of resources and the interaction among them that will generate economic growth.

Implicit in the new framework is a notion of "feedback loops" and vital reinvestments for sustainability. For example, long-term reinvestment in R&D has sustained venture capital investment, put Massachusetts in the lead in terms of patenting, technology licensing and federal Small Business Innovation Research (SBIR) awards to entrepreneurs and stimulated a high-capacity telecommunications infrastructure—all of which are essential to the sustainability of the Massachusetts economy.

The negative effect of inadequate reinvestment, by contrast, is most obvious in the area of primary and secondary education. This weakened link in the cycle has diminished the state's ability to produce a high-quality work-

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**INDICATIVE OF INNOVATION**

The Massachusetts Technology Collaborative (MTC) assembled 33 "indicators" from various sources, including state and federal agencies and private firms, to tell the story of how innovation is transforming the Massachusetts economy. The 1997 indicators are:

1. Net employment change in nine key industry clusters*
2. Employment in the telecommunications industry by segment
3. Employment concentration and growth in nine key industry clusters
4. Average annual pay per worker in nine key industry clusters
5. Average annual pay per worker, compared with average of six leading technology states**
6. Ratio of average income among highest 20 percent of households to that of lowest 20 percent
7. Change in value of manufacturing exports, compared with six leading technology states
8. High-tech CEOs' perception of business climate
9. Patents issued to state residents per capita, compared with six leading technology states
10. Inventions and patent applications by universities, hospitals and research institutions
11. Technology licenses issued by major universities, hospitals and research institutions
12. U.S. Food and Drug Administration approvals of advanced medical devices
13. Number and distribution of publicly traded fast-growth "gazelle" companies
14. Number and value of Small Business Innovation Research (SBIR) awards
15. Change in number of initial public offerings (IPOs)
16. Value added per employee in selected industry clusters
17. Market value minus book value of publicly traded companies per employee
18. International and domestic migration
19. Education levels compared with average of six leading technology states
20. Number and distribution of engineering degrees awarded
21. Massachusetts-educated science-related Ph.D.s working in Massachusetts
22. Average math and science test scores among 8th graders, compared with other participating leading technology states
23. High school dropout rates
24. Combined math and verbal SAT scores
25. Per-capita federal R&D expenditures at academic institutions, compared with six leading technology states
26. Per-capita federal expenditures for health-related R&D at academic institutions, compared with six leading technology states
27. Industrial R&D expenditures per employee at publicly traded companies
28. Value and distribution of venture capital investments
29. Value of research tax credits awarded to companies
30. Growth in share of telephone switches with ISDN capability
31. Growth in number of Internet host computers
32. Public school classrooms connected to the Internet
33. Change in number of nonstop international flights from Logan International Airport

* The nine "key industry clusters" are: computers and communications hardware; defense; diversified industrial support; financial services; health-care technology; innovation services; postsecondary education; software and communications services; and textiles and apparel.

** The six "leading technology states" selected for comparisons are: California, Florida, Illinois, New Jersey, New York and Texas.
force. Various school reform efforts now underway recognize that education is an essential resource for sustaining the innovation economy. It is too soon to say what the remedial costs to maintaining a competitive advantage will be as a result of the longstanding lack of reinvestment in this essential economic resource.

A first step

Publication of MTC’s inaugural Index marked an important initial step toward understanding the innovation process, but it was just a first step. By design, the Index elicits a whole new set of questions about the structure and interactive dynamics of the Massachusetts economy. Importantly, in addition to developing the new framework, the Index assembles a reliable body of data for wrestling with these questions. It establishes for the first time a straightforward, data-driven way to track and benchmark key components and processes of the commonwealth’s innovation economy over time and in comparison to other states.

The framework for innovation places R&D expenditures within the context of other required components for an innovation economy. It identifies and provides measures of human resources—immediate and distant—such as engineering degree recipients and K-12 performance in math and science as well as competitive measures of innovation such as federal approvals of advanced medical devices, numbers of initial public offerings (IPOs) and numbers of fast-growth “gazelle” companies.

The framework relates these variables to one another through a classification strategy: under-scoring the breadth and interrelationship of issues in an innovation-driven economy. These components are parts of a whole measured by economic results for businesses and people.

For decision-makers, public and private, facilitating these competitive economic results raises complex questions. How do factors such as the quality of K-12 education, the make-up of the labor force, immigration patterns, federal R&D expenditures, venture capital availability and information infrastructure investment relate to measures of idea generation such as patents, numbers of technology licenses, SBIR awards and fast-growth companies? How might the various players in the state’s economy, in recognition of these interrelationships, collaborate to compete effectively? How can this interdependence be fully leveraged in support of the economy?

The Index of the Massachusetts Innovation Economy creates a baseline from which to begin to address these questions in one state.

A review of the information in the 1997 Index about the health-care technology cluster in Massachusetts illustrates the point. The Index shows that between 1990 and 1996, this industry cluster experienced absolute increases in federal health-related R&D expenditures (see figure 1), a doubling of licensing royalties from institutions in which health-care technology dominates (see figure 2), increases in inventions and patent applications by institutions (see figure 3), and consistent levels of venture capital investment (see figure 4).

Result? Health-care technology companies accounted for a significant 28 percent of all IPOs in Massachusetts during 1996, eclipsed only by the computer software and hardware industries, which accounted for 36 percent of the 1996 IPOs in the Bay State (see figure 5).

The health-care technology cluster also posted a 5 percent increase in the number of fast-growth companies between 1990 and 1996 (see figure 6) and a 7.24 percent increase in the number of jobs created from 1992 to 1996 (see figure 7).
Employment in health-care technology was 1.87 times more concentrated within Massachusetts than in the nation as a whole in 1995. This concentration level places the cluster directly in the middle of the nine “key industry clusters”—which the Index identifies as industry drivers—in terms of its specialization within the state.

The benefit of understanding the economy through a framework for innovation is complex.

The interrelationships among R&D investment and the idea generation it supports and subsequent technology commercialization and entrepreneurship, sustained by venture capital, offer multiple points at which some action might foster or impair economic growth and development.

**Where’s the action?**

Underlying the call for newly grouped categories and classifications and the development of new data for the New Economy is an essential and sometimes overlooked point. Taking the vital signs of a real-life economy necessitates remembering that the underlying data that make up economic indicators represent, directly or indirectly, the activities of people.

Importantly, these areas of activity identify new potential intersections of human economic interests. They expand the definition of whom and what is involved in creating economic results and help to establish new priorities for approaching economic development issues in the policy arena. These newly identified intersections are where effective policy action will occur.

The Index of the Massachusetts Innovation Economy is a step toward better identifying these intersections. Work on the 1998 Index is well underway. MTC is committed to working with others in the state and throughout New England to help guide opinion leaders and policymakers by further illuminating what goes on inside that black box of economic development.

*Jennifer Montana* is a senior policy analyst at the Massachusetts Technology Collaborative who directs The Index of the Massachusetts Innovation Economy project. The 1997 Index report can be ordered for a nominal charge from MTC at 508.870.0312 or downloaded from the World Wide Web at www.mtc.org/research/indica.htm.
Aquaculture, Marine Sciences and Oceanography: A Confluence

HARLYN O. HALVORSON

New England's geography, fishing tradition and scientific expertise present unique opportunities in aquaculture, marine science and oceanography. The region should seize these opportunities by developing the special niche advantages of the individual states while sharing resources, supporting one another's marine-related initiatives and understanding the various interdependencies within the region.

Due to the special characteristics of the ocean, some marine organisms have unique properties that cannot be found in other ecosystems.

Since marine biotechnology was first defined in 1983, the ocean has yielded various important discoveries. For example, microorganisms that grow in very acid or alkaline ocean environments (extremophiles) are a source of commercially valuable alkaline proteases that may be used in detergents to break down wool, hair, feathers and other substances. Similarly, marine microorganisms that grow at very high temperatures (thermophiles) are a source of thermostable enzymes used by the biotechnology industry to modify DNA. Microorganisms that grow at temperatures below 10 degrees Celsius (psychrophiles) also have valuable commercial applications. Marine organisms are also the basis for new adhesion products; barnacle cement proteins are used for sutures, skin grafts and dental fillings.

Then there is the promise of fish farming in fresh and marine waters. The collapse of traditional wild-capture fisheries has led to worldwide interest in aquaculture—or underwater agriculture—as well as saltwater aquaculture known as mariculture. In 1995, aquaculture production amounted to more than $60 million in Connecticut and $55 million in Maine.

Generally, marine biotechnology research has developed around three areas: 1) production processes, including food and bio-energy; 2) biormonitoring, including use of biological models for testing pollutants in the environment; and 3) bioremediation processes designed, for example, to treat industrial wastes and heavy metals, clean up oil spills or break down xenobiotics such as pesticides.

**Region's resources**

During the past 10 years, centers of marine biotechnology have emerged in Europe, blending traditional marine biology with modern molecular biology. These well-equipped centers, usually located in academic institutions, have attracted international scientists by providing special
facilities or access to interesting marine model systems.

Here in New England, each state offers programs in aquaculture, marine sciences and oceanography at its state universities as well as considerable research at private institutions. The region boasts 14 marine labs and formidable oceanographic research and training. Indeed, the Woods Hole Oceanographic Institution (WHOI) in Massachusetts is the world’s largest independent oceanographic laboratory. The Massachusetts Institute of Technology and the University of New Hampshire are among several New England universities with strong oceanography and ocean engineering programs.

New England also has long been recognized for national leadership in technology, especially biotechnology, biomedicine, microelectronics, telecommunications, software and new materials. And technology transfer from MIT, WHOI, the land-grant universities of Massachusetts and Connecticut and others have spawned nationally recognized industries in marine engineering, electronics and environmental monitoring. The region’s technical schools attempt to provide the industries with a supply of workers.

Additionally, traditionally active ports in New England cities such as Portland, Boston, Gloucester and New Bedford once made the region a leader in the now-declining traditional fishing industry and provided a strong infrastructure to process and market seafood.

Recently, the region’s tradition of innovation and fishing history have helped give rise to an important aquaculture industry. Because most aquaculture facilities cultivate stock at high densities, the emerging aquaculture industry requires infrastructure to support animal husbandry and disease detection and control.

New England also boasts important centers for policy research on marine and oceanographic issues, including the National Marine Fisheries centers in Woods Hole and Milford, Conn. Additional policy strengths are found at UMass-Boston’s Urban Harbors Institute and Environmental, Coastal and Ocean Science Program, as well as the New England Aquarium in Boston and the Mystic Aquarium in Mystic, Conn. And through the U.S. Environmental Protection Agency’s Massachusetts Bays Program, community groups and government agencies have developed policy-oriented action plans and research agendas to protect and enhance the marine resources of Massachusetts and Cape Cod bays.

Moreover, the combination of the cold waters of the Gulf of Maine and warm Gulf Stream waters provides an environment for abundant and diversified marine life that led Spencer Baird, the founder of the Woods Hole Biological Station, to locate the original U.S. Fish Lab on Cape Cod. The proximity of Georges Bank, meanwhile, provides opportunities to monitor and study important fish stocks. And the numerous estuaries and rivers flowing into the ocean make New England a rich laboratory for studying coastal zone management.

Aquaculture, if properly planned and managed, can provide rural economic development opportunities while contributing to environmental preservation.

Programs such as the federal Gulf of Maine initiative have sought to resolve conflicting uses of coastal space and resources such as urban settlement, industry, tourism, vacation homes, recreational activities, mineral exploitation, fishing aquaculture, pipelines, power plants, shipping, military installations, nature conservation and marine archeology. The recent Coastal Zone 97 conference sponsored by the Urban Harbors Institute dealt with issues such as protecting marine habitats, the North Cape oil spill, learning from aquariums and museums, coastal access and urban estuarine management.

In a 1991 report to the Massachusetts Centers of Excellence Corp., William Hogan of the former Southeastern Massachusetts University, now UMass-Dartmouth, and colleagues drew attention to the fact that marine technology was an economically significant common denominator in major Bay State projects ranging from efforts to promote marine electronics at the Quincy Shipyard to cleanup of Boston Harbor.

New England lawmakers, meanwhile, have been articulate leaders on marine issues. Former Sen. George Mitchell of Maine spearheaded federal efforts to protect the Gulf of Maine, while former Congressman Gerry Studds of Massachusetts, provided strong leadership on fisheries issues. Senators Edward Kennedy and John Kerry of Massachusetts garnered federal support to build the state-of-the-art Marine Resource Center at the Marine Biological Laboratory at Woods Hole and other physical facilities, while Senators Patrick Leahy of Vermont and Olympia Snowe of Maine have led on environmental issues.

At the state level, Maine Sen. Jill Goldthwait and Rhode Island Rep. Eileen Naughton stand out for their commitment to regulatory reforms aimed at simplifying the permitting process for aquaculture projects.

States working together
States cannot change natural phenomena such as tidal range or native species. But they can initiate innovative programs such as one-stop permitting to encourage development of the aquaculture industry.

Governors and state legislatures need common and consistent technical advice. Policy decisions are no better than the scientific, economic and technical advice on which they are based. Megan Jones, former head of the Massachusetts Centers of Excellence, noted in a 1997 Kennedy School of Government study that most states do not handle this very well. And at the federal level, the Office of Technology Assessment (OTA), which provided technical advice to Congress, was eliminated by the Republican leadership in the House. The absence of OTA is of concern as Congress considers legislation on aquaculture, biotechnology and the environment.

The New England states must learn from one another's experiences in balancing conflicting uses of coastal resources and educating the public about aquaculture. Indeed, Connecticut has developed a successful high school-level technical education program in aquaculture. And the New England Board of
Higher Education (NEBHE) has earned National Science Foundation (NSF) support to extend this aquaculture instruction throughout the region by providing New England college faculty with current knowledge of aquaculture curricula and laboratory methodology, and helping develop "articulated" aquaculture programs, so students can move smoothly from one level of education to the next.

Maine and to a lesser extent New Hampshire, as well as Washington state, served as models for the environmental oversight featured in the comprehensive Massachusetts aquaculture plan developed in 1996. The plan addressed a series of deterrents to aquaculture and called for creation of an office to promote and coordinate aquaculture. Still, the Bay State's home rule system, in which local communities issue coastal aquaculture shellfish licenses, makes it difficult to implement a statewide aquaculture strategy.

Some problems must be solved on a regional basis. Already, the New England Fisheries Management Council, appointed by the governors of the New England states, has established a management plan for aquaculture which should greatly smooth out the process of permitting in New England federal waters.

We have laws governing the transfer of marine animals from one state to another. Still, pollution of coastal waters and other conditions affecting fisheries do not respect state borders. Also development of a "value added" New England seafood market requires standardizing regulations in the participating states.

In addition, multistate arrangements may be the best vehicles to maintain watersheds, restore coastal habitat, reduce pollution and support fish hatcheries. In 1989, the governors of Maine, New Hampshire and Massachusetts and the premiers of New Brunswick and Nova Scotia established the Council on the Marine Environment to protect and utilize the Gulf of Maine. The council's creation was timed to coincide with the implementation of Canada's "Green Plan" and the Regional Marine Research Act, also known as the "Mitchell Bill" for Sen. George Mitchell, both of which called for regional agreements to coordinate use and protection of marine resources.

**Toward synergy**
New England's fragmented aquaculture industry, composed mostly of small businesses with few resources, cannot afford to initiate long-term breeding programs to develop commercially viable marine animals for aquaculture markets, carry out clinical trials for new approved drugs, conduct research on diseases of marine animals, or adopt new nutrition and animal husbandry practices for cultivated species.

The New England states should promote marine science by fostering strategic partnerships among academia and nonprofit laboratories, industry and government. Such partnerships would bring together relevant constituencies to identify aquaculture opportunities that are unique to the area, assess available technologies, address regulatory issues and deterrents to aquaculture development, and prepare educational materials about aquaculture for regulators, practitioners and the public.

The last point is particularly important, for lack of knowledge about aquaculture has created a negative public perception of the industry. As the National Research Council noted in a 1992 report "public awareness of aquaculture [is] limited and, in some cases, consists primarily of information about widely publicized negative environmental effects." Both public and private involvement are required to address public perceptions, develop cost-effective projects and ensure that the public is protected.

Academic and industry experts in marine sciences can demonstrate to the public that aquaculture, if properly planned and managed, can provide rural economic development opportunities while contributing to environmental preservation. After all, aquaculture relies on superior water quality for its success.

We must take advantage of the regional organizations already in place such as NEBHE, the New England Governors' Conference, the New England Biotechnology Cooperative and the New England Council to promote export trade in marine-related fields and otherwise harness the power of the region's marine science resources.

Sound policy is forged when all the stakeholders are at the table participating in public discussion, and when the relevant scientific and technical information is available to all. The Maryland Roundtable Oyster Mediation offers a good case study in how to address the user conflicts that accompany marine development. In this case, a mediator brought together representatives of the aquaculture industry with state legislators, regulators, environmentalists and others for a year-long discussion of complex issues that ultimately led to an action plan dividing the resource for various uses.

The Policy Center for Marine Biosciences and Technology has adopted the mediation process used in the Oyster Roundtable to establish a Sea Scallop Working Group to develop and promote a plan for sea scallop aquaculture in Massachusetts. The resulting document is an industry-driven, bottom-up blueprint for sea scallop aquaculture in Massachusetts that puts forward recommendations from the perspective of potential sea scallop farmers tempered by the advice and guidance of professional scientists, government managers, regulators, lawyers, environmentalists and economic development specialists. A demonstration project under consideration by the working group would establish a nine-square-mile site south of Martha's Vineyard, Mass., for an 18-month experimental project involving sea scallop research and aquaculture. The plan, advanced by a consortium of aquaculturists, the MIT Sea Grant Program and the Conservation Law Foundation opens opportunities for aquaculture projects in New England federal waters.

We need to find and fund mechanisms for continued dialogue on a regional basis. However, the policy concerns that once formed the basis for regional action are themselves undergoing change: defense spending, basic research funding, energy prices and others. And as the information revolution cuts distances around the world, it may divert intellectual resources from a New England regional focus.

We should take advantage of the diversity of problems, challenges and opportunities churned up by the sectoral, disciplinary and geographic confluence of marine-related issues to build upon New England's strengths in marine technology and biotechnology.

_Harlyn O. Halverson_ is director of the Policy Center for Marine Biosciences and Technology at the University of Massachusetts at Boston and chair of the Biotechnology Center of Excellence Corp.
Marine aquaculture or “mariculture” is potentially a promising growth industry for New England. To understand the industry’s prospects, it is important to see it in context with other industrial sectors that make use of New England’s marine resources. Understanding the scale of competing marine resource activities helps us understand some of the hurdles facing mariculture in the region.

New England’s most important marine resource is a relatively clean and productive ocean and coastline. In economic terms, the dominant industrial use of this resource is tourism and recreation. New England’s tourism industry generates annual revenues in the tens of billions of dollars. There is no good way to separate the contribution of the ocean to this revenue, but in Massachusetts alone, tourism expenditures in coastal counties exceeded $5 billion in 1996. Even if only a fraction of these expenditures are directly attributable to the ocean, the combination of tourism and recreational fishing constitutes by far the largest “marine sector” in Massachusetts, far outpacing commercial fishing and other marine resource uses. (See Figure 1.)

The Massachusetts numbers are generally representative of New England as a whole. Commercial fish landings for the U.S. Gulf of Maine now run about $700 million per year. Marine transportation industries in the region generate some $200 million in annual revenues, and aquaculture generates about $90 million.

Employment statistics paint a similar picture. More than 50,000 of the 81,000-plus marine sector jobs in Massachusetts are attributable to tourism and recreation, according to a 1991 study conducted by William Hogan, Daniel Georgianna and Toby Huff of the University of Massachusetts at Dartmouth for the Massachusetts Centers of Excellence Corp. These marine sector jobs accounted for about 3 percent of total Massachusetts private sector employment. (See Figure 2.)

Aquaculture industry

Of the world’s 1995 aquaculture production of $42 billion, the United States produced only $800 million (roughly equivalent to the value of Gulf of Maine wild-capture or “traditional” fish landings). New England accounted for about one-quarter of U.S. aquaculture production, or $150 million, mostly from oysters, and Atlantic salmon and steelhead trout raised in net pens.

Leading northeastern states include Connecticut (1995 production of $61 million, mostly oysters), Maine ($55 million), and New Jersey (notable for its sea urchin farming).
Mariculture challenges

Mariculture ventures require a degree of tenure—the establishment of exclusive rights—over part of the ocean. The small size of the mariculture industry in New England puts it at a disadvantage in use conflicts with established nearshore activities, such as recreation, tourism and commercial wild-capture fishing. As a result, mariculture ventures are being driven further offshore, and the access and tenure issues move from state and local waters into federal waters, which begin three miles offshore. While nearshore lease tenure policies for mariculture vary from state to state, they have been the subject of considerable attention for some time. In federal waters, by contrast, these issues are only now beginning to receive attention. There is, as yet, no coordinated policy on mariculture leases in federal waters.

Other issues such as the apparent lack of available financing can be better addressed when tenure uncertainties are reduced. Several experimental projects in federal waters off Martha's Vineyard—one exploring scallop ranching on the sea floor, the other using so-called “long-line” technology to cultivate blue mussels along rope further out—are exploring these problems and should contribute to their resolution.

How quickly and substantially the New England mariculture industry grows depends in part on how tenure and access issues are resolved, as well as the competitiveness of New England seafood farmers vis-à-vis foreign competitors and domestic wild-capture fisheries. There is much room for growth, but even under optimistic scenarios, a lean and competitive mariculture industry is not likely to provide job opportunities for all fishermen displaced by the decline of wild-capture fisheries.

Hauke L. Kite-Powell is a research specialist at the Woods Hole Oceanographic Institution’s Marine Policy Center. The author is grateful to Porter Hoagland, Lenise Jarrininen, and Di Jin of the center for much of the data presented in the article.

FIGURE 1: COMPARATIVE SIZE OF MASSACHUSETTS MARINE SECTORS, 1996

<table>
<thead>
<tr>
<th>Marine Sector</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourism expenditures</td>
<td>$5,297,000,000</td>
</tr>
<tr>
<td>Recreational fishing expenditures</td>
<td>$1,026,000,000</td>
</tr>
<tr>
<td>Value of commercial fish landings</td>
<td>$231,000,000</td>
</tr>
<tr>
<td>Value of cranberry production</td>
<td>$118,000,000</td>
</tr>
<tr>
<td>Whalewatch revenues</td>
<td>$18,000,000</td>
</tr>
<tr>
<td>Value of aquaculture production</td>
<td>$9,000,000</td>
</tr>
</tbody>
</table>

Source: Porter Hoagland, WHOI Marine Policy Center.
FIGURE 2: EMPLOYMENT IN MASSACHUSETTS MARINE SECTORS, 1989

- Water transportation, 4%
- Commercial fishing, 5%
- Fish processing, 4%
- Retail and wholesale fish sales, 3%
- Seafood restaurants, 30%
- Marine recreation and tourism, 27%
- Electronics, 21%
- Research/education, 2%
- Aquaculture, <1%

TOTAL MARINE SECTOR EMPLOYMENT: 81,826

Source: Hogan et al., 1991.

FIGURE 3: VALUE OF AQUACULTURE PRODUCTION FOR SELECTED STATES

<table>
<thead>
<tr>
<th>State</th>
<th>Total volume, 1995</th>
<th>Annual % change total volume, 1992-95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>$50,909,000*</td>
<td>16.4%</td>
</tr>
<tr>
<td>California</td>
<td>58,924,000</td>
<td>15.2%</td>
</tr>
<tr>
<td>Connecticut</td>
<td>61,881,000</td>
<td>0.1%</td>
</tr>
<tr>
<td>Hawaii</td>
<td>13,307,000</td>
<td>23.1%</td>
</tr>
<tr>
<td>Idaho</td>
<td>56,566,000</td>
<td>-0.6%</td>
</tr>
<tr>
<td>Maine</td>
<td>55,207,000</td>
<td>8.8%</td>
</tr>
<tr>
<td>Maryland</td>
<td>11,032,000</td>
<td>12.9%</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>8,622,000</td>
<td>2.5%</td>
</tr>
<tr>
<td>Mississippi</td>
<td>&gt;229,591,000*</td>
<td>&gt;8.5%</td>
</tr>
<tr>
<td>New York</td>
<td>3,867,000</td>
<td>n.a.</td>
</tr>
<tr>
<td>North Carolina</td>
<td>11,881,000</td>
<td>13.9%</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>13,795,000</td>
<td>5.0%</td>
</tr>
<tr>
<td>South Carolina</td>
<td>12,000,000</td>
<td>n.a.</td>
</tr>
<tr>
<td>Virginia</td>
<td>19,000,000</td>
<td>n.a.</td>
</tr>
<tr>
<td>Washington</td>
<td>66,601,000</td>
<td>7.7%</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>United States</td>
<td>$806,496,000</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

*catfish only

New England’s burgeoning telecommunications industry faces an unprecedented need for community college-educated, technically trained workers.

The roughly 500 telecommunications companies operating in Massachusetts alone added more than 34,000 new jobs between 1993 and 1996, for a total exceeding 90,000, according to a study conducted for the Massachusetts Telecommunications Council by Craig Moore, a professor of finance and operations management at the University of Massachusetts at Amherst. The Bay State boasts the highest percentage of telecommunications workers per capita of any state.

Though the region’s telecommunications activity—and the demand for telecommunications technologists—is concentrated in Greater Boston, it is expanding rapidly in all directions. For example, JAVANET and F.C. Com. recently located operations at the Springfield Technical Community College’s Technology Park in Springfield, while Brooks Fiber established operations in Springfield and Hartford, Conn. Media One and Bell Atlantic have regional facilities in the Merrimack Valley of Massachusetts. Tripod.Com., an Internet conferencing service, is located in the Berkshires, and Clickshare, a pay-per-byte metering service, is in Williamstown, Mass.

A non-scientific look at New England job openings posted on Career City, ZD.net and other World Wide Web-based help wanted services reveals that one in seven are in the field of telecommunications. And the majority of these remain unfilled for more than 60 days, with many posted for six months or more.

The region’s capacity to continue growing its telecommunications industry is threatened by workforce bottlenecks. Colleges fail to educate and train sufficient numbers of telecom professionals to meet the job market demand, while the reservoir of skilled workers displaced by downturns in the region’s defense and computer industries has all but dried up.

To make matters worse, computer scientists and engineers with the skills, for example, to develop security and network protocols for wireless digital networks are demanded not only by the region’s telecommunications industry, but also by similarly booming information technology companies. Indeed, the two sibling industries require engineers, scientists and technicians with very comparable skills, training and experience.
These workforce bottlenecks exist in the context of profound changes descending upon the workplace. Bell Atlantic cites futurists' estimates that early in the next century human knowledge will double every 75 days and technological innovation will accelerate along with it. The well-trained professional hired in June 2020 will be desperately in need of retraining within a year.

Already, workers must continually master new concepts, new technologies and new skills on a rapidly changing basis. New England's telecom companies particularly need technically competent individuals prepared for a lifetime of learning and independent, critical thinking, for as older technologies such as microwave transmission for phone and cable television disappear, rendering earlier skill sets irrelevant, newer technologies relentlessly demand new skills.

The typical cable television technician of just a few years ago would have scant knowledge of photonics. Today, photonics—the practical use of light—underlies test and repair equipment that is routinely used in maintaining hybrid fiber-coaxial cable systems. And within photonics, knowledge and skill requirements are changing fast, with three generations of fiber-splicing tools emerging in the past five or six years. In telephony, new services and technologies such as ISDN and the emerging XDSL standard require constant retraining not only of technicians, but also of sales and customer service personnel.

Clearly, it's time for industry and community colleges to stop talking about partnerships and to start addressing the most critical chokepoint in the production of telecom technologists.

One model is Bell Atlantic's Next Step program—an associate degree program in telecommunications technology developed and offered by Springfield Technical Community College in partnership with 10 other community/technical colleges throughout New England. The degree program aims to prepare technologically competent graduates who have an understanding of the changing telecommunications marketplace and enhanced customer service skills.

The program is particularly focused on methodology: Bell Atlantic has committed significant financial resources to ensure that the degree is competency-based, learner-centered and contextually focused. Besides offering the skills usually associated with a technical degree, each course incorporates "umbrella" competencies defined by Bell Atlantic in critical thinking, problem-solving, team-building for teamwork, customer focus and quality improvement.

Moreover, Bell Atlantic provides faculty and students with notebook computers networked through Lotus Notes in an effort to create an interactive teaching and learning environment, both within and outside the classroom.

Senior technicians mentor less experienced ones. And project assignments incorporate concepts such as team-building, troubleshooting, project management, Internet-based management and customer relations for a diverse customer base. Individual education plans are used to address each student's competencies as identified by the student and faculty teams.

In addition, the recently established Northeast Center for Telecommunications Technology at Springfield Technical Community College is one of nine U.S. facilities designated by the National Science Foundation as a National Center for Excellence in Advanced Technological Education. It is the only so designated center specializing in developing telecommunications curriculum and training.

The center—regional hub to a consortium of 14 high schools, 14 two-year colleges, five universities, leading telecom companies and government and private agencies in New England and New York state—will monitor emerging telecommunications-related technical trends, applications and innovations, and develop relevant curricula and materials to support technical education in the telecom field.

More specifically, the center will develop a new industry-driven seamless telecommunications curriculum, beginning in grade 11, running through an associate degree and culminating in a bachelor's degree in engineering technology or electrical engineering. The center will also develop alternative teaching mechanisms such as virtual laboratories and Internet-based courses and promote "best educational methods and tools" for delivering world-class technical education and related math and science programs in cost-effective ways. Finally, the center will work to ensure the competence of faculty members who teach telecommunications programs.

Nonetheless, further efforts are needed to unite industry and community colleges in support of New England’s vital telecommunications industry and ensure its contribution to the region's economy.

John H. Dunn is executive vice president of academic affairs at Springfield Technical Community College, director of Bell Atlantic's New England Next Step Program and chair of the Northeast Center for Telecommunications Technologies.
The Problems and Promises of School-to-Work

The school-to-work movement was created to prepare young people to meet today's demanding high-wage, high-skill economy, as Lynn Olson explains in *The School-to-Work Revolution* (Addison-Wesley, 1997, $25).

Programs linking academic study with real-time work experience, Olson writes, have been shown to result in increased student interest in schoolwork. Students are more motivated when they understand why they are being taught mathematics, why they must improve their reading skills and how important it is to learn the rules of effective verbal and written communication.

Olson, a senior editor at *Education Week* and Sloan fellow, poses the question: which students is school-to-work for? She finds that the focus is no longer on "non-college-bound" students, although this cohort continues to have the most difficulty finding productive and adequately paid jobs. She suggests such differentiation should no longer be applied since most workers in the future will of necessity rotate between work and school throughout their adult lives. But she warns that problems are magnified for minority and disadvantaged youth if they have only a high school diploma, noting that the unemployment rate for black high school graduates in 1994 was nearly double that of white high school graduates.

Many employers support Tech-Prep programs in which the last two years of high school are coordinated with two years in a community college leading to a technical degree. Other variations on school-to-work programs include Cooperative Learning, perhaps the oldest form of work-based learning; *Career Academies*, schools organized around specific career themes such as health care or communications; and *Job Shadowing and Internships*, which can range from a few hours spent outside the school setting to a full-time position held for an entire summer.

Olson contrasts the movement as it stands today with what she sees as the failure of vocationalism. Low-paying, low-skill jobs were too often the end point of narrow vocational programs. Even the physical location of voc-ed programs—frequently in school basements or separate wings—is indicative of its second-class status. Too many programs lack academic substance and are out of step with changes in industry.

As a general rule, school-to-work programs that push students to train for immediate labor needs can leave students worse off than when they started, Olson says. But there are exceptions. She cites the Rindge School of Technical Arts in Cambridge, Mass., among successful programs that integrate academic and technical education.

The high school, which began as the Rindge Manual Training School in 1888, merged during the 1970s with Latin High School, a highly regarded academic school. Combining academic and technical studies is what Rindge is all about. It currently has a student-run electronics service for the school's computers and telephone equipment, an auto shop and a news program offering weekly broadcasts on a local cable channel.

Yet for all its individual successes, integrating learning at the workplace with classroom activities remains difficult.

Olson devotes a chapter of her book to examining the role of higher education in school-to-work; and another on how such programs can contribute to the burgeoning school reform movement. She also lays out in plain terms how business can benefit from such programs, most importantly by reducing the cost of identifying, screening and training employees and increasing the pool of qualified applicants for technical positions in high-demand fields.

Olson also provides suggestions for "Making it Happen," citing supportive state government, securing seed money and setting benchmarks. Not surprisingly, dedicated involvement is an essential component of successful programs.

*The School-to-Work Revolution* is well organized and provides a very thorough bibliography, index and inclusive chapter notes. Olson provides interested readers with a more complete understanding of how creation of tomorrow's skilled workforce may depend on an effective alliance between employers and educators today.

— Susan W. Martin
Mann and the Woman Teacher
By the mid-19th century, such noted American education reformers as Horace Mann had sown the image of teaching as a women's job.

Writing in the new issue of Sextant, Salem State assistant professor of English Sandra B. Fowler observes: "In considering both quality and quantity in seeking teachers, reformers began to envision the ideal teacher as a woman. Although men dominated the teaching profession prior to 1830, the Industrial Revolution with its professional opportunities and higher salaries in industry and business attracted many men away from the schoolroom. Reformers also took into account that when women did teach, usually during the summer months, they received lower wages than men. Towns could be convinced to expand their public schools if additional teachers could be hired for lower wages."

"When Horace Mann arrived upon the scene, teachers were already poorly paid compared to shoemakers, blacksmiths, clerks, seamstresses and factory workers," writes Fowler.

Moreover, explains Fowler, women fit the expectation of the male education leaders of the time: "For the most part, educators expected the female teacher to be comfortable in a maternal role, concerned with religion and morality, uninterested in money or decision-making, and naturally dependent and sacrificing."

When Salem and Framingham "Normal" schools—the nation's first teacher colleges—opened, they admitted only women students. By the 1850s, women constituted more than 70 percent of New England teachers.

Sextant, Salem State College's biannual journal, has been handsomely designed and well-written since it rose from budgetary ashes in 1992. But the current issue (Vol. VIII, No. 1, 1998) is particularly good.

In another engaging piece, Marion Kilson, dean of Salem State's Graduate School, recounts her interviews with more than 50 biracial Americans about their memories of developing a racial identity. Among her findings, 27 percent recalled hearing racial slurs from peers, 20 percent remembered receiving different treatment from peers and sometimes adults; and just 5 percent remembered their parents providing positive instruction about their heritage.

Kilson's analysis is enlivened by the photography of Max Belcher and compelling recollections from her biracial study subjects, such as the African-American/European American woman who recalled white friends saying, "You know, I sometimes forget you're black," and blacks telling her, "You just can't understand because you're white."

(For more information on Sextant, call 978.741.6578.)

—John O. Harney

Documenting Connecticut's Recovery
The Connecticut Economy began its sixth year of publication with a packed Winter 1998 issue.

The newsletter-style journal published by the University of Connecticut economics department offers important economic data and colorful economic indicators in plain English. The Winter 1998 issue's indicators are up—a rare and welcome phenomenon in the publication's short history. Traffic volume on Connecticut roads has grown by nearly 14 percent since 1991, according to the editors. "How come? More jobs means more commuting, more income means more shopping and more recreational driving, and an improving economy in the Northeast means more out-of-staters visiting or passing through."

The issue also features a thoughtful commentary by UConn economics professor and co-editor Dennis R. Heffley on promoting the arts as an economic development tool for Connecticut. "Targeted tax incentives to artists or other small businesses may not excite the corporate community or urban planners," writes Heffley, "but they are quicker, more direct and more certain to stimulate some of the economic and cultural diversity that Hartford lacks."

Professor James Stodd of Rensselaer at Hartford, formerly Hartford Graduate Center, offers a disturbing analysis of how income inequality has grown faster in Connecticut than in the nation as a whole.

"Much of this income gap is clearly one between labor and capital," writes Stodd. "Total per-capita real income from labor (wages and salaries plus bonuses) in the state grew by 3.7 percent over the entire 1992-96 period, while 'dividends, interest and rent' and 'proprietor's income' (a mix of labor and capital) grew by 13.8 percent and 17.8 percent, respectively." The piece is troubling even followed as it is by economics professor and co-editor William A. McEachern's thoughtful discussion of mitigating circumstances.

Slicker state economic indexes have cropped up since The Connecticut Economy began six years ago, but few have been as accessible to readers outside the dismal science.

(Annual subscription to The Connecticut Economy is $50; for more information, call 860.486.0263.)

—John O. Harney
HOLYOKE, MASS.—Holyoke Community College was awarded a two-year, $436,592 grant by the U.S. Department of Education to study the impact of welfare reform, immigration reform and the changing workplace on the learning and achievements of adult students.

CRAFTSBURY COMMON, VT.—Sterling College, formerly a two-year institution, received accreditation from the New England Association of Schools and Colleges to launch new four-year bachelor’s degree programs. Initial four-year programs will include concentrations in wildlands ecology and management, sustainable agriculture and outdoor education leadership.

FAIRFIELD, CONN.—Sacred Heart University won state approval to offer a new bachelor’s degree program in human movement and sports science. The four-year program offers students the scientific and professional skills to become certified athletic trainers, fitness instructors or personal trainers—or to pursue further studies in physical therapy, exercise physiology or other health-related graduate programs. Southern Connecticut State University offers Connecticut’s only other state-approved program in athletic training.

CHESTNUT HILL, MASS.—Pine Manor College received a $3.5 million unrestricted bequest from 1925 graduate Frances Crandell Dyke. The women’s college announced it would use the gift to offset a reduction in tuition for 1998-99. Tuition for non-Massachusetts residents will drop by 34 percent from $16,700 to $11,000 in fall 1998. Pine Manor cut tuition for state residents by $6,000 in 1996, then froze the in-state rate the following year.

CHICOPEE, MASS.—Elms College announced it would freeze tuition, fees and room and board charges for the 1998-99 academic year, while raising graduate tuition to $320 per credit.

DURHAM, N.H.—The University of New Hampshire’s hospitality management department received $50,000 from the Conrad N. Hilton Foundation to buy computer equipment and fund a program enabling students to spend time on the job with hospitality industry executives.

AMHERST, MASS.—The University of Massachusetts at Amherst Department of Germanic Languages and Literature received $160,000 from the National Endowment for the Humanities to support the second year of a program in which high school teachers and administrators explore the changing cultural landscape of a unified Germany. The four-week summer program, to be conducted entirely in German, will bring together 25 secondary school teachers and staff to focus on issues such as the tension between East and West and the status of minorities in Germany.

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Student was able to pay on time.
Student was able to pay on time.
Student was able to pay on time.

Nov. 5th
Nov. 6th
Nov. 7th
Dec. 5th
Jan. 5th
Feb. 5th
BOSTON, MASS.—New England School of Law’s Rwanda Genocide Project received $5,000 from the Open Society Institute, a division of the George Soros Foundation, to cover the costs of transporting legal memoranda and source material produced by law students to the United Nations International Criminal Tribunal for Rwanda in Kigali, Rwanda. The project provides pro bono legal research and analysis to the deputy prosecutor of the tribunal.

AMHERST, MASS.—Amherst College was awarded a three-year, $365,000 grant by the Andrew W. Mellon Foundation to help faculty make effective use of the World Wide Web in their teaching. The grant will fund a series of seminars for faculty as well as direct technical assistance for professors who want to incorporate Internet resources into their courses. In addition, an Amherst staff member will be designated to train and advise faculty.

BAR HARBOR, MAINE—College of the Atlantic received a $1 million gift from the family of the late Elizabeth Battles Newlin of Northeast Harbor, Maine, and Philadelphia, to endow a chair in botany—the first endowed professorship at the college. College of the Atlantic Professor Craig Greene, an authority on rare and endangered plants of coastal Maine, accepted a five-year appointment as the first Newlin chair.

AMHERST, MASS.—Two University of Massachusetts at Amherst researchers were awarded a three-year, $647,000 grant from the National Science Foundation to create interactive software programs aimed at easing math anxiety in girls. Near the end of elementary school, many girls become pessimistic about their math abilities, even though they tend to outperform boys in class, according to the researchers. The researchers aim to develop a program called “AnimalWatch” on CD-ROM to strengthen math skills while students learn about endangered species.

KINGSTON, R.I.—The University of Rhode Island was awarded a three-year, $391,000 grant from the U.S. Department of Housing and Urban Development to help revitalize the economically distressed Woodlawn area of Pawtucket, R.I. Under the initiative, URI will work with the Rhode Island School of Design, Roger Williams Law School and other partners to address housing issues, offer English-as-a-second-language programs, create special admissions arrangements for local high school students and help resolve landlord-tenant conflicts. Similar HUD Community Outreach Partnerships are in place at Yale University and several other New England colleges.

W. BARNSTABLE, MASS.—Cape Cod Community College reached agreement with Suffolk University to offer a four-year degree program in business management/accounting at the community college’s West Barnstable campus, beginning in fall 1998. Under the program, the community college will provide first- and second-year course instruction, while Suffolk’s Sawyer School of Management provides junior- and senior-year courses and awards bachelor’s degrees. The community college is considering a similar two-plus-two liberal arts program with the University of Massachusetts at Dartmouth.

DANVERS, MASS.—North Shore Community College signed separate joint admissions agreements with Suffolk University in Boston and Bradford College of Haverhill, Mass., guaranteeing eligible community college transfer students acceptance into certain programs at the four-year colleges.

BOSTON, MASS.—Emerson College received a $1 million gift from the owner of a Boston television station to help build new studios for Emerson’s student-

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CONNEXION/Spring 1998 51
MILTON, MASS.—Aquinas College introduced three new academic programs at its Milton and Newton, Mass., campuses. A new associate degree program in criminal justice emphasizes human services aspects of criminal justice such as victim-witness advocacy, community-based corrections and court-related drug and alcohol rehabilitation programs. An associate program in tourism and hospitality prepares students for jobs in hotels, conference centers, airlines and vacation spots. And a new certificate program in phlebotomy aims to train health-care workers responsible for collecting blood samples for lab tests.

BOSTON, MASS.—An anonymous donor pledged $10 million to Tufts University School of Medicine, contingent upon the school raising an additional $10 million by Feb. 1, 1999. The $20 million total would allow Tufts to complete funding for a $57 million biomedical and nutrition research center to be built on the school’s downtown Boston campus. In a separate development, Tufts Health Plan, a Boston-based health maintenance organization, pledged $1.5 million to establish an endowed professorship in community health at the medical school in honor of former Tufts dean Morton A. Madoff, who helped launch the health plan in 1979.

PROVIDENCE, R.I.—Brown University began requiring all manufacturers who supply products with the Brown name or university logos to adhere to a code of conduct that respects labor law, worker rights, environmental preservation and a high standard of business ethics. As part of their licensing agreements with Brown, manufacturers of items ranging from Brown-imprinted apparel to stationery must also assure that they will hold subcontractors and other business associates to the same standards.

DURHAM, N.H.—The University of New Hampshire’s School of Health and Human Services was selected to lead a five-year, $1.2 million study of the state’s welfare reform program. Funded by a grant from the U.S. Administration for Children and Families to the New Hampshire Department of Health and Human Services, the study aims to evaluate the effectiveness of New Hampshire’s welfare reform program and

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document aspects of the program that could be replicated in other states. In addition to conducting surveys and focus groups with families, employers, program staff and others, UNH researchers will follow 100 families as they move from welfare to work.

NORTH ANDOVER, MASS.—Merrimack College and the New England College of Finance, formerly known as the New England Banking Institute, formed a partnership enabling graduates of the corporate college’s associate-level and other accredited programs to transfer smoothly into Merrimack bachelor’s degree programs. Meanwhile, Merrimack and Suffolk University officials agreed to offer Suffolk’s master of business administration program at Merrimack’s North Andover campus, beginning in September 1998.

Worcester, Mass.—Holy Cross College received a $5 million gift, the largest in the college’s history, from Cornelius B. Prior Jr., a 1956 Holy Cross graduate and international telecommunications executive. The gift will fund three new professorships in fine arts, history and humanities.

Kingston, R.I.—The University of Rhode Island established a Rapid Manufacturing Center, designed to provide industry partners with access to cutting-edge technology developed at the university. In exchange for annual dues of $30,000, the center will provide member businesses with tooling that will enable them to produce high-quality products at a fraction of the cost and time associated with conventional tooling.

Lowell, Mass.—The University of Massachusetts at Lowell launched a new master’s degree program in the economic and social development of regions. Students choose one of three tracks: organization, technology and policy; social and historical dynamics; or regional and community development. UMass-Lowell officials say only Rutgers University and the University of California at Berkeley offer similar programs—and those focus more on planning.

New Haven, Conn.—Yale University’s School of Forestry and Environmental Studies was awarded $400,000 by the new Doris Duke Charitable Foundation to support fellowships for 10 graduate students in environmental fields over the next two years.

Marlboro, VT.—Marlboro College established a formal partnership with Huron University in London, England, featuring student exchange programs, credit transfer and joint coordination of international offerings. Beginning as a two-year commitment, the relationship soon may include longer-term faculty exchanges and other cooperative programs.

Cambridge, Mass.—Lesley College received a $5 million gift—its largest ever—from alumna Tashia Morgridge and her husband John to create a Center for Special Education in which Lesley faculty will collaborate on research into early intervention, inclusion and other education strategies for students with special needs.

Fairfield, Conn.—A secretary who served three presidents at Fairfield University bequeathed $73,000 to the university to fund scholarships for financially needy students. The scholarship fund established in the will of Virginia B. Merritt is the second such fund created this year through the estates of former Fairfield secretaries.

N. Dartmouth, Mass.—The University of Massachusetts at Dartmouth was awarded $788,000 by the U.S. Department of Commerce to continue research in textile manufacturing. One of six universities supported by the department’s National Textile Center, UMass-Dartmouth received $500,000 last year to support textile research with

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DURHAM, N.H.—The University of New Hampshire was awarded $8 million by NASA to develop a Web-based environmental information system. UNH planned to work with New Hampshire software companies to generate and disseminate information on how Earth is changing naturally and as a result of human activity.

BOSTON, MASS.—Simmons College created new departments in African-American Studies and Women’s Studies, as well as a new graduate program in gender and cultural studies. Simmons already publishes Aboyeji, a journal focusing on African-American women.

FRANKLIN, MASS.—Dean College formed a partnership with two private firms to develop an assisted living community with 60 apartments and walking paths adjoining the two-year college’s campus. The facility, to be developed by Benchmark Assisted Living and National Development of New England, will also house a new laboratory pre-school staffed by Dean students and a dance studio. The project aims to encourage intergenerational relationships among Dean students, elderly residents and children.

BAR HARBOR, MAINE—College of the Atlantic was awarded a five-year, $50,000 grant by the Agnes M. Lindsay Trust of New Hampshire to provide scholarships for financially needy students from rural New England, specifically Vermont, New Hampshire, Maine and Massachusetts.

WALTHAM, MASS.—Brandeis University’s Heller Graduate School was awarded a three-year, $9.75 million grant from the Robert Wood Johnson to launch the Access Project, an initiative designed to link health policy experts and community groups and document local efforts to provide access to care for uninsured people.
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