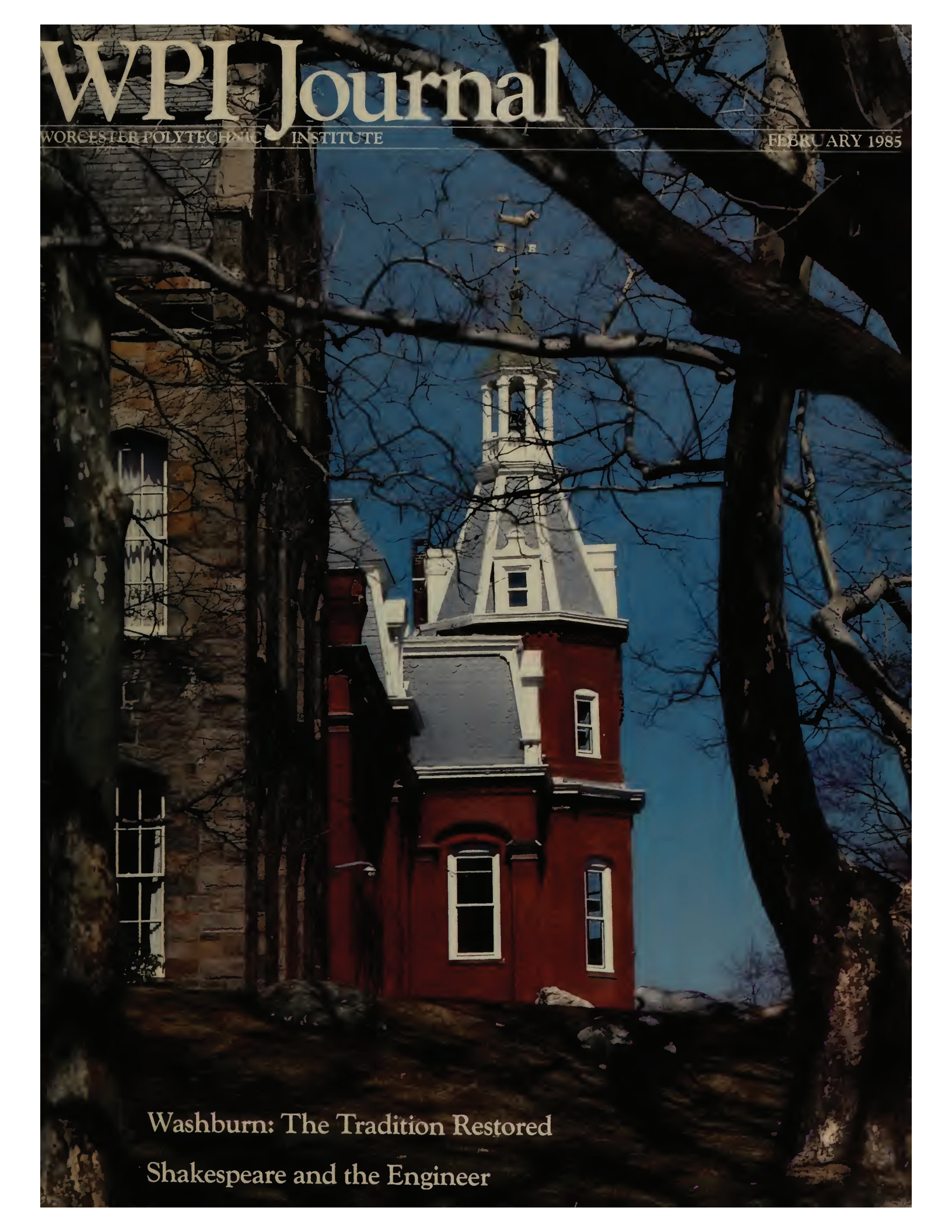


WPI Journal

WORCESTER POLYTECHNIC INSTITUTE

FEBRUARY 1985

A photograph of a red brick building with a white steeple, framed by bare trees. The building is the central focus, with a prominent white steeple rising from its roof. The scene is set in winter, with bare trees in the foreground and background. The sky is a clear, pale blue. The building has several windows, some with white frames. The overall mood is quiet and traditional.

Washburn: The Tradition Restored
Shakespeare and the Engineer



Dr. Edmund T. Cranch at rededication ceremonies of the Washburn Shops and Laboratories.

A Message from the President

The attention given in this issue of the *WPI Journal* to pre-college education, and to our high schools in particular, is of paramount importance to science and engineering education at the college level. Because the United States has no national system of education, we often lose sight of the critical role pre-college education plays in providing the proper base to the pyramid within which science and engineering education is contained. I describe the dependence in this manner, because both the demographics and the curricular substance of science and engineering education are strongly related to a sequential process that can be thought of in geometric terms. The sequential nature of the process also implies a time dimension for effecting change.

Consider first the nation's impending demographic shifts and their consequences for science and engineering. The projection for high school graduates indicates a 22 percent decrease nationwide between 1982 and 1991. All but ten states share in the decrease, which in absolute numbers is a decline of approximately 590,000 from a base of 2.2 million high school graduates. This drop varies widely by region and state, with several New England and Middle Atlantic states showing about a 40 percent decline.

The ramifications for science and engineering education are far-reaching. Half of all bachelor of science degrees in engi-

neering nationally now come from 45 colleges that have 400 or more graduates each year. Fourteen of these institutions are in states (New York, Pennsylvania and Massachusetts) where the high school population will be especially hard hit. Twenty-seven of the 45 colleges are concentrated in the 13 frost-belt states, which will all experience an appreciable decline in their high school populations. Clearly, if the flow of science and engineering graduates is to be maintained in the face of these major demographic shifts, substantial efforts will be required to increase the number of high school students who are both qualified and motivated to pursue these fields. The critical importance of our high schools is obvious.

The sequential nature of the process is again reflected by the need for curricular strength in high school science and mathematics programs, which form the foundation for science and engineering education. Unfortunately, these are the very subjects in which our schools are most vulnerable. Between 1978 and 1984, at least 20 comprehensive studies of the nation's school systems cited major deficiencies: loss of basic purpose, absence of clearly identified goals, low expectations of students, and inadequate teacher preparation. Anyone who reads these studies is struck by their fundamental unanimity on the key issues and must conclude beyond any doubt that our nation is dangerously at risk in several ways.

U.S. technological supremacy erodes as other nations strengthen their own capacities. Our ability to compete economically is challenged, and our strategic position is

under constant pressure, due in part to a shortage of excellent engineers and scientists and a lack of scientific and mathematical literacy. Such literacy is essential if our citizens are to support a technologically based society.

In the past 20 years the percentage of high school students completing courses in science and mathematics declined in biology, general science, geometry and algebra. This loss of interest is significant when we realize that Japan and the Soviet Union recognize that world leadership depends on technological superiority. It has been observed that the technological battle with the Japanese is really an industrial equivalent of the East-West arms race.

Students' disinterest in pre-college science courses is acquired early: Nearly half of them dislike science by the end of the third grade; the figure jumps to nearly 80 percent by the eighth grade. The popularity of mathematics declines from a high of 48 percent in grade 3 to a low of 18 percent in grade 12. Another study traces the loss of talent from the nation's 4.2 million high school freshmen in 1977-78: Only about 300,000 of these students (7.3 percent) entered the study of science and engineering as college freshmen in 1981-82; 83,000, or 2 percent of the original high school class, will graduate, 0.4 percent will earn a master of science degree and 0.1 percent a doctorate in science and engineering. The paucity of doctorates is directly related to the serious shortage of faculty in several engineering disciplines. This loss of interest and talent is a national tragedy and clearly affects our pool of scientists and engineers.

To meet this critical situation, the nation's school systems must embark on an urgent program to revitalize mathematics, science and technology education in pre-college curricula. We will need to establish regional "lighthouse" schools in which these subjects are given high priority so that they can serve as beacons to which other schools can look for guidance. The task can only be accomplished in a realistic time-frame if our science and engineering colleges—together with our professional societies, industry and government—actively support the required effort. Priorities will need to be changed and additional sources of talent and funds directed at this effort.

Edmund T. Cranch
Edmund T. Cranch
President

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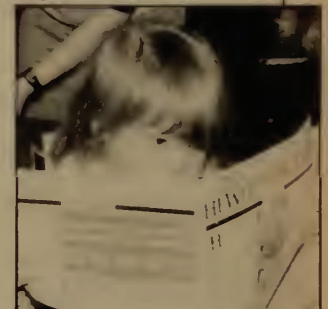
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Cover: The Washburn Shops and Laboratories, restored. Photograph by Robert Arnold.

NEWS FROM THE HILL

To ABET or not to ABET

In early November 1984, representatives of the Accreditation Board for Engineering and Technology (ABET) made a planned visit to WPI to review the curricula of the Departments of Chemical, Civil, Electrical and Mechanical Engineering, which ABET accredits. In a 1981 visit, ABET granted these departments three-year accreditation but also recommended reinforcing the science component of the programs for engineering students. Subsequently, these departments complied with the ABET recommendation and established distribution, or degree, requirements to take effect with freshman entering WPI in September 1984.

In keeping with its policies, ABET visited WPI in November to review the actions it had recommended in 1981. According to Vice President and Dean of the Faculty Richard H. Gallagher, WPI will receive a written evaluation of ABET's November visit in April 1985 and will have four weeks to respond. Later, in June or July 1985, the four departments will receive word of ABET's accreditation decision.

"ABET accreditation," says William R. Grogan '46, Dean of Undergraduate Studies, "is the single most important endorsement of the academic qualifications of any college's engineering programs." "Without ABET accreditation," he adds, "WPI's engineering disciplines may face serious problems of credibility—before prospective students and employers alike."

According to Grogan, during an exit interview at its November visit, ABET suggested broadening the coverage of distribution requirements still further. It also recommended review of WPI's faculty advising system. Active, well-informed advisors, the ABET panel said, are vital to any program which allows students freedom in selecting courses. Such academic freedom is a hallmark of the WPI Plan. Debate over how best to meet ABET



'Tis the season—for seniors to line up for job interviews. At the Office of Graduate and Career Plans, business is hot and heavy.

expectations while preserving flexibility has been active, and at times, heated among faculty, administration and students for the past three years or more.

Along other guidelines, says Gallagher, ABET was quite positive in its review of WPI's engineering programs, including such elements as laboratory equipment, faculty and student quality and institutional support.

Presidential Search Update

As reported in the November 1984 *Journal*, Dr. Edmund T. Cranch has resigned the presidency of WPI, effective June 30, 1985. After seven years at the helm, he will become president of Wang Institute of Graduate Studies, Tyngsboro, MA.

Irving James Donahue, Jr. '44, vice chairman of the WPI Board of Trustees, has announced formation of a presidential search committee. He will chair this committee, which consists of trustees, faculty, alumni, staff and one student.

According to Dr. Ray E. Bolz, secretary to the committee and Vice President and Dean of the Faculty Emeritus, the committee hopes to make its recommendation to the Board of Trustees sometime this spring. In addition, as we went to press, the committee was considering use of an executive search firm as a complement to the committee's efforts. Such involvement, says Bolz, would be used only to identify appropriate candidates rather than also to contribute to candidates' evaluations or the committee's recommendation to the Board.

The closing date for applications for the presidency was January 25, 1985.

Paul Bayliss '60 to Preside Over Alumni Association

For the 1985-86 academic year, Paul W. Bayliss '60, of Barrington, Illinois, will serve as president of the WPI Alumni Association, according to Stephen J. Hebert '66, Director of Development and Alumni Affairs. Bayliss will succeed Harry W. Tenny, Jr. '56.

Bayliss has been active in alumni activities for many years, serving as senior vice president of the Association, 1984-85, and for several years as chairman of the Alumni Trustee Search Committee, which nominates WPI graduates for term positions on the Board of Trustees.

In other appointments, Alex C. Papianou '57 will succeed Bayliss as senior vice president. New members of the Alumni Fund board, effective August 20,

1984, are Michael A. DiPierro '68, Bruce A. MacPhetres '60 and Stanley P. Negus, Jr. '54.

Yours for a Song

Your years at WPI may have found you singing in the Glee Club, the Technicords, the Polytones, your fraternity octet, or even in the shower. If so, you like to sing and can (maybe) carry a tune and even harmonize a bit. If you still enjoy crooning, can sight read or learn a part quickly, and would like to bring back those old favorites, have I got a deal for you!

For a few months now, a small group of us grads have been getting together to rehearse the oldies we all remember—for the fun of it and maybe to sing at Reunion or Homecoming or other campus events.

The tunes have harmonies we can han-

dle, and we rehearse on campus for convenience. So if you enjoy singing and think you'd enjoy the company of kindred spirits, why not plan to join us. Give me a call, and I'll give you the details.

Alex Papianou '57
(617) 543-5935

Editor's Note

A few days before mailing of the November 1984 issue of the *Journal*, Lawrence C. Neale '40 passed away. He was director of Alden Research Laboratory (ARL) from 1968 until 1975. We regret that publishing deadlines prevented us from noting his death in the November issue, which contained a feature story on ARL. His obituary appears on page 56 of this issue of the *Journal*. Our condolences to his family and friends.



Unseasonably warm fall and early winter weather enabled easier construction of WPI's new residence center at the corner of Institute Road and Boynton Street. The new facility, to house and feed 229 students, should be open for September 1985 classes.

Mr. Washburn Would Approve

He never lived to see his dream open its doors to hopeful young industrialists like himself. Still, after 116 years, Ichabod Washburn would admire the facelifting his Washburn Shops recently received.

If Ichabod Washburn were able to view his Shops today, he'd have little trouble locating the building from the outside, for its facade remains essentially unchanged. But inside there's a whole new world, with the latest technology, faculty space and more. Where once stood his shops, its banks of lathes linked by leather belts to steam-powered shafts, he'd see a computer-controlled machine tool cutting intricate shapes from instructions programmed by a student operator.

Where students once worked at rows of blacksmiths' forges heating iron to white-hot plasticity, he'd see today robots programmed to perform in accurate repetition the most dangerous and tedious jobs of industry.

On the second floor where stood his beloved woodworking shop, he'd find the Department of Management. He'd see students seated not at ruled ledgers but in front of computer terminals, learning how to process, store and retrieve the information needed to make management decisions in moments.

In his day, Ichabod Washburn was one of Worcester's most successful businessmen. He was an inventor and an innovator. He had built the world's largest wire mill because he had applied new ideas effectively.

If he could see these renovated and enlarged Shops which bear his name, he'd be the first to recognize that after 116 years, the educational concept on which the Shops was built remains alive and well within its walls.

And Mr. Washburn would approve.

Milton P. Higgins and Philip Morgan officially open the Shops, as Dr. Edmund T. Cranch looks on.

For years, the Washburn Shops has stood as testament to Ichabod Washburn's sagacious vision of a school for teaching modern factory techniques. Yet time cannot help but take its toll on both the physical condition of the building and the facilities within.

When the Shops opened in 1869, students were greeted with what was by the standards of the day an ultramodern manufacturing facility. Besides the new machinery, there was a staff of experienced craftsmen under the watchful eye of Milton Prince Higgins, the Shops' first superintendent.

In accordance with the founding concept, the Washburn Shops created an environment that simulated the manufacturing floor of the day, providing students hands-on practice in advanced production methods to complement the "book learning" of their classroom courses. Too, the Shops produced manufactured goods for sale: lathes, drill presses, grinding machinery, laboratory equipment and even hydraulic elevators, which had been

designed by Mr. Higgins right there in the Washburn Shops.

But perhaps the Shops' best-known product was the Washburn Drawing Stand, a tilting, wooden drawing table mounted on a three-legged cast iron base. For more than 80 years the Shops shipped them to corporate drafting rooms and schools throughout the country. WPI still receives an occasional letter inquiring about replacement parts. On the campus itself, these stands remain a common sight in classrooms where they serve as lecterns, prized relics of an earlier era.

The boom years of the Washburn Shops as a commercial activity came at the end of the 19th century. On the WPI Board of Trustees, however, there were some who began to feel that a commercial enterprise, prosperous as it might be, was an inappropriate adjunct to an institution of higher learning. They were a minority, but a vocal one. "The educational features of the Shops," they were saying,



Michael Curmill

"are getting lost in its profit-making incentives."

It took nearly 50 years to phase out the commercial shops, beginning with sale of the elevator business in 1896. Yet even today, industry-sponsored research in Washburn's Manufacturing Engineering Applications Center (MEAC), the Materials Processing Laboratory and other facilities continues the Shops' tradition of close ties with industry.

The issue of the Shops came to a head early in the tenure of WPI's third president, Dr. Thomas C. Mendenhall, who served from 1894 to 1901. The new president faced up squarely to the controversy. (See "Mendenhall" on page 12.)

The \$4 million renovation, expansion and re-equipping of Washburn have revitalized WPI's second oldest building and have created under one roof a modern yet practical environment for continuing and broadening WPI's original Two Towers tradition. The reborn Washburn now houses:

- Modern manufacturing and materials processing laboratories stocked with state-of-the-art equipment, including computer-aided manufacturing, computer graphics, multiple testing systems, injection molders and automated manufacturing equipment.
- Eight identical "machining modules," equipped with lathe and milling machine—the heart of any machining operation—plus a video-cassette system for on-screen, individualized instruction. A specialized equipment area and group demonstration room, also with a video system, are just steps away from each module.
- MEAC, an industry-college program that applies robotic technology to current

manufacturing production problems.

- The Department of Management and Management Engineering (including the faculty in Industrial and Operations Engineering), which recently developed an MBA program designed specifically for managers of technological organizations.

According to the architects, Goody, Clancy & Associates Inc. of Boston, improvements to the complex cover some 46,000 square feet in all—more than an acre—and include two new floors of space above the former welding shop.

What's more, the Washburn Shops is the nation's oldest building for the teaching of engineering (Boynton Hall now houses administrative offices). The Shops is listed in the National Register of Historical Places and has been named by the American Society for Metals a National Historical Landmark.

It truly was a celebration, bringing to a new—yet an old—facility a blend of perspectives on the past, present and future of WPI, and on higher education's role in what is being called the high-technology revolution. It was an opportunity to thank the many individuals and organizations that made the Washburn restoration a reality. And it was a chance for WPI's friends and neighbors to sample one of WPI's most advanced facilities for educating tomorrow's engineers.

It was "Washburn: The Tradition Restored"—the formal rededication of the Washburn Shops, October 19-20, 1984.

Dr. Thomas C. Mendenhall II, the grandson and namesake of WPI's third president, delivered the keynote address. "Grandfather's Views on Science, Engineering and Management" was a wide-

ranging journey through a watershed period in the evolution of the Washburn Shops (see excerpts from his address, page 12), punctuated in words and emotion with the kind of frank humor that is a Mendenhall trademark.

Later, Professor of Management Arthur Gerstenfeld was moderator as four movers and shakers of high technology gave their views on the challenges confronting higher education in helping to build industrial America. The four executives—Martin A. Allen, Chairman, Computervision Corp., and a WPI Trustee; Fred W. Garry, Vice President, Corporate Engineering and Manufacturing, General Electric Co.; John A. Weese, Director, Division of Mechanical Engineering and Applied Mechanics, Natural Science Foundation; and Russell G. Meyerand, Jr., Vice President (Technology), United Technologies Corp.—shared their perspectives on this crucial issue, enlightening and impressing the enthusiastic audience.

Informal tours of the restored Washburn and dedication of the Arthur E. Smith '33 Materials Testing Laboratory followed. Though Mr. Smith, a retired chairman of United Technologies Corporation, was unable to attend the ceremonies because of illness, his wife, Frances, and son Kenneth joined Dr. Meyerand and the WPI community in honoring one of WPI's most distinguished graduates.

Later that evening trustees and guests of the college gathered for dinner in Alden Hall. The evening provided an opportunity for informal exchange after a long day of scheduled events and marked the conclusion of the three-year-long Capital Program, which was capped by the Washburn project. The high point of the evening



Worcester County Free Institute of Industrial Science, opened in 1868.



Ichabod Washburn, 1798-1868.

came in light and sound, in a specially commissioned slide show of the history of the Washburn Shops. It was a perfect nightcap to an extraordinary day and set the stage for the events of the following morning.

Saturday, October 20, couldn't have been more lovely: an idyllic autumn day in central New England. Hundreds from the public toured the Shops, entertained and delighted by what they saw: spanking clean machining modules, industrial robots executing intricate maneuvers, laboratories displaying latest generation equipment, the history and tradition of the Two Towers.

At the dedication of the Shops' Milton Prince Higgins Lecture Hall, President Edmund T. Cranch noted in his remarks what a challenge and a joy it has been to work with life trustee Higgins. "The questions he asks," said Cranch, "are always right on target. He is a president's trustee, the best of his kind." The break in Dr.

Cranch's voice was evident even at the back of the hall. Yet few in the audience knew at that point that the Washburn project would be one of Dr. Cranch's last major programs as president: Earlier that morning, he had announced his resignation to the trustees, effective June 30, 1985.

Finally, the ribbon was cut at the Shops' new entrance on Freeman Plaza. Fittingly, Peter Morgan and Milton Higgins did the honors, assisted by President Cranch. It was Charles Morgan who had seen construction of the Shops through to completion for the ailing Ichabod Washburn. And it was the elder Milton Higgins, two generations before, who had charted the course of the Shops as its first superintendent. The modern-day Milton Higgins, his eyes perhaps dimmed by the years, yet his mind ever so sharp, and Philip Morgan, Charles Morgan's great grandson, together launched the Shops on a new course for the future.

Fuller, General Electric, Higgins, Lufkin, Morgan, Norton, Perreault, Smith, United States Steel, United Technologies: these names head a list of WPI benefactors that have helped greatly in giving new life to the Washburn Shops; people and organizations without whose generosity the Washburn program would not have been possible.

The George F. and Sybil H. Fuller Foundation

In 1887, at the age of 18, the late George Fuller began what was to become a life-long affiliation with Wyman-Gordon Company. He started as the fledgling firm's bookkeeper, a skill he taught himself in a month—after he had convinced Winfield Wyman '82 and Lyman Gordon '81 of his worthiness. He also learned what he could about the heart of Wyman-Gordon: the newly evolving business of drop forging (now called closed die forging).

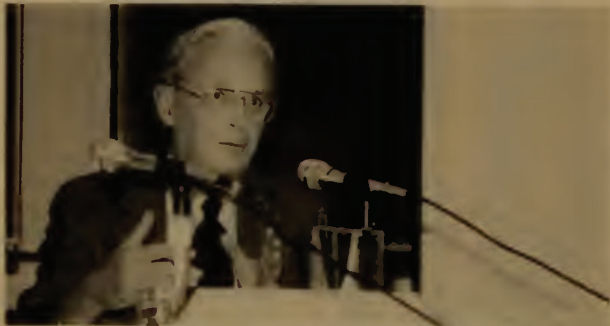
Several years later, in a moment of crisis for the young company, Fuller found a way to strengthen metal through heat treating to prevent brittleness in forged industrial parts. This hard-won success proved to be a turning point both for the young company and for George Fuller. He would go on to lead W-G for 48 of his 76 years with the firm.

He never graduated from high school, having to support his family after his father died. Yet in 1944, WPI awarded George Fuller an honorary doctorate in engineering. He also served on the WPI Board of Trustees from 1920 until 1939 and again from 1948–58. In addition to its support of the Washburn construction, the Fuller Foundation made a generous grant for the renovation of Kaven Hall during the Capital Program of 1979–83. WPI's Fuller Residence for students was named in Mr. Fuller's honor.

General Electric Company

A gift of significant proportions from GE, made in connection with the Washburn Shops' restoration, will be used to develop senior-year and graduate level courses and laboratories in topics closely identified with manufacturing engineering. Students and programs in computer aided design and manufacturing (CAD/CAM) automation controls, industrial automation, fracture mechanics, and ceramics will benefit directly from the GE grant.

General Electric has a tradition of supporting engineering and science education. The help of GE, one of the nation's oldest companies, will enable WPI to



Michael Carmill

Washburn symposium panelist Fred W. Garry (top left) of General Electric Company: "The continuing education of engineers is absolutely essential." Dr. Russell G. Meyerand, Jr. (left) of United Technologies Corporation: "It is terribly important that engineering education emphasize fundamentals." Raymond J. Forkey '40 (below, right), Capital Program Chairman, receives a pewter replica of the Washburn tower from Dr. Edmund T. Cranch at the trustees' dinner in Alden Hall.



Michael Carmill



Michael Carmill

The Names Behind the Washburn Story

accelerate the development of engineering courses and laboratories in the new Washburn Shops and elsewhere on campus.

Milton Prince Higgins and Norton Company

Milton Higgins' WPI heritage goes back to the beginning of the Institute, when his grandfather, for whom he was named, was appointed to the first faculty as superintendent of the Washburn Shops.

His father, Aldus C. Higgins, was graduated in the Class of 1893, served as president of the WPI Alumni Association and was a trustee for nearly 50 years. It was Aldus Higgins who built and later donated to the college the magnificent residence known today simply as the Higgins House.

Milton Higgins was president of Norton Company (of which his grandfather and Professor George I. Alden had been founders) when he joined the WPI Board in 1955, becoming the third generation of his family to serve in these two roles.

Milton Higgins served as chairman of the WPI Centennial Fund, which surpassed its goal of \$15 million in support of campus capital needs in the 1960s. He also served as trustee chairman from 1971 to 1978, during implementation of the WPI

Plan, a bold departure from traditional engineering education. For WPI, this was a period of unprecedented growth in student enrollment, faculty hiring, research and alumni giving. Yet, throughout these years, WPI operated with a balanced budget during every year except one.

At the Washburn Shops rededication, WPI named a new 110-seat lecture hall in honor of Milton Prince Higgins. He and Norton Company, which celebrates its centennial this year, have been among the Institute's most devoted advocates for many years. Norton Company, the world's leading maker of abrasives and grinding wheels, and industrial ceramics and drills, has played a vital role in many WPI programs. It was a charter member of the Management of Advanced Automation Technology (MAAT) Center, is a member of MEAC and houses a WPI Project Center. Scores of its employees are also active in the college's School of Industrial Management (SIM) and continuing education programs.

For three decades, Milton Higgins has helped guide WPI through by far its most dramatic era of growth and expansion. He has brought the name Higgins full circle in the history of WPI and the Washburn Shops. And his service to the college will not soon be forgotten.

The Morgan Family

Morgan Construction Company, an important benefactor of the Washburn restoration, has been closely identified with the wire industry as well as with WPI since the company's founding in the late 19th century by Charles H. Morgan. He was the great-grandfather of Paul S. Morgan, the firm's current chairman and president.

In 1866, at the suggestion of Ichabod Washburn, Charles Morgan was given the responsibility of erecting, equipping and overseeing the Washburn Shops as well as planning for its continuance. He was also elected a trustee of the college. Since Washburn died shortly before the Shops' completion, it was thus left to Morgan to bring to life Washburn's dream of a modern factory setting for teaching young men their life trades.

In 1888, Morgan formed a company to design and build wire drawing machinery for his own Morgan Spring Co. and other wire makers. Meanwhile, his son, Paul B. Morgan, Class of 1890, was being groomed to take over Morgan Construction for his aging father in an era of stiffening competition. The legacy did not end here. Philip M. Morgan, son of Paul B. Morgan, also became president of the company, as has his son, Paul S. Morgan. In a similar vein, these four Morgans have served on the WPI Board of Trustees. Most recently, Paul S. Morgan retired as chairman in January 1984.

Built in 1958, the Morgan Hall student residence was named in honor of the family which has served through four generations of trusteeship in continuous leadership of the Institute.

Raymond J. Perreault '38

Ray Perreault is one of three brothers who were graduated from WPI in the 1930s. A Worcester native, he earned his bachelor's degree in mechanical engineering and has enjoyed a rewarding career in the metalworking industry. Still, for all his success, he has never forgotten the education he received at WPI.

It is, perhaps, his gratitude for this education as well as his commitment to the mission of the college, that have caused him to establish a scholarship fund and to contribute to the refurbishing of the Alumni Office in Boynton Hall.

Recently he has also seen fit to provide in a major way for the renovation and expansion of the Washburn Shops, supporting construction of the main machining shop and a Washburn machining module. The college is indeed grateful for the sustained generosity of Ray Perreault and



Name day: From left, Mr. and Mrs. Milton P. Higgins, Dr. Edmund T. Cranch and Norton Company President Donald Melville at dedication of the Washburn lecture hall named in honor of Mr. Higgins.

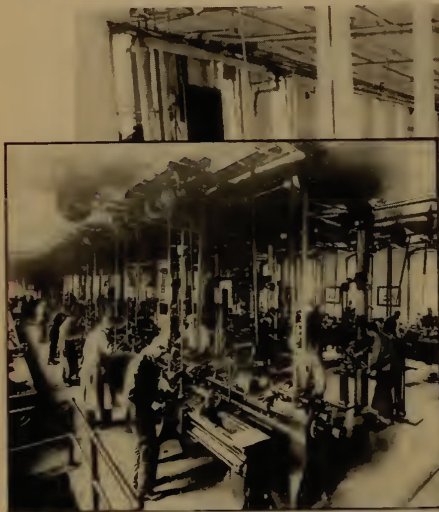
Painters putting final touches on the Shops' bell tower (right), before placement of the regilded arm-and-hammer weathervane. Clockwise from far right: the Shops' new main entrance, which opens onto Freeman Plaza; the Management Department's suite of offices on the Shops' second floor; from the outside, the renovated Shops appears little changed; construction on the Shops' west end, once the site of welding shops, now home of MEAC; where a spaghetti-like network of leather belts once connected machining tools to steam engines (insert), construction makes way for modern industrial equipment and methods.



William Demason



Kenneth McDonnell



Roger Perry '45



Michael Carroll



Kenneth McDonnell



Robert Arnold

other alumni and friends like him.

Today, Perreault is President and Treasurer of Falls Machine Screw Company Inc., of Chicopee, Massachusetts. He has been with the company for 45 of its 46 years. He also serves as a WPI trustee.

Arthur E. Smith '33

Prior to his retirement in 1973, Arthur E. Smith was one of Pratt & Whitney Aircraft's key movers. It was Smith who served as chief engineer of P&W's 25,000-employee Kansas City, MO, facility from 1942 to 1944, during the height of the war effort. He was only 31 when he took on that responsibility. He later rose through the ranks to become president of United Aircraft (now United Technologies) Corporation in 1968 and was named its chairman in 1972.

Arthur Smith was one of the early members of Professor Kenneth Merriam's Aero Elective Program for top students in mechanical engineering. As these young men studied the design of engines, probed the mysteries of flight and speculated on the future of the emerging aircraft industry, they developed a pioneering spirit which has typified Smith throughout his bright career. His son David was also graduated from the Institute, in 1962.

Smith holds the prestigious Robert H. Goddard Award for professional achievement, the highest prize given an alumnus by the Institute, as well as an honorary Doctor of Engineering degree and the Herbert F. Taylor Award for service to the college. In addition, he served with distinction on the WPI Board of Trustees from 1975 to 1980.

At the Washburn Shops rededication on October 20, 1984, WPI named the Washburn Materials Processing Laboratory in honor of one of its preeminent graduates, a pioneer in his own right, Arthur E. Smith '33. A major contribution from United Technologies helped to make possible this new laboratory.

United States Steel Corporation

Both WPI and U.S. Steel can trace their roots to the inquiring mind and boundless energy of Ichabod Washburn, inventor, manufacturer and in later life proprietor of the world's largest wire mill, part of an industry he revolutionized. He invented machinery for making piano and hoop wire, developed a continuous hardening and tempering process, and built the first continuous wire-rod rolling mill in America. In 1884, his company, Washburn & Moen, joined other wire makers in organizing the American Wire and Cable

Company. The firm was one of the principals in the Andrew Carnegie-led formation of U.S. Steel in 1901.

It was at Washburn & Moen that Harry G. Stoddard got his start in business, joining the company in 1886. Stoddard would go on to become general manager of the company and, later in his career, president and chairman of Wyman-Gordon Company and co-owner of the Worcester Telegraph & Gazette Inc.

American Steel and Wire established the U.S. Steel Industrial Scholarship in 1920, and the U.S. Steel Graduate Student Loan Fund in 1979. Most recently, a major contribution from U.S. Steel supported construction of a Washburn machine shop.

Wyman-Gordon Company

In 1883, H. Winfield Wyman '82 and Lyman F. Gordon '81 opened Worcester's first forging shop to produce shaped metal parts. As the Industrial Revolution gathered steam in the 1880s, the demands of competition called for metallic strength, durability, speed, weight and lowered cost. For all these requirements, forging was often the perfect solution.

It was the transportation industry—largely railroads and later automobiles and aircraft—that gave Wyman and Gordon their first real opportunities. With the help of the inventive George Fuller, W-G was responsible for many breakthroughs in hardening and tempering steel. Today W-G conducts on-going metals research second to none and is the world's leading supplier of forgings for defense and space applications as well as for agricultural and other civilian equipment manufacturing. Currently, the company employs more than 50 WPI graduates.

Since 1920, Wyman-Gordon, through the company itself, the Wyman-Gordon Foundation and, indirectly, the George F. and Sybil H. Fuller Foundation, has been among the Institute's most generous benefactors and most recently has made a sig-

nificant contribution to the Washburn project.

In addition, the Stoddard family, a name tied for all times to Wyman-Gordon Company and to WPI, has given major support for construction of WPI's Stoddard Residence and is responsible for the Stoddard Professorship in Management. The company's current president, J. Richard Bullock, serves on WPI's Board of Trustees. In December 1984, Robert Stoddard (son of Harry G. Stoddard), former president and chairman of W-G, chairman of the Worcester Telegram & Gazette Inc., and a WPI trustee emeritus, died. His obituary appears on page 55.

Additional Names in the Washburn Story

For nearly 25 years the Lufkin Trust has been one of WPI's most generous benefactors. In all cases, the fund has designated that its grants be used by mechanical engineering programs at WPI for the support of students pursuing studies having a close relationship to machinery and mechanics.

Augat Corporation has generously supported construction and equipping of Washburn's new X-ray diffraction laboratory. Additional lab space has been made possible by the Class of 1943.

A contribution from Francis C. Swallow '17 has funded a computer lab for student use, while Allen M. Mintz '48 has given a generous gift for Washburn's new metallography laboratory. The Class of 1944, through its 40th Reunion gift, has supported construction of seminar space, and a generous contribution from Stanley C. Olsen has helped create a student lounge in the Shops. Additional support has come from the Class of 1983 and other sources.

The college welcomes and is most appreciative of the support of these individuals and organizations.

By Roger N. Perry, Jr. '45, Michael Shanley and Kenneth McDonnell



Veteran mechanical-laboratory technician Joe Gale in one of Washburn's new machine shops.

Michael Carroll



George F. Fuller, 1896-1962.

Other Washburn Connections



Robert W. Stoddard, 1906-1984.



Dr. Thomas C. Mendenhall II, grandson and namesake of WPI's third president.



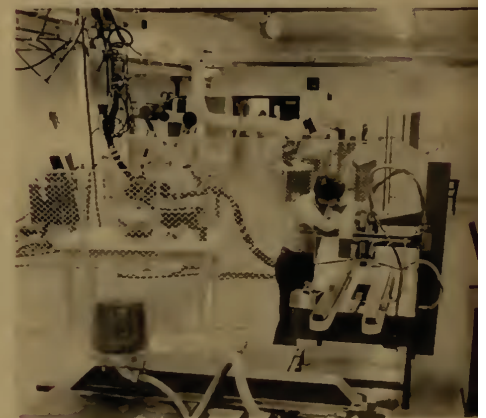
Four generations of the Morgan family—Charles H., Paul B. '90, Philip M. and Paul S.—have served on the WPI Board of Trustees through much of the Institute's history.



One of eight machining models for individual student use. Significant funding came from Mrs. David Bailey, in memory of her husband, '25; C. John Lindegren '39; Edward G. Perkins '72 and Mrs. Jacob Perkins; Raymond J. Perreault '38; Rexnord Inc.; and the Class of 1959.



The Milton P. Higgins lecture hall, a 110- seat



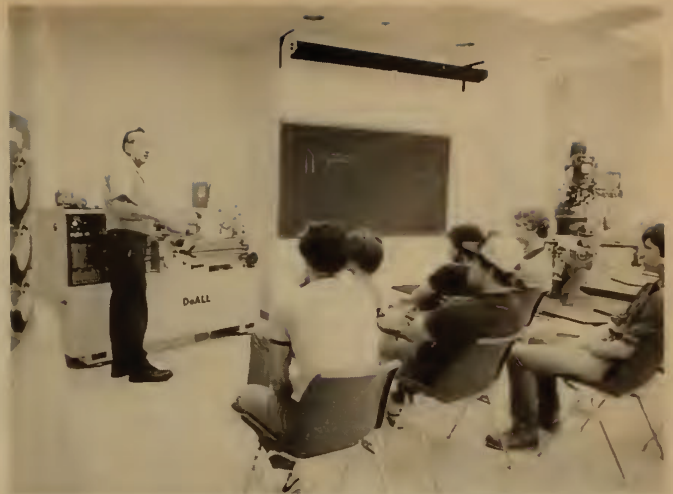
The Manufacturing Engineering Applications Center (MEAC) works with companies—such as Emhart Corp., instrumental in its establishment in 1980—to apply robotics and flexible automation to industrial problems.

The Building at Work



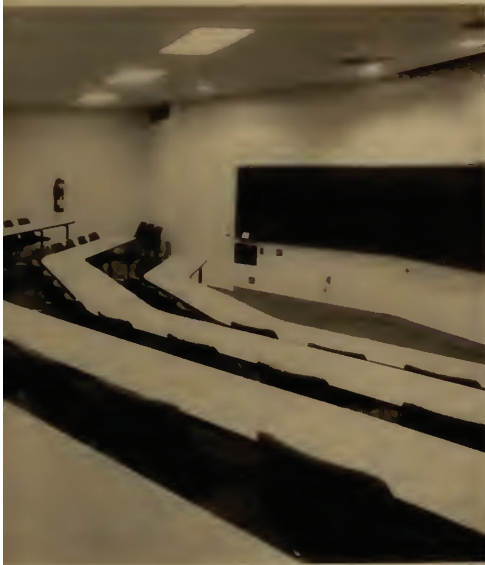
The "common area" of the main machine shops contains specialized equipment to complement that in the machining modules. Major support from Raymond J. Perreault '38 and the L.S. Starrett Company helped underwrite the center.

Michael Carmoll



A Class of 1959 gift provided funding for Washburn's machine shop demonstration room, which contains equipment identical to that of the eight machining modules.

Michael Carmoll



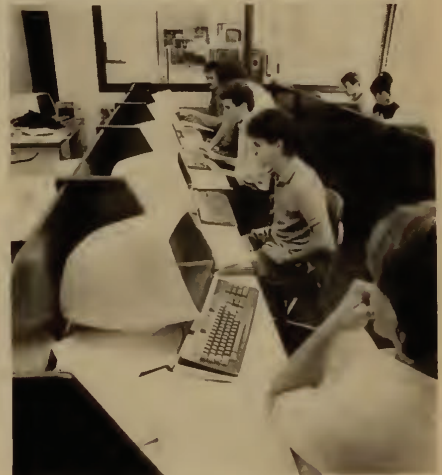
facility built above the old welding shop.

William Demson



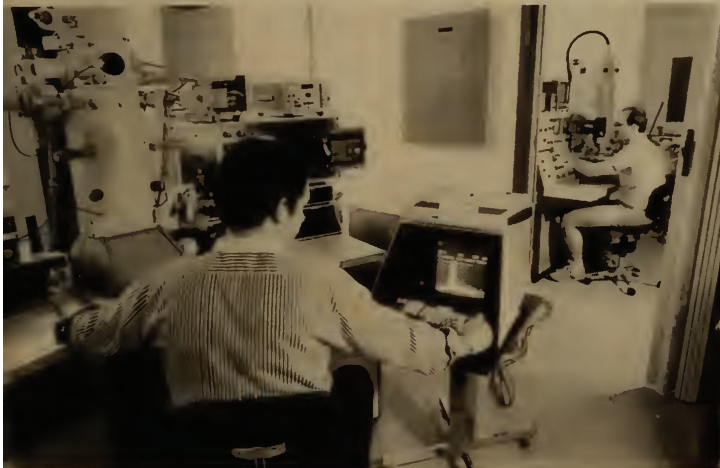
Located in the Arthur E. Smith '33 Materials Processing Laboratory, this Instron servohydraulic, computer-controlled, mechanical testing system evaluates the tension, compression, fatigue and fracture characteristics of metals, ceramics, plastics and other composites.

Michael Carmoll



A Computer Science Department laboratory, with no fewer than 25 terminals, is located in newly created Washburn space. Class of 1958 contributions helped fund this lab.

Michael Carmoll



These electron microscopes were gifts of the Lufkin Trust and the Wyman-Gordon Foundation. A Class of 1944 gift helped finance construction of the laboratory, structurally isolated from the rest of Washburn to eliminate outside vibrations.

Michael Carmoll



Funding from the Ellsworth Foundation helped support construction of Management's departmental offices.

Michael Carmoll

Mendenhall: The Place, the Moment, the Man

Thomas C. Mendenhall was WPI's third president, from 1894-1901. It was Mendenhall who as president found himself grappling with controversy surrounding the propriety of a commercial Washburn Shops—and the successful enterprise the Shops had become. He was well suited to the task.

Those were tumultuous times for WPI and for science and technology as well, as Mendenhall's grandson, Dr. Thomas C. Mendenhall II, recounted before a Washburn rededication audience in October.

"History," he began, "is full of coincidences as well as changes. The place, the moment, the man so frequently come together to produce interesting, exciting, tension-full occasions."

What follows are excerpts from Dr. Mendenhall's unforgettable keynote address.

The Place:

By 1882, the Shops had been making more than \$33,000 a year for the college. The hydraulic elevator developed here was threatening to raise the whole institution right off the map and into big business. Which is ultimately where Milton Higgins' elevator went, I guess, under the Otis'.

The Shops was causing increased concern among many of the faculty, and trustees and many even in the community. The trustees were split over the question, but when 50 graduates were polled, "Do you think the commercial Shops should be continued?" they bellowed unanimously, "Of course!"

The Moment:

The last half of the 19th century witnessed an extraordinary outburst of activity in pure and applied science—Darwin's treatise in 1854 on the origin of the species, Gramme's dynamo in 1869, Maxwell's work on electricity and magnetism in



Thomas C. Mendenhall, WPI's third president, had to resolve the controversy over the Washburn Shops' commercial interests.

1873 and later his book on the theory of heat, Rayleigh's book on the theory of sound, the Philadelphia Centennial Exposition of 1876. All the while, Worcester was booming. Seven railroads served the city.

The Man:

He was born in 1841 in eastern Ohio of Quaker stock. Quakers, as you know, were not in those days quite as socially obliging as they may be today. They ran up and down the streets literally quaking, which could stop a good deal of traffic. Which may be why the English were glad to get rid of us.

He had an early interest in science. One time, for instance, his father, a farmer, sold a cow to a neighbor 25 miles away, and young Tom was given the job of leading the cow to the new owner, where he spent the night. While there he noticed some books, one being a Euclid's geome-

try text. "What are you giving me for driving the cow over here?" Tom asked the farmer. "One dollar." "How much is that geometry book?" "One dollar"—quite a sacrifice, because he had 25 miles to go back.

He was also interested at an early age in teaching—he got his first teaching certificate to teach in a local school which he had just finished, at the age of 16. At the age of 17 he was assistant principal in the village school—at \$90 a year.

In 1873, TCM was appointed the first professor of physics and mechanics at Ohio State University. He was keen always to get money for books and equipment for his laboratories. One time, when he didn't have proper equipment, he borrowed a carpenter's lunchpail to use as a pendulum in a physics experiment.

He was quite interested in weather as well. You and I just click on the radio with its marvelous weather reports. Grandfather was instrumental in setting up a series of weather stations across Ohio and eventually, across the country. He had the ingenious idea of putting the latest weather information on the sides of railroad cars: "rain tomorrow" or "18 inches of snow" or something like that.

In 1886, TCM went to Rose Polytechnic Institute in Terre Haute, Indiana, as its second president. The founder and first president was Charles O. Thompson, who had been WPI's first president as well. Thompson had modeled Rose after Worcester Tech.

Three years later TCM left Rose to head the Coast and Geodetic Survey to map the whole country. He also worked to make the Alaska-Canada boundary line more precise, more exact. Those of you who have been to Alaska—you'll find there the Mendenhall Glacier, a rather handsome great bit of ice. I get about four postcards a summer always asking a rather unflattering "Is this you?"

Why did Worcester hire him? I suppose institutions always want to attract distinguished people for president. He was one of the first members of the National Academy of Sciences, and as a teacher he was in great demand as a lecturer. Maybe they thought they needed some changes made. Maybe they figured this was the man to do it.

Why did he accept? He'd been through change once at Rose, liberalizing the curriculum and reducing the importance of shop practice. Well, I think he saw Worcester as a challenge, and he knew he wanted to leave the government service because of the patronage hassle.

His initial question at Worcester was, "Are we one institution with several branches or are we two institutions?" And by 1896 he had worked out his own resolution of this situation.

"The only reason for the existence of the Shops," he wrote, "is the educational value of the training which they may give." And, "A very important part of an engineer's education is the acquisition of a familiarity with the best methods of shop management."

"There's another class of work which is in every way suited to a school machine shop and which should be sought for continually: the making of special machines, models, apparatus, instruments . . . and the like."

As his grandson and namesake I was summoned to stay with TCM for about two weeks after he retired in 1901. Every morning I was given a list of arithmetic problems and I had to solve them by supertime. He had an enormous shop in which he was always doing all kinds of things. He took the temperature morning and noon and night all his life.

My wife discovered some years ago a lovely document in my grandfather's handwriting, dated 1912. It's called "Rejoicing."

"I rejoice in the love and companionship of my wife for over 40 years of our happy marriage.

I rejoice in my son and his work as a scientist and physicist.

I rejoice in my many friends, students and colleagues with whom I have enjoyed working and friendship over the years.

But at this particular moment I rejoice most of all in the fact that I am not and never have been a member of the National Education Association.

Thomas C. Mendenhall II is president emeritus of Smith College.



Michael Carmoll

A MEAC teaching robot seems to have captured this little visitor's attention.



Michael Carmoll



Michael Carmoll

More scenes from rededication day: Dr. George Hazzard (top, left), WPI president emeritus; Dr. Thomas C. Mendenhall II, president emeritus of Smith College, who gave a talk on his grandfather's WPI presidency; and Dr. Edmund T. Cranch, president of WPI. At the open house (above) of the restored Washburn Shops, a student demonstrates the capabilities of a General Electric industrial robot in the Manufacturing Engineering Applications Center (MEAC).

It's 1960 and your hair is short. You wear white socks and loafers. John F. Kennedy has just been elected President, and scientists are excited about a new discovery called the laser beam. Hitchcock's *Psycho* is packing the movie theatres. Arnold Palmer has won both the Masters Tournament and the U.S. Open, each time with a come-from-behind charge. Floyd Patterson has KO'd Ingemar Johansson to regain the heavyweight championship of the world.

You're one of the 1,100 young men enrolled at Worcester Tech. On campus, Morgan and Olin halls have just been built. Harrington Auditorium, Goddard Hall, Gordon Library and the Wedge don't exist. Nor do Stoddard, Ellsworth or Fuller residences. Tuition is \$1,300 per year, room and board another \$730.

Regardless of what your major is, you'll take composition and reading during your freshman year. Sophomore year means U.S. and world history. You'll take a semester of political science in your junior year. As a senior, you may take a humanities elective, of which there are five to choose from.

You might consider the humanities to be a waste of time. All those names and dates—who needs them. And anyway, what's Shakespeare to an engineer?

Plenty has changed in 25 years. The world is a different place. So is WPI. And so is the Humanities Department.

The 1960 scenario is representative of the role humanities played for decades at WPI: a few English and history survey courses, little of anything else.

"Humanities courses here were always very structured," notes Dean of Undergraduate Studies William R. Grogan '46. "Students didn't take them seriously and neither did the faculty, for the most part."

If the humanities didn't get a great deal of respect, it was no reflection on the department's faculty or on the school itself. It was more just a product of the times.

"The department had a different function entirely then," recalls Donald E. Johnson, Professor Emeritus of History and former Humanities Department head. When he began his career at WPI in 1946, he says, "Our role was a secondary one, as a service department."

While it would be unfair in many ways

Shakespeare and the Engineer

The humanities, once the poor cousins of the science and engineering disciplines at WPI, now stand straight and proud.

to compare the old Humanities Department with the new, there is no denying the massive transformation in both theory and structure.

Now, under the degree requirement known as the Humanities Sufficiency,* students choose a topic of interest, take five or more related courses and then complete a final independent study project. The Sufficiency may be limited to a single discipline—American literature or Eastern philosophy, for example—or it may involve several disciplines—perhaps the history, literature and philosophy of a particular period. In either case, the final project examines a single theme.

The possibilities for the Sufficiency are limitless, the topics as varied as the students themselves. "A Parallel Between Othello and the Passion of Christ," "Remaining Human in the Modern World," and "An Analysis of Wagner's *Lohengrin*" are a few examples.

The catalyst for this restructuring was, of course, the WPI Plan, put into place in the early 1970s. But for some time before the Plan, a handful of outspoken faculty members had been urging a greater emphasis on the humanities. "These boys have to make a life as well as a living," English Department head Edwin Higginbottom would say. "It's the old story all over again—if your son asks for bread, do you give him a stone?"

In the mid 1960s, the curriculum committee, chaired by Dean Grogan, then a Professor of Electrical Engineering, tried to offer a little more in the way of bread. A bachelor of science degree in Humanities and Technology was established, and electives were added. "Those changes, while not sweeping, may have had the effect of

pulling the plug out of the bottle, letting the genie loose," says Professor Johnson.

It was the planning committee, however, that truly elevated the humanities to first-class status. When these Plan architects made the Sufficiency one of four degree requirements, they removed any doubt about the importance of the liberal arts at WPI.

"Basically, there are two schools of thought about humanities and the engineer," says Grogan. "One argument holds that a student should get a little bit of everything, which means required survey courses. The second argument—the one we ultimately embraced—says that it's better to master one area than get a superficial sprinkling of many."

And what of the argument that a student can go through four years here and never study Plato or Aristotle, Homer or Shakespeare, the great events of history and religion?

Humanities Department head Jo Ann Manfra fields that one. "In the best of all possible worlds, I would want students to study more liberal arts. But we don't have that option. What we try to do is give them quality and encourage lifelong learning. Our goal is to introduce a critical thought process that will carry over into their other work. We want the students to understand ambiguity, complexity and nuance. Things aren't just black and white—in engineering or the liberal arts—and that's a point we want to get across."

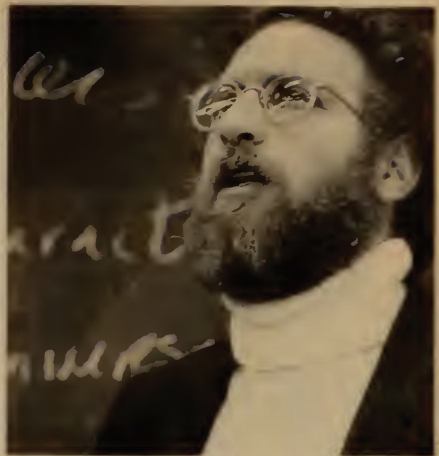
*The term is derived from the concept that students will develop "sufficient" understanding of an area of the humanities to engender a lifelong interest in that area.



Michael Carmill



Michael Carmill



Michael Carmill

Perhaps the Department's most impressive growth has taken place within the philosophy-religion-ethics area. These once neglected subjects are now a vital part of the curriculum. Assistant Professor of Religion Ruth L. Smith, Associate Professor of Philosophy Iris M. Young, and Assistant Professor of Philosophy Roger S. Gottlieb (left to right)—all relative newcomers—are active researchers whose broad interests give students a wide range of courses and projects to choose from.

In the years following approval of the Plan, the Department of History and Foreign Language and the Department of English (there was, as yet, no combined Humanities Department), like the others on campus, were faced with a staggering amount of work. New courses had to be developed, and old courses had to be adapted to the seven-week term. Clear standards for student work in interdisciplinary areas involving the humanities also had to be established.

Help in those early years came in the form of grants from the National Endowment for the Humanities (NEH), the Andrew W. Mellon Foundation and the Rockefeller Foundation.

"Those grants were invaluable," says Professor Johnson. "So much time had to be spent on curriculum planning and

development. It was a huge task."

In the mid-1970s, as the liberal arts at WPI grew, an administrative decision was made to unite the various disciplines under a single umbrella; the Humanities Department was officially created. "It was simply a logical step," says Professor Johnson, who served as head of the department until his retirement in 1983.

What might surprise those with a timeworn view of engineering schools is the healthy state of the performing arts at WPI. Musical groups abound—the Brass Choir, the WPI Band, the Jazz and Woodwind Ensembles, the Polytones and the Stage Band. Students interested in music can choose from a variety of classroom and performance offer-

ings. Assistant Professor of Music Louis J. Curran, Jr., has for years taken the Men's Chorus on tours to Europe, Canada and the West Coast.

The theatre program, begun in the 1960s by Professor of English Edmund M. Hayes, has grown by leaps and bounds. Susan Vick, assistant professor of Drama-Theatre since 1981, now directs the production of one major play each fall and works with Masque, the student theatre group, on a production each spring. Last fall's production of "You Can't Take It With You" featured Associate Professor of English Charles Heventhal in a leading role. Heventhal, who as a member of the planning committee was instrumental in molding the Humanities Sufficiency, has also played the title role in Brecht's "Galileo."

Also in the spring, Professor Vick oversees "New Voices," a week of plays, dance and music written and/or performed by students.

Professor of Music David P. McKay and Associate Professor of English Kent Ljungquist have produced two operas based on literary works: Charlotte Perkins Gillman's "The Yellow Wallpaper" and Edgar Allen Poe's "The Devil in the Belfry." In both cases, McKay wrote the music, and Ljungquist adapted the text. The operas were performed on campus at the Higgins House. Professor McKay has also composed a number of original works, conducted music on four albums and co-authored a prize-winning book. Ljungquist, co-editor of the national Edgar Allen Poe newsletter, will have a book about Poe published this spring.

Today, the Humanities Department is second in size only to Electrical Engineer-



Michael Carmill

The lone figure in the foreign languages is Lieselotte Z. Anderson, lecturer in German. She teaches ten or more sections per year, accommodating both the beginner and the advanced student. Those interested in other foreign languages can make arrangements to study at another of Worcester's colleges.

JO ANN MANFRA: LAWYER, LEADER, LEARNER

There were those who told her she was crazy to get a law degree—she didn't need it. Crazy, too, to accept the chairmanship of the Humanities Department—she didn't need that either, they said.

But they understood little about this determined, energetic woman who earned not one but two law degrees (from Suffolk University and Harvard University law schools) while carrying a full-time teaching load, who accepted the five-year appointment as head of the second largest department on campus, and who loves it.

"When I walk into the office," says Jo Ann Manfra, "I never know what's going to happen. The faculty is so active they exhaust me. It's a good kind of exhaustion, though. They're constantly on the move—dynamic, committed." Words which well describe Professor Manfra herself.

"I operate better in an invigorating environment," says Manfra, a graduate of State University of New York (SUNY) at Cortland and the University of Iowa. "The Mellon grant and other new things have given me a shot of adrenaline. It's an exciting time."

She cautions, however, that requirements for a department head include "a good sense of humor and the ability to step back from it all."

One of Professor Manfra's own research interests is 19th-century American Catholicism. The author of several articles, she is working on a manuscript entitled "Bishops of the Republic: The Making of An American Catholic Hierarchy, 1789-1851."

Professor Manfra just had another



article—"Serial Marriage and the Origins of the Black Stepfamily: The Rowanty Evidence"—accepted for publication in the prestigious *Journal of American History*. Co-author of the article is Robert R. Dykstra, Professor of History and Public Policy at SUNY at Albany, who also happens to be Manfra's husband.

The commuting marriage works out pretty well, Manfra says, since her husband has arranged his schedule so that he spends three days a week in Albany and four days in Worcester.

Over the years Manfra has been an active participant in the campus community, serving on virtually all the major academic committees. In 1980 she was faculty advisor at the Washington D.C. Project Center.

A member of the Massachusetts Bar and the U.S. District Bar, she is consultant to the Legal Systems and Law Enforcement IQP area and advises student projects that examine and evaluate the legal process.

Despite all this activity, she says, "I never feel like I've done it all. There's always more to do."

ing. In quality, the faculty can hold its own not just among engineering colleges, but among comparably-sized liberal arts colleges as well. The 20 full-time tenure track and 10 part-time or visiting faculty are an active group. Virtually all are engaged in research in their respective fields.

Associate Professor of History Peter S. Onuf, for example, last year was awarded a long-term fellowship at Worcester's American Antiquarian Society (AAS). This distinguished national award was

financed by the NEH. Professor of English Lance E. Schachterle is an AAS research associate working on an edition of James Fenimore Cooper's *The Spy*. For years he has worked as an editor on NEH-financed research to produce the definitive series of Cooper texts.

Professor of Religion and Social Ethics Thomas A. Shannon is a nationally recognized expert in the field of ethics. The author or editor of six books, he has lectured widely and has been featured in

newspaper articles and on radio and television shows. He co-edited with JoAnn Manfra *Law and Bioethics*, a book on the major court decisions in that field.

Professor of History John F. Zeugner has twice been awarded fellowships to teach at universities in Japan. An outspoken critic of Japanese higher education, his articles on the subject have appeared in the *New York Times* and *Change* magazine. He has also published as both an historian and a fiction writer.

Deborah M. Valenze, an assistant professor of history, will have a book published this fall on popular religion and female preaching in industrial England.

Because the history of science and technology is particularly germane to a college like WPI, the Humanities Department has two specialists in that area. Professor of History Michael M. Sokal, a nationally acknowledged expert on American psychologist James M. Cattell, has edited a book of Catell's letters. He is working on what will be the definitive biography of the man and recently received a major NEH grant to complete the work. Sokal has also written several book chapters in the fields of the history of science and technology, psychological testing and the history of psychology.

Associate Professor of History E. Malcolm Parkinson specializes in the history of European science and technology. He has published widely, with particular interest in jousting and the medieval tournament. Last fall he took a sabbatical from WPI to become a visiting scholar at New York University, joining 15 other scholars of medieval culture in a seminar program funded by the Mellon Foundation.

Despite all the professional activity within the department, Professor Manfra sees no indication of what educator Clark Kerr called "the cruel paradox that a superior faculty results in an inferior concern for undergraduate teaching."

"Professional development can't help but *improve* your teaching," she says. "What is a college for if not to be on the cutting edge of knowledge? That means students *and* faculty. As for undergraduate education, commitment to teaching is a given."

If a great deal has been accomplished in the humanities, there is more to be done. A recent \$250,000 grant from the Mellon Foundation represents a giant step into the future. First on the list of priorities is a reexamination of the programs already in place—the Humanities/Technology or



Michael Carmil

Associate Professor of History James P. Hanlan, co-director of the Living Museums program, oversees the projects done at Mystic Seaport in Mystic, CT. Hanlan's varied professional interests include American labor history, social and urban history, history of the family, and textile communities in New England.

Science major, concept courses, the Living Museums Program, Light and Vision (a course that examines how scientific ideas originate and change), and the Writing Resources Center, which provides students with technical assistance in the preparation of research papers.

In addition, the grant will be used to provide new faculty with the time they need to explore interests in other disciplines, and thereby better advise student projects that combine humanities and technology.

The department also intends to address

what many see as a major shortcoming of the program—the fact that most students complete the Sufficiency in their sophomore year and thereby end their association with the Humanities Department.

"We'd like to have them do more," says Professor Manfra, "but given their schedules, that can be tough."

One option is a senior seminar of some sort, perhaps with an interdisciplinary base. The first step is determining how best to make the seminars attractive to students, who already have a demanding major course schedule.

A report issued last fall by the National Institute of Education cited a serious flaw in higher education: "The college curriculum has become excessively vocational in its orientation," part of the problem being a prevailing belief that "the best insurance in a technological society is a highly specialized education that will lead to a specific job."

The attitude may be understandable, given the cost of a college education and the intense competition in the job market, but many observers see it as a serious threat to the fundamental concept of a complete education. WPI has clearly defined its stand on the issue.

"We see the humanities as a vital educational experience in its own right," says Dean Grogan. "Its application is through the development of the individual. We don't want to graduate people who are just technically qualified. We want to graduate people who have developed their intellect."

This theory harkens back to Professor Higginbottom's bread versus stone remark and the Shakespeare-engineer relationship. The humanities, besides teaching us about the world we live in, teach us about ourselves—a subject well worth probing, regardless of career goals. It's also a subject from which a lifetime of learning can be culled. Which is one of the reasons why Shakespeare and the engineer get along quite well here in Worcester.

Michael Shanley is Director of the WPI News Bureau.



PROJECTS WITH PERMANENCE

One of the IQP programs developed through the Mellon Foundation grant in the mid-1970s was the Living Museums Program, which has evolved into an extensive project series.

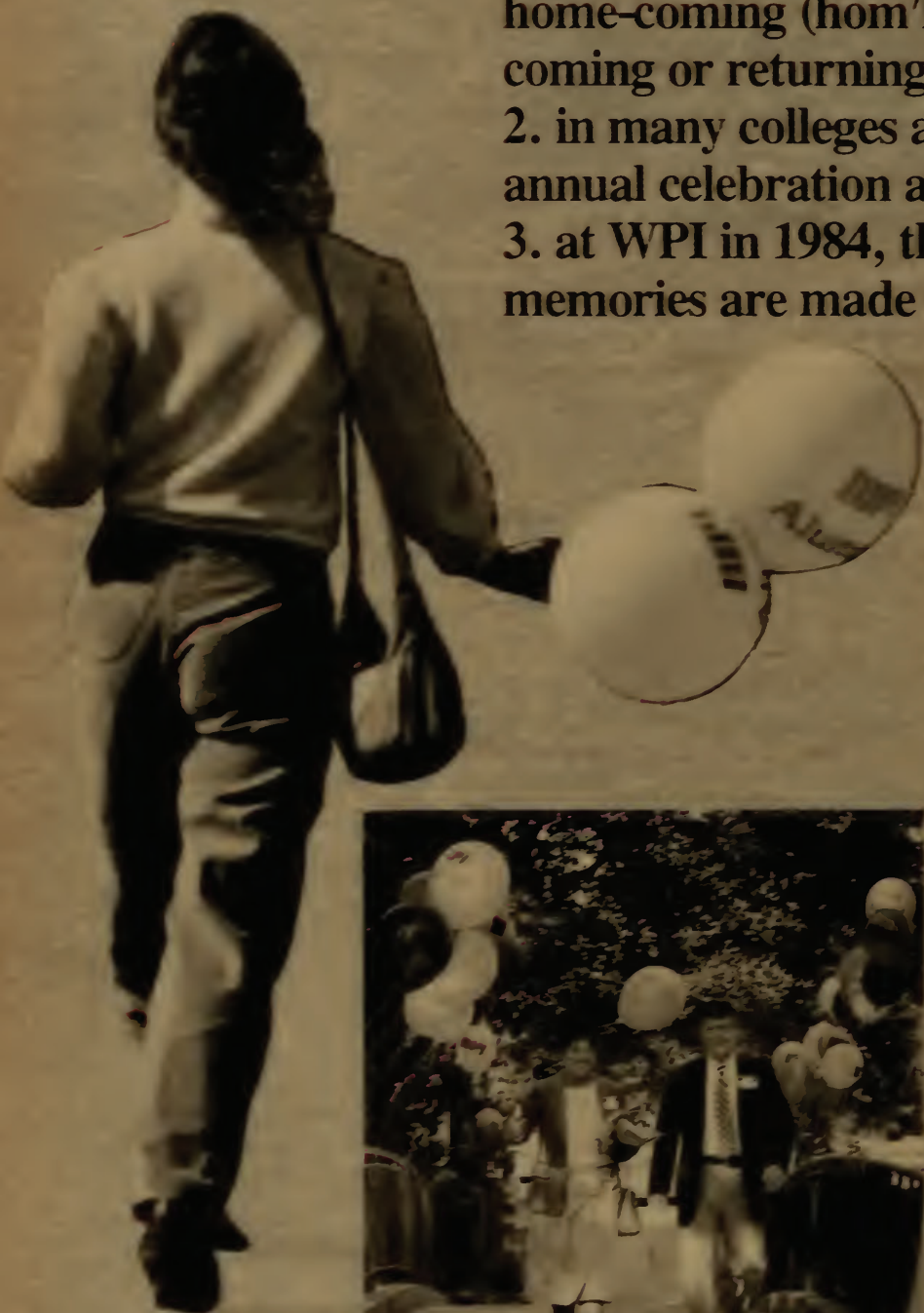
The program is directed by James P. Hanlan and Malcolm E. Parkinson, both associate professors of history.

Students, usually guided by one advisor from the Humanities Department and one from a science or engineering discipline, work with the staff at one of New England's many outstanding museums. They have access to documents and artifacts; sometimes the projects culminate in permanent exhibits.

Projects have been done at the Mystic Seaport and Mark Twain House in Connecticut, Slater Hill Historic Site in Rhode Island, and the Peabody Museum, Higgins Armory Museum, Worcester Science Center, Sturbridge Village, Merrimack Valley Textile Museum, and the Worcester Historical Museum, all in Massachusetts.

In the photograph at left, a student works on a sailing simulator, now a featured exhibit at the Peabody Museum in Salem, MA. The finished product is a large model sailboat enclosed in a glass case, with the actual mechanism hidden below the blue carpet "water." A museum visitor simply touches a control and a breeze begins to blow inside the glass case. Then, by manipulating three controls—one for the rudder, one for the main-sail and one for the jib and staysail—the visitor can actually tack, jibe, reach off the wind or run before the wind.

home-coming (hom'kum'in), n. 1. a coming or returning to one's home. 2. in many colleges and universities, an annual celebration attended by alumni. 3. at WPI in 1984, the kind of event that memories are made of.



Yes, 1984's edition was perhaps the most ambitious Homecoming ever staged. But the weather was flawless (for once), the turnout was huge (with a record attendance at WPI's football victory over Coast Guard), and the sheer number and variety of events and programs provided nearly everyone with something to cheer about.

From the continental breakfasts for graduates in chemical, civil, electrical and mechanical engineering, to the 5-Km road race (won by Bob Ferran '74), to the annual Homecoming barbeque, to tailgating (gaining in popularity each year), to the annual rope pull (somehow the freshman won—again), to the varsity football, soccer and field hockey games, to fraternity dinners and parties, to the Athletic Hall of Fame induction and dinner, to the alumni rugby game, and lots, lots more—well, you might say Homecoming '84 packed as much into a weekend as is humanly possible.

One special stand-out was a new alumni award, the Ichabod Washburn prize, given to three graduates in recognition of their outstanding professional achievement. They are Barbara Bain Gatison '74, Michael Graham '74 and Ronald Howard '77.

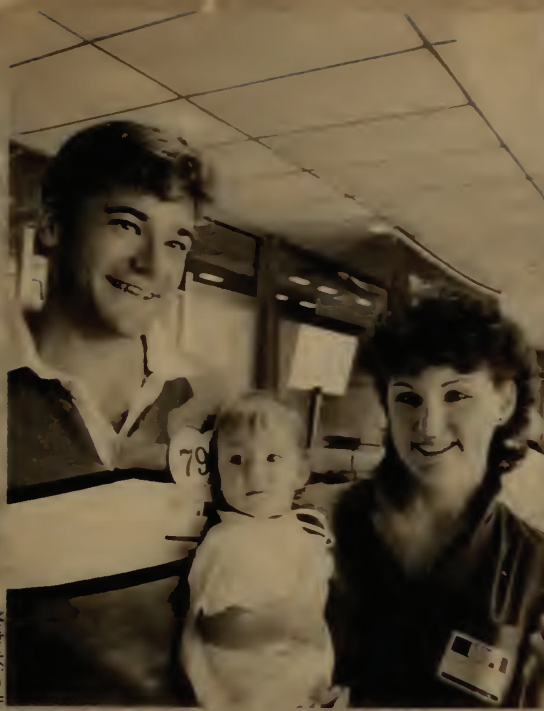
So have a look, if you please, at the photographic record we've made of Homecoming '84 on these pages and throughout the Class Notes section of the *Journal*. And remember, it's not too early to start making plans now for next year's autumnal festivities on the Hill.



Barbara and David Johnson '60.

Michael Carroll

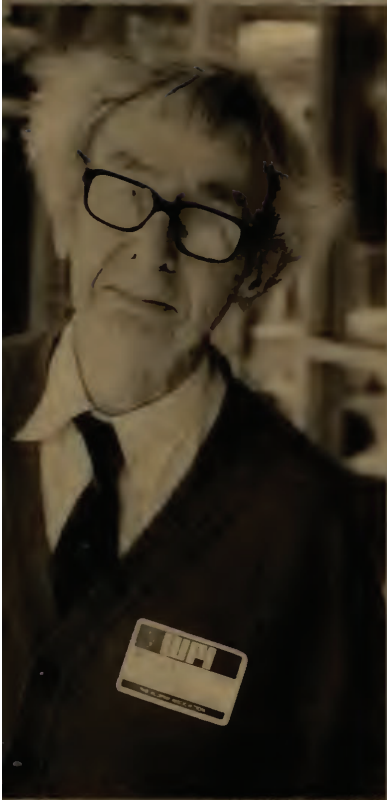
Homecoming '84 (clockwise from below): Gordon Crowther '37, Mr. and Mrs. Robert Bierweiler '43 and Edwin Campbell '43 at a reception for the alumni who worked on record-setting 1983-84 Alumni Fund; Mrs. Virginia Cranch, a familiar face at many alumni functions; Jan and Morgan "Mo" ('61) Rees, one of WPI's greatest-ever wrestlers, at his induction into the WPI Athletic Hall of Fame; Fred Pomeroy '27; Wally and Theresa Metcalf Catanach, both '80, with daughter, Monica.



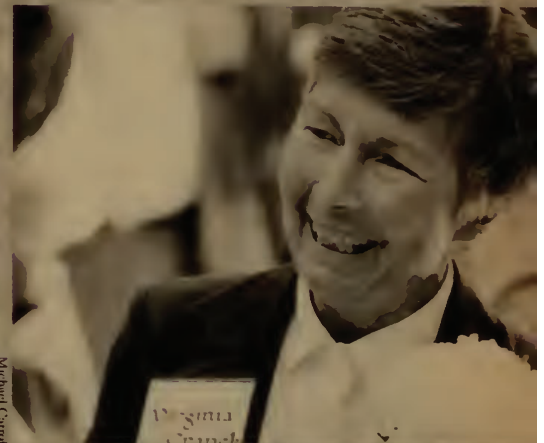
Michael Carroll



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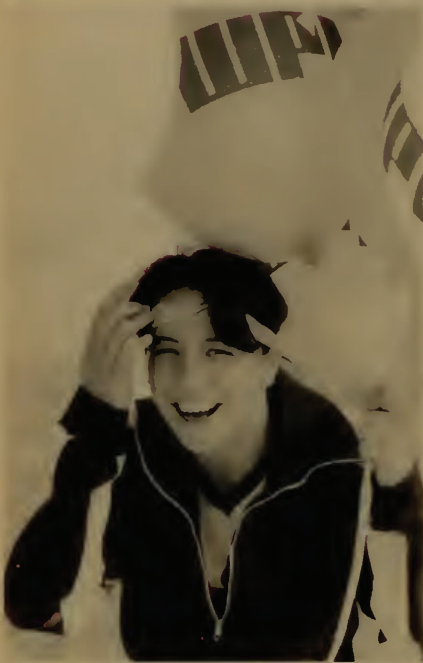


Michael Carroll

A more natural family portrait (left) you'll never find; above: the agony of de-feet.



Michael Carmill



Michael Carmill



Michael Carmill

Homecoming '84 (top to bottom): Melanie Flynn, wife of Matthew Flynn '82, shows off their pride and joy, Andrea; Robin Gately '86, of Dorchester, MA, in the spirit of things; the Lambda Chi's, predicting gridiron victory over Coast Guard.

Six to Athletic Hall of Fame

At Homecoming '83, the induction dinner for the eight charter members of the WPI Athletic Hall of Fame virtually stole the show. And at Homecoming '84, in the evening of September 22, six more exemplary members of the WPI family joined the ranks of one of the college's most exclusive fraternities.

- The late **Ivan "Pete" Bigler**, head football coach, 1923-40; head basketball coach, 1922-41; and head baseball coach, 1922-42; dedicated a significant portion of his life to WPI and its intercollegiate athletic program. He led WPI to more football victories (42) than any other coach except Bob Pritchard (a 1983 Hall inductee). He coached the Engineers' first (1938) undefeated football season, as well as the second-place New England standing of the 1938-39 basketball campaign.

- **Earl Bloom '54** was one of the greatest athletes to ever wear the Crimson and Gray. His 15 varsity letters are the most earned by any WPI athlete. A workhorse running back in the 1954 undefeated football season, he also scored the winning goal in the 1954 basketball game against UMass. He performed in several track and field events. And he played both singles and doubles in tennis.

- **William Graham '31** earned 11 varsity letters. Despite a football injury that sidelined him for most of his junior year basketball season, he led all area collegiate scorers in 1930. As an end, he was a scoring threat on the football field. And as the ace pitcher on the Engineer baseball staff, his career was highlighted by his one-hit, 12-strikeout performance against Clark University in 1929.

- **Donald Lutz '67** won the Outstanding Athlete Award in his senior year, the result of a ten varsity-letter performance at WPI. He was an All New England guard on the basketball court, with 1,212 career points, fifth in the WPI record books. Despite never playing soccer before his sophomore year, he was the team's star goaltender in its 10-0-1 1965 season. And on the baseball field he was both an offensive and defensive threat.

- **David McEwan '39** won 12 letters and was a three-sport team captain. One of just two freshmen to earn soccer letters in 1935, he would go on to earn All-America and All New England honors. In basketball, his four-year performance led the team's 44-17 record, and he was the Engineers' leading scorer as a junior. He was also captain of the golf team.

- **Morgan "Mo" Rees '61** was a three-sport captain and winner of 11 varsity letters. As a student, he was a player-coach in wrestling and, as much as anyone else, helped develop it into one of WPI's most successful sports. He was WPI's first All New England wrestler, and compiled a 23-3 dual-meet career record. He earned four letters in football, playing both offense and defense, and captained the 1960 team. And in the springtime, he was an outstanding high hurdler in track. Since graduating, Mo Rees has remained active in the WPI wrestling program, helping WPI to become a New England power.

It is well worth noting that as students *all* of these alumni were members of Skull—the Senior Honor Society. Congratulations to each and every 1984 inductee of the WPI Athletic Hall of Fame.



Michael Carmill

Principals at the 1984 Athletic Hall of Fame dinner, flanked by Patricia Graham Flaherty '75, Poly Club president, and Dr. Edmund T. Cranch, are inductees David McEwan '39, Donald Lutz '67, Earl Bloom '54 and Morgan "Mo" Rees '61.



A high school is a high school.



But every high school student is different.

Mass education is fine, says Educator Theodore R.Sizer, but standardized education is not. In *Horace's Compromise*, he describes the plight of the American high school teacher—trapped between too many

demands from the system and too little time for the students.

It doesn't have to be that way, Sizer argues. Chairman of Brown University's Education Department and formerly headmaster of

Phillips Academy, Andover, and dean of the Harvard Graduate School of Education, Sizer directs the Coalition for Essential Schools. It's essential, he says, to revamp the high school's traditional structure.



“High school is a rite of passage. Rituals are important, and rituals are embedded in the structure. If high schools didn’t have age-grading, who’d go to the junior prom?”

In *Horace’s Compromise*, you say that all high schools are alike. Could you describe the typical high school? Most high schools are very large and impersonal. All start before 9 o’clock in the morning. Mom and Dad leave the kids off, that’s the theory: Schools start early so the parents can leave the kids and go to work. I know of none that start as late as 9 o’clock.

All break up their day into what they call “periods,” usually somewhat more than 40 minutes and somewhat less than 60 minutes. Kids take at least five or six of those a day. It’s all set—it’s been that way since the 1890s.

Almost without exception, high schools are arranged horizontally by the age of the kids and vertically by subjects. Almost invariably those subjects are called English, mathematics, social studies and science, language arts, and so on.

High schools do vary by the social class of the students. What doesn’t vary is the structure.

What are the social class differences? One way of defining social class is parental income. Another is what Ed Banfield [*The Unheavenly City: The Nature and Future of Our Urban Crisis*, 1968] calls orientation to the future. I know some very low-income kids who are very upper-class and very aggressive academically. But by and large low-income kids tend to be kids who don’t put much value on investing in the future—which means doing their homework, or the ditch-digging of learning French verbs in order that sometime they might be able to speak French—in short, to do the things *that will get them somewhere*.

But there are less abstract differences. On the whole, the lower the income of students served, the larger the total load of students on the teacher. In city schools, the teacher usually faces—on the roster—five classes a day of 35 kids, which is appalling. In a suburban public high school, the teacher has five classes, or for an English teacher four classes, of 25 kids. In a very

rich suburb or a very wealthy private school, the ratio may be one to 12. But if a kid’s parents are low income, chances are the teacher’s load is 175 kids. That’s the most dramatic difference.

Another difference is that a low-income kid’s chances of having textbooks for every course are lower. And that kid’s chances of having *up-to-date* books for every course are lower still.

In a school with many low-income kids, many of the problems of the street wash into the school. For example, I spent some time in a school where 20 percent of the kids were already legally emancipated—they were under the age of 18, but the courts had termed them adults—and another 40 percent were *de facto* emancipated, that is they had no home addresses. Sixty percent of the kids had no home addresses. Probably very few “existed” in the census. They lived in burnt-outs. School was a health clinic, a restaurant, a sanctuary. The fights, the terrors, the drug pushing, the horror of those kids’ lives were reflected in the school.

I visited the principal of that particular school in December some years ago and asked, “Has this been a good year? How’s discipline?”, and he said, “It’s been a good year, no cutting.” “What do you mean?” I said.

“There have been no razor and knife fights yet, it’s all been fists.”

That’s not the way it is at Phillips Andover. No. The poor in this country continue to get the short end of the stick, although gross expenditures per student in many big cities are as large as those in suburban schools. Of course, much of this is soaked up in special services. Special services are needed, but they distort the data.

What’s surprising, though, is that the poorer school is still organized just like every other school—even in cases, like a high school I visited last week, where half the kids couldn’t read or write. Teachers teach grades made up of youngsters of a particular age. Teachers teach their own

special subjects, each department operating blissfully in isolation from every other one. Seven periods a day. Every high school in New York City is the same—every last district—in its daily routine.

Those students who can’t read and write still go to English and social studies and—And economics class. I talked with an economics teacher who taught the entire course without ever asking the students to read, even from the blackboard.

“What do you do?” I said.

“Well,” he said, “we run a Junior Achievement program. We decide on a product to make and then sell.” They turn the classroom into a factory and make the product—this year, they bought little calendars and put them in plastic folders with the school seal on them. Then the class worked out a marketing program and designed advertising posters—they did do that much writing—and then they sold the calendars in other classes.

It was a class in practical marketing, but it was called economics. The school can say it has a 12th-grade economics class, but the kids can’t read. The teacher says, “They can’t read, so I don’t try to make them read,” which is to say, “I’ve given up.”

The conspiracy is school-wide. Everybody says, “You can’t read, so we will avoid the issue.”

Until they learn to read and do elementary mathematics, there’s no point in giving students high school-level work. They can’t read—and, God, there’s nothing else the kids can do, because without that, they’re slaves in society.

To say, “We’re going to teach our students economics, health education, Bio I,” or to play the silly game that everybody, even the illiterate in their home language, will start to learn French—the city of Baltimore now has a requirement that everybody learns a foreign language, whatever their proficiency is in English—sounds terrific. But it’s silly.

We have a horrendous problem here, a fundamentally complicated problem.

If the structure is so irrelevant, what keeps it in place? High school is a rite of passage. Rituals are important, and rituals are embedded in the structure. If high schools didn't have age-grading, who'd go to the junior prom?

Graduation *must* be related to age, because graduation in many communities is a signal that it's all right to get married. It has nothing to do with whether a person knows English, it has to do with whether a person is old enough to get married. We don't tamper with these things because they're important to the culture for reasons that have nothing to do with educating students.

Have the high schools ever worked?

High schools have always worked for certain groups of kids, the students whose particular incentives seem to fit with what the schools want to do. Kids who have pressure from outside the school to do well what the school wants done well. Kids who don't have to worry about protecting their flanks all the time.

As a very wise principal told me in a conversation, "Look, I will show you an effective high school—if you give me just one power."

I said, "What's that power?"

He said, "Let me pick the parents."

He was absolutely right. Let me pick the parents—I'll teach in a barn and the school will succeed.

Neither students nor schools get to pick their parents. There was a time when more of the students who actually went to high school were likely to respond to the system's incentives. As recently as 1950 only half the age group finished high school. Today, the percentage of diploma recipients is somewhere between 70 and 75 percent. Enrollment is somewhere over 90 percent—the percentage will never reach 100.

The second world war was fought by an army whose average school completion level was the eighth grade. The Vietnam war was fought by an army with a high



school diploma. Between those two wars, there's been a social revolution: mass high school education for the first time.

Today, the majority of American schools are very nice schools. They aren't ill disciplined. They aren't dangerous. They're full of happy, friendly kids. A lot of them have great fun striking their bargains, going through in mindless, happy fashion.

But for many of these students, many of whom, wouldn't even have been in high school in 1947, the incentives are all wrong. If what a student wants is a high school diploma, and if the student has no particular ambitions for some sort of technical, specialized career, and if the student knows that the way you get a diploma is collecting Carnegie units, which means serving time, then the student is likely to say, "Well, I'll serve time doing as little as possible." Which means not being truant more than X days, not cutting-up too much. "Do the minimum, and I get as many Carnegie units as the person who breaks his back. Why do more? We'll both wind up with the same diploma."

Current incentives value expenditure of

Theodore Sizer, outside Brown University's Education Department offices: "It saps a teacher's morale when somebody else is making all the important decisions about students that teacher knows better."

time. Some states call it *seat time*, a wonderful phrase, and in the name of excellence, they measure it in minutes per year: If a school has 36,000 minutes of academic seat time in California, the school gets a bonus. So kids say, "I'll play the game, turn on the clock."

If we said, "You get a diploma if you show us you can *do* some important things," then we would get a different result. Get the incentives right, and you can teach anybody anything.

So turning high school into a mass enterprise is part of the problem? The problem isn't mass education. The problem is the assumption that standardized practice is the route to high standards—when in fact the opposite is true, because we're all different.

A lot of people these days just don't understand that. They think that by cen-



“The problem isn’t mass education. The problem is the assumption that standardized practice is the route to high standards—when in fact the opposite is true.”

tralized regulations and standardized practices, high school will improve.

Oh, high school will improve a little bit, because it will go from mindless to marginally less mindless. If you have everybody take aspirin, you are going to cure a few headaches.

Competency testing by the state, to make sure everyone has learned the same things, is the lesser of two evils. The greater of two evils is the state that says to the school, “There will be one syllabus and we will decide it and you will administer it to the students so-and-so-many minutes per day.” That is, everybody will use the same, specific program, all in the name of excellence.

And in the name of equity as well? It’s fair because everyone is getting the same thing? That’s right. Everybody will have their left finger amputated because a few may have a left finger that needs to be amputated.

And economy too—It’s very simple. You set up an assembly line and have an ax going, bang, bang, bang. You can whack a whole lot of fingers. It’s silly, absurd.

But the alternative means trusting the teachers. Some of them don’t deserve the trust, some of them do. But unless we trust the teachers, we won’t get more teachers we can trust. It’s a vicious circle.

If we make the job attractive, make it a job which has some authority, then more people who are deserving of that authority will enter the profession. If we reduce the autonomy of the position, we’ll drive out the best people. There it is.

Running down teachers is a popular thing to do at cocktail parties. Have teachers gotten a bad press? Yes. I think the current teaching force is stronger, as a whole, than it has ever been. But the job, as it’s structured in many high schools, is impossible. Many very good teachers do journeyman’s work, many journeyman teachers do terrible work, simply because there’s no alternative.

If we get the conditions right—better, not right—we’ll find that a lot of teachers will do a lot better and be a lot happier.

One condition, you’ve already suggested, would be fewer students. What are some others? More authority for the teachers. Control over their own time and materials. And authority to handle kids directly, instead of always having to refer to this or that, or send them somewhere else.

It saps a teacher’s morale when somebody else is making all the important decisions about students whom that teacher knows better. That’s why in private schools, many of which give much more authority to the teachers, morale is often quite a bit higher than in the public sector, even though salaries may be lower. Those teachers have some control.

Teachers, of course, must be prepared to make compromises. If the goal is to reduce the number of students per teacher, the compromise might be to teach more subjects to fewer students. If, for example, I’m prepared to teach both English and social studies, instead of teaching social studies alone to 160, I can teach English and social studies to 80. This will cut in half the number of kids I have to get to know. The compromise is that I have to teach a subject in which I didn’t happen to major in college. To me, that’s a much readier compromise.

But such a compromise involves a change in certification laws. And, for the teacher, that kind of compromise means taking risks, working hard, and working in a team.

Are you saying it is a compromise for teachers to have to work in a team? For some teachers it is, because it means admitting to your colleagues, “Gee, I just don’t know English very well, you’ve got to help me.” Some teachers don’t want to collaborate with each other.

On the other hand, teachers are already forced to teach outside their specialties.

Whenever a school board cuts the number of teachers, then the teachers with the most years are told, “You can stay, but you have to teach an unfamiliar grade, an unfamiliar subject”—But within their certification. Of course, that certificate could be 20 years old. It may be a “general” certificate.

I talked with the headmaster in a very distinguished Boston public school where a kindergarten teacher was being asked the following year to teach 12th-grade physics, because her certificate was a general certificate. She had the right seniority, the right race. We joked about this, and said, “It’ll never happen, it’ll never happen.” A year later, it had happened. She retired early. She was an excellent kindergarten teacher, but some computer bounced her into physics. Stupid.

Everyone of us has one of those horror stories about the teacher who doesn’t know the subject he or she is teaching. A lot of teachers don’t know their subjects, but many do.

The real problem is that there is no incentive for those who don’t know their subjects to learn more about them. And another thing—no one ever sees these incompetent teachers at work. There’s no one to watch them. If they say something wrong, no one knows. And, often it’s not even that the teacher is incompetent, it’s that he just doesn’t know.

When schools start teaching in teams, someone else will be watching. I sat with a school principal in a social studies classroom where the teacher said that the reason the Chinese came to the West Coast in the 19th century was because it was cheaper to bring them here than to send the dirty laundry to China. And that wasn’t a joke. I almost fell out of my chair and so did the principal, but if he hadn’t had a visitor to show around, he never would have heard.

Your Coalition for Essential Schools will try some of these ideas? What we’re going to try to do is join together a small group of schools, 15 to 25 of them, all of



Jack Sporn

which agree to a very simple set of basic principles and which try to put these principles into practice. We'll spend five to ten years working with them and see what we can learn.

The principles? No one will get a diploma except on the basis of mastery. No teacher will ever have more than 80 kids. The basic pedagogy will be what we call coaching. The kids will be expected to do the work, while the teachers support them. The expenditure per pupil will not increase by more than 10 percent. Among the compromises such a school will be prepared to make is that it will not be a comprehensive service center.

No two schools will put those principles in effect in precisely the same way. Nor should they.

There are a lot of schools out there that say they'd like to try. What the Coalition staff is doing now is visiting schools who've expressed interest. We're meeting good people, who want to do right by the kids. That's a cause for optimism.

But 15 to 25 high schools, out of thousands in the U.S., are a drop in the bucket. Salk didn't give his vaccine to

everybody in the beginning. It's an experiment—an experiment in the schools.

The 15 to 25 schools will be enormously diverse. There's a great distance between many of the schools we are visiting, even when they are as geographically close as an inner-city high school in Baltimore and a suburban high school in Columbia, Maryland.

What's been interesting is that a disproportionate number of the schools serving the poor have expressed interest. Why? They say they don't have much to lose.

Some people have criticized your plan. They usually cast their criticism this way: "You're talking about giving an 'intellectual' education to kids who will become ditch-hole diggers. *They* don't want a liberal education." By "they," the critics mean the poor and the minorities. "*They* should be trained up to be service workers." I find that argument easy to knock down.

What's your rebuttal? "Thomas Jefferson would be surprised to hear you say that." Just because you're black and poor doesn't mean you're dumb. Just because

you're rich and white doesn't mean you're smart.

But people really say things like: "Just send *them* to vocational school."

Learning to think is vocational training, whatever you do. Yes. And, of course, a student can learn to think in what appears to be vocational, as well as academic, training. Remember, no two schools will put our principles into action in the same way.

One of the teachers I describe in my book was a person I called Charles Gross. He was an electricity teacher. The day I was there, he had his students up at the boards doing their circuitry. Most of those kids wouldn't be in school if they weren't doing hands-on work in electricity, which they saw as a trade that they were likely to use afterwards.

But Charles Gross wasn't primarily teaching them the techniques of electricity, because he said the technology of the trade changes every five years and anything taught in school would be quickly obsolete. As the students worked at the board, he would walk behind one and say, "Billy, what would happen if you switched that differently?"

And Billy would point—always. Mr. Gross would say, "Billy, I'm blind, you've got to tell me." So—to put it pompously—Billy would engage in the careful description of hypothetical deductive reasoning. If he did this, then that would happen. But on the other hand, that would lead to this further result. A very complicated, abstract train of consequences. And the youngster would have to say all this in precise language—he wouldn't have to write it, but he would have to say it.

A vocational teacher has only 50 students. Charles Gross knew those kids, one by one. His teaching was very sophisticated basic, basic, basic training—not just "vocational" training in electricity. It wasn't taught by *Dick and Jane*. It was taught in a way that held the attention of those particular kids. And it was effective.

There are a lot of people saying, "Go



“There’s no way of knowing which kids will need what skills. Imagination, resourcefulness, and high intelligence are not the preserve only of the wealthy.”

back to the basics. There’s only one pedagogy, that’s grinding it down. Warriner’s grammar for all.” But unless we get the kids’ attention, unless the incentives are right for those *particular* kids, we won’t persuade them to learn.

We have to teach in different ways with different kids, particularly the demoralized. We can’t just say, “You should be interested in the life of the mind, therefore you will now read *Ivanhoe*.” We need to come at it from different angles, different directions.

We can never stop trying—that would be a waste of intellectual resources, the minds of young people. There’s no way of knowing which kids will need what skills. Imagination, resourcefulness, and high intelligence are not the preserve only of the wealthy. A lot of poor kids, maybe now semi-illiterate, are in fact very, very talented. Unless we make it possible for every young person to have a shot at showing off, at achieving, we won’t know who can.

Sure, a lot of kids are going to live very dull lives, at least by our values. We hope they’re happy lives, but they’re going to be dull. The question is, how do we collectively—how does society—decide which lives we’ll each live? The answer is, we must eliminate to the greatest possible extent influences on each of our decisions that are unfair. We should push every kid as though that youngster were going to reach the moon.

And we should do so knowing full well that some kids will say, “I need to add and multiply and subtract and divide but beyond that, everything’s dull. I’m *never* going to use any more math.” For a lot of people, that’s true. They won’t even use percents—alas, they’ll be conned by the bank. But for others, more advanced work will be essential. And no one knows which will be which.

Society categorizes all the time. If a person is black or Hispanic and poor, that person is a service worker. It’s a self-fulfilling prophecy. And some of the kids start believing it. I remember working

with a girl from Baltimore who came to an intensive program at Andover Short Term Institute saying that she was going to become a practical nurse. She left saying she was going to be a physician. The last I heard, she was a full scholarship student at Goucher College. Six weeks with a science teacher completely redirected her sense of herself. She was miserably schooled, but look where she is now because that physics teacher saw something special in her.

All this will be a very hard job because many young people don’t see much in the system that rewards them or their families. Why play the game if the rules are stacked against you? And what do we tell a low-income black kid these days, “Shoot for the stars”? The kid will say, “Who are you kidding?”

Is that the key thing, though, not categorizing students? There are no panaceas. But if there is one idea that seems to be very persuasive, it is the elimination of anonymity.

Truancy in good elementary schools is very low. One obvious reason is that the students are little kids, but another reason is that these youngsters are known as *individual* people. There aren’t big classes, so when Johnny is absent, Mrs. Jones knows who Johnny is, knows where Johnny lives, knows Johnny’s younger sister, goes and finds Johnny’s younger sister: “Where’s Johnny?”

And if Mrs. Jones is really aggressive, she trots down to the local game emporium, grabs Johnny by the ear, and drags him back. In the high school, with 125 kids or 150 kids or 120 kids to be responsible for, the teacher doesn’t know many individuals. Their sisters? C’mon. Where they live? Too much.

Many high school students are anonymous in their schools. They can drift. And they feel that no one cares. If we can change the high schools to get the anonymity down, then we will have a fighting chance. This is what many of us who want to reform the schools are saying.

The trick, then, is how to get those ratios down without increasing budgets. The trick is for people to be prepared to make the necessary compromises to eliminate anonymity. It can be done.

But when you’re dealing with a demoralized student who has been around schools for nine years and hasn’t picked up the skill of reading, how do you teach that person? Slowly, patiently, and with great difficulty. We’re dealing with a very wounded person.

The humiliation of not being able to read is why a lot of kids fake it. They’re very clever at faking it. They’ll look at the picture and guess. And you and I would be the same way. When we go to a foreign country and forget the language, we fake all over the place.

This makes teaching exceedingly difficult. One-on-one usually works best, or one-on-two. Often, the only people who can get through are peers, a sixteen-year-old teaching another sixteen-year-old.

We know a lot about how to do it. It’s just that it’s very expensive. It takes a lot of “people time”. And that “people time” is spent as much in dealing with the damage to self esteem and with the demoralization as in getting the student to read.

It’s not as expensive as dealing with them the rest of their lives. Have you got numbers on that? Various people have computed such costs. But that argument involves long-range thinking. It’s like lowering the national debt: people say, “We just won’t talk about it now.” The same reasoning is applied to education: “We’ll cut the funds and not talk about the costs in frustration.” The country just doesn’t want to hear. We’ve lost our faith in investing in the future.

Our illiteracy rate is rather high among civilized nations, isn’t it? A fifth of Americans are essentially illiterate. Some, such as Jonathan Kozol, argue that the number is even higher—a third. Ironically, many of these illiterates have high school

An Uncompromising Position: High Schools Must Change

diplomas. Again, we're so enamoured of the symbol—graduation exercises, the diploma—we've lost track of what it's supposed to mean. So we allow the school machines to run: People move and go to class, to ninth grade and tenth grade—even though they can't read. The truth is so painful we can't face it.

Should we go with the flow and simply turn our colleges into high schools? And our high schools into grade schools? I think a lot of colleges *have* to be high schools. I don't think we should ever give up on a youngster. We can't say, "Well, this kid's illiterate, so we should stop teaching him because he's unworthy of our attention." If illiteracy is what the system produces, we must teach basic English in the junior year of college, and that's what's happening. We can't just give up.

You say there are no panaceas. But some people argue that our high schools should simply have higher standards, and they point to Japan and Europe. Are their standards that high, or is it apples and oranges? It's partly apples and oranges. It's partly that in some cultures there is more societal support for abstract academic learning than in others. If I were to pick the parents for the ideal high school, many might be Asian.

I'm not sure how closely we should be looking at Japanese and European models. As far as many of the problems of American schools go, we don't need research at all, we just need to be able to add and subtract and multiply. If we want a teacher to spend five minutes a week with each of 175 students, we multiply 5 by 175 and we divide by 60, and the result is, of course, an absurd number, a block of hours that few teachers can invest. And just for *five minutes a week* on a particular student's work!

Until we get those numbers down, let's not talk about assigning two pieces of writing a week. We don't have to cross the Pacific to realize American high schools have a problem—or to find a solution.

The current criticism of America's high schools is not, of course, unique. "Since the 1930s," writes Theodore Sizer in a 1983 report published by the National Association of Secondary School Principals (NASSP), "American education has experienced a series of cyclical reform efforts, each about a decade long." Sizer divides each ten-year period into phases: initial outrage, the formation of commissions and task forces, reports and recommendations by those groups, adoption of some of those recommendations, and relative tranquility—to be shattered by fresh outrage, inaugurating the whole process once again.

In 1985, the United States should reach the end of the reports and recommendations stage. Two major reports—*High School*, sponsored by the Carnegie Foundation for the Advancement of Teaching and written by the foundation's president, Ernest L. Boyer, and *A Nation at Risk*, the report of the National Commission for Excellence in Education—have already been presented.

Horace's Compromise is the first of three books which report on a "Study of High Schools" co-sponsored by the NASSP and the National Association of Independent Schools. A second book, *The Last Citadel* by Robert Hampel, will be a historical survey of American high schools since 1940. The third book, like Sizer's an outgrowth of time spent observing American high schools, is *The Shopping Mall High School* (to be published in August 1985 by Houghton-Mifflin).

Of the many reports published thus far, few have been labeled "radical" as often as has *Horace's Compromise*. "The most far-reaching blueprint for change," said *Newsweek*. "A drastic reorganization of the curriculum and school day," said *Time*. What is radical about Ted Sizer's "imperatives for better schools"? Here are some of his recommendations:

Education should be decentralized, allowing each school to adapt to the needs of its particular students. High school should be voluntary—students who demonstrate a minima of basic literacy and mathematics skills are free either to leave school or to enroll in high school. In high school, they should be able to progress at their own rates, graduating when they

have exhibited mastery of the school's requirements, whether that takes two years or five. Age grading and days divided into six or seven 50-minute periods, with each subject taught in a different block, should be abolished, in favor of a curriculum organized into four large areas: inquiry and expression, mathematics and science, literature and arts, and philosophy and history.

Sizer admits that these new schools will be "messy," and that they fly against the American passion for order: "Our schools have a passion for predictability. System plays a big role; spontaneity is frowned upon. High schools are very complex places because a lot of things have to go on in the same place."

The writers of *The Shopping Mall High School* also claim that the system can get in the way of education. Arthur G. Powell, David K. Cohen, and Eleanor Farrar took their shopping mall analogy from a high school guidance counselor: "Both types of institutions are profoundly consumer-oriented. Both try to hold customers by offering something for everyone. Individual stores or departments, and salespeople or teachers, may try their best to attract customers by advertising appeals of various sorts. Yet in the end the customer has the final word." And quite often that customer decides not to buy. There are specialty shops—college prep, special ed programs, gifted programs, vocational tech, and so on—but there is nothing "special" for the "average" student, many of whom end up "hanging out" in the high school, much as they do in the real mall after school.

It's a depressing thought, but like Sizer and the authors of the other reports, Powell and his colleagues see a ray of hope: It might be possible to launch "a new, unusual, and long-term marketing campaign: to sell skill in using one's mind as a serious life skill. That is one of the few products the shopping mall high school has not tried to mass market. But it is not inconsistent with the mall at its best: it simply takes things one step further toward the day when different specialty shops, all committed to maximizing intellectual potential, will exist for nearly all teenagers instead of just for some of them."

HIGH SCHOOL NEWS

A plethora of national studies has made high schools front-page news. Here are reports on more specialized research, on colleges and universities forging new links with secondary schools, on the "competition" with Japan, and on the impact of computers—plus comments from the classroom: high school teachers voicing criticism and praise.

Teachers On Raising Standards

Kathleen Webb, Hartwick '67; guidance counselor at Lely High School, Naples, Fla., for the past 11 years:

"Florida is trying to lead the nation in upgrading academic standards. The requirements for graduating have gone sky-high; 26 credits now instead of 20, seven 50-minute periods a day until four o'clock, with no study hall, and a state test in basic skills. Those requirements are reasonable for some kids, but unreasonable for others; to some extent I think the standards are equating quantity with quality, and everyone's getting burned out.

"The requirements are heading in the right direction, but so quickly that we aren't giving the kids time to adjust."

James T. Hepinstall, RPI '33; retired in 1975 as superintendent of the Albany, N. Y., school system, where he had been teacher and administrator for more than 40 years:

"Lately, I've seen more intense requirements for diplomas being pushed by those with money and power, and in a lot of ways, that makes sense. But what about the kid in the ninth grade who's reading as if he were in the sixth? Do we just let him go, or do we give him skills commensurate with his abilities? We know that a diploma is the key to a job, and in Albany, we've offered several kinds for years."

Robert Cross, Hartwick '59; social studies teacher for 25 years at Maple Hill High School in Castleton, N. Y.:

"I'd like to see more rigorous academic standards, with the teachers having more power to enforce them. The impression I get is that parents don't like to see their kids do poorly. Instead of focusing on the



kid, they focus on the teachers as the source of the problem. Instead of calling teachers for conferences on the kid, they call the guidance office to find out what's wrong with the teacher.

"The implication you get as a teacher is that you're supposed to give everybody good marks. Don't fail anyone. As a result degrees don't end up meaning very much, because the students get through school without being held to learning anything.

"But I have a simplistic approach. I blame everything on Dr. Spock. He said, 'Don't stifle a budding ego; no one can be a failure.' That has carried over into academics, and as a result, there's been no setting of standards, and kids do end up as failures.

"I'd rather have taught in an earlier day when the students who couldn't make it were allowed to drop out. Admittedly they can't do anything now without a diploma, because they'll end up unemployed—but now we keep them in school, and they still end up unemployed."

Jerry Dyer, Hopkins, MA '83; he is in his first year of teaching English at Loyola High School in Towson, Md.:

"Even among the good students, the system doesn't teach the value of independent thinking; education is meritocracy-based: You need grades. Kids want to know, 'Is this going to be on the test?' It's almost a materialism of the intellect; rather than having intellectual skills, education is having these measurements that you flash in front of people to get a job or impress them. Measurements need to be devalued—but not achievement."

Sister Christopher Pixley, RPI, MS '75; a Dominican Sister of San Rafael, she is principal of the St. Vincent Ferrer High School in Vallejo, Cal., and has taught math and chemistry for 23 years:

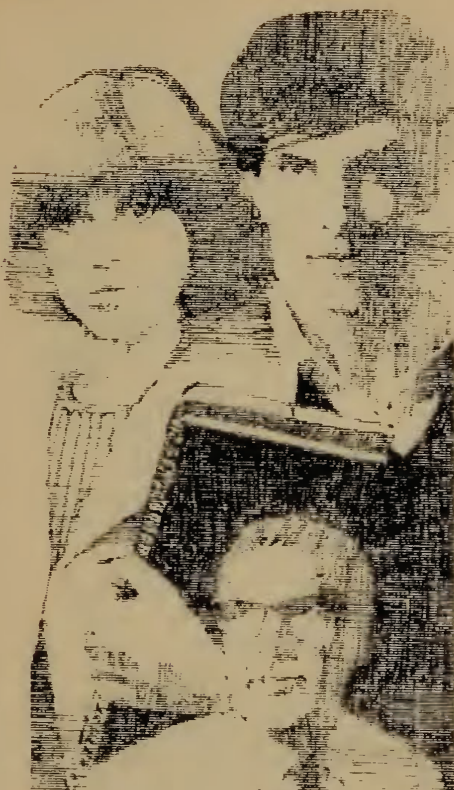
"We need to have high expectations for our students, but we also have to accommodate our school system to the learning styles that students have, because that's the only way to reach the students we're losing. You can't just raise standards across the board. You have to demand that each student strive to the limit of his or her potential, whether on the remedial or honors level. It's been shown that students do best when demands are put on them, so the question is, how can we do that for the ones we're in danger of losing? It's a tall order."

Just Friends? Students in School

Walking past a knot of laughing, talking teenagers, you can often sense the power of a peer group. It's a power, says sociologist Joyce Levy Epstein, that can be made to work for the high school. But first, the school must realize that it has the ability to influence students in their choice of friends. "Friendships can't be engineered," says Epstein, "but the conditions which yield friendships can be put into place."

Students make more friends, and more friends from diverse backgrounds, in what Epstein and colleagues call high-participatory schools. Unlike more traditional schools, where the underlying assumption is that students working together will lead to students talking together and then to general unruliness, high-participatory schools encourage student interaction. With many types of assignments and projects, students move from group to heterogeneous group, and teachers reward group achievement. (In a traditional classroom, there are usually only a few, easily recognized individual "stars" or "pets".)

Eliminating or limiting academic tracking, making room for extracurricular activities during the schoolday (so students who work after school won't be automatically excluded, for example), and opening such activities to people at all skill levels are other ways a school can encourage broader contacts.



In such situations, says Epstein, a researcher at the Johns Hopkins Center for the Social Organization of Schools, students tend to make friendship choices that are more "egalitarian." Because they are given a chance to recognize others' special skills, they are not limited to choosing friends on the basis of externals—which often means picking friends much like themselves. In fact, admits Epstein, a stu-

dent's two closest friends are likely to be fairly similar even in such a high-participatory setting, but it's at the next level, from the third-best friend out, that the broadening influence is felt.

Why bother? First, the school may feel it has an obligation to support society's commitment to diversity: "Take the example of desegregation. It may be the school's responsibility to arrange that black and white students meet in a positive way." Another example: "It may be the school's responsibility to see that kids have the opportunity to know that even though some kids have lesser academic abilities, they have talents."

Some schools, she says, balance the need for diversity and for different paces of instruction by having academic tracking only in certain courses and making others as heterogeneous as possible. A total commitment to academic tracking may widen the already large gap between high- and low-scoring students, partially by separating those students: Having high-scoring friends increases the achievement of both low- and high-scoring students.

High-participatory schools, Epstein points out, also do a better job of holding their students' interest. While students' satisfaction with other schools drops as they go from Grade 9 to Grade 12, the interest level for students in high-participatory schools stays constant. —MRY

A Population At Risk: Dropouts

With standardized test scores declining and the education page of the *New York Times* wondering why Johnny can't read (or write, or add, or even make it to class), the consensus among educational movers and shakers in the high schools has been: We're not working them hard enough. Back to the basics, say the National Commission on Excellence in Education, the Education Commission of the States, and the Task Force on Education for Economic Growth: a core curriculum of English, math, science, social studies and language, with more homework and tougher grading standards. Some educators are calling for longer school days and calendar years; a few have even suggested a longer school week.

All well and good, since studies have shown that smart kids get smarter when pushed. But a new study, prepared for the American Educational Research Association (AERA) by sociologists Edward McDill and Aaron Pallas of Johns Hopkins and Gary Natriello of Columbia University Teachers College, warns that students who are less academically inclined may get trampled underfoot in the stampede back to excellence.

"If academic standards are raised and students are not provided substantial additional help to attain them, it seems plausible to expect that socially and academically disadvantaged students will be more likely to experience frustration and failure," the authors declare in *A Population at Risk: The Impact of Raising Standards on Potential Dropouts*.

The study ultimately walks a middle line between what it identifies as the two

major trends in high school education over the past 30 years: excellence and equity. In the post-Sputnik era of the late 1950s, America was in a fever to be the best, and the National Defense Education Act of 1958 improved programs and facilities in the public schools. With the Civil Rights Act of 1964 and President Johnson's Great Society Program, the schools' focus shifted from quality to equal opportunity; critics have blamed the shift to equity for the subsequent erosion of academic standards and performance.

"We don't want to roll back the accomplishments of the last decade," says the AERA study's co-author Aaron Pallas, an associate research scientist in the Department of Sociology at Hopkins. "I think the crowning achievement of schools over that time was the opening of doors to minorities."

The study notes that dropping out is

already a problem of epidemic proportions. Research in 1979 showed that some 25 percent of all 18-year-olds weren't graduating from high school (on the other hand, the U.S. and Japan led the industrial world in percentage of young people entering high school), and a 1972 report to the U.S. Senate estimated the yearly economic impact of the attrition rate: \$71 billion in lost tax revenues from high school dropouts between the ages of 25 and 34, \$3 billion in welfare and unemployment assistance, and \$3 billion in associated crime prevention.

The AERA study says that dropping out stems from problems which tougher standards are only likely to aggravate. "By far the most common reason for leaving school is poor academic performance," say the authors. "It is not surprising that students who are not doing well in school should seek to leave an environment providing negative feedback." In other words, nobody likes to feel stupid, and under a back-to-basics curriculum, the non-academics may have even less room to shine.

Similarly, demanding more of the borderline student's time may be like trying to get blood from a stone. The average U.S. high school student spends "more time watching television per day than doing homework per week," but not the potential dropout. He or she has often "taken on the attitudes and roles of adults while still in high school," including "the work role." Among twelfth-graders, for example, those who work average 15 to 18 hours a week. And each year there are 400,000

adolescent mothers under the age of 17, 80 percent of whom never finish high school. The point is that many dropouts and potential dropouts already suffer from conflicting demands on their time.

So what's the answer? It's still "excellence," but with a safety net for the at-risk population. Pallas and colleagues suggest some modifications in the educational environment, none of them very surprising, that could keep the potential dropout from being pushed over the line by higher standards: smaller schools, with lower student-teacher ratios and the flexibility to gear programs to individual needs. At the same time, good old-fashioned rules, with the emphasis on clarity and consistency, are also "crucial to high academic achievement," no matter how specialized the curriculum. And school "climate," an atmosphere of "support for achievement and intellectualism," is important, too.

Laudable aims, but the fact is that it's a lot easier to institute reforms on paper than to legislate them in the classroom. "Most teachers have their own definite ideas about what will work," says Pallas. "At every step there's the risk that someone will say, 'Forget this stuff, I'm going to implement my own ideas.' Programs should be closely evaluated at the same time that they're being put into effect."

Even if all teachers follow the same game plan, evaluating the success of a program is tricky. Once more challenging standards are in place, it's likely that overall student achievement will rise. But, argues Pallas, it's also likely that many borderline students, if they aren't helped



to meet the new standards, will drop out. Since the students being tested will be the "survivors," rather than what Pallas calls the "full enrollment model," the reformers should not be too quick to take credit for higher performance. To get a truer estimate of the efficacy of higher standards, the researchers say methods should be found to include dropouts in the performance measures.

It's a way, they say, of keeping equity, as well as excellence, in mind. —JL

Computer Caveat

Schools are buying computers so rapidly that no one knows how many are now in American classrooms. One thing we do know, however, according to researcher Henry Jay Becker of the Johns Hopkins Center for the Social Organization of Schools, is that schools are buying computers without really knowing how to use them most effectively.

In a survey of U.S. principals and teachers (another survey is in progress), Becker was able to draw some conclusions about patterns of computer use in schools. High schools are the largest users. By January 1983, 85 percent of all high schools had at least one computer, compared to 42 percent of elementary schools.

Most high schools used their computers to teach students how to program. In fact, the longer schools had had the computers,



the more likely they were used to teach programming. That's perfectly understandable, Becker says, because educational software is notoriously bad and little has been done to integrate computers into the traditional curriculum or to apply computers to traditional classroom activities.

It's nonetheless disappointing that schools are making such limited use of computers, Becker says, and the solution goes beyond simply putting more and more computers into the schools. Becker is one of a growing number of educators who is recommending that schools stop buying computers for the moment, until more research is done about how to use them. "I'm personally a really avid computerist," he says. "But at the same time I spent enough wasted time in my crazed period so that I can safely say that schools shouldn't feel they have to do something

Misguided Efforts: College Counseling

For six out of 10 high school students in the United States the next step is college. But often that step is a misstep: six out of 10 students enrolled as freshmen at a college or university fail to graduate from that institution.

Why do so many students pick the "wrong" school? The answer, suggests the National College Counseling Project, can be found in inadequate college counseling. In the spring of 1984, the project's researchers surveyed guidance counselors at 2,200 of the nation's 25,000 high schools. (Of those counselors, 51.8 percent returned their questionnaires.) This is what the researchers found:

Schools serving upper-income families provide the best college counseling services. The disparity is likely to get worse: over the past three years, one in five lower-income schools (where family income is less than \$15,000) has reduced its college counseling resources. So poorer students, who can expect the least help in college counseling from their parents and friends, are also the ones who can expect the least help in school.

Regardless of the income group a high school serves, one factor is constant. Almost all counselors—99 percent—report that their programs are somewhat or very effective, despite the fact that few schools ask for feedback from students (35.7 percent) or parents (15.8 percent).

about computers even though they don't know what they are doing."

What then should be done? Becker thinks what's needed is an "experimental attitude": "Small numbers of schools should be given sufficient equipment to put computers in the classroom and try to use them in different ways."

Leaders in school districts, or teachers in very large schools, could find areas where the curriculum is weak and apply computers to make it better—more understandable and more fun. They would need the support of the school or school district, so that they could get their hands on all the computer resources needed, maybe even moving all the computers from a school district to one classroom. They would collect available software, or perhaps write their own. They would devise ways to integrate the computer into the normal activities of the classroom—lec-

While the counselors rated their overall efforts highly, some anxieties showed up when they filled in the questionnaire's Comments section. Many mentioned the high ratio of students they have to serve or complained of too much time spent on non-counseling duties. "I didn't earn 80 credits in counseling," one person told the researchers, "so I could sit here and figure out how many kids can take Phys. Ed. in third period."

"College counselors don't do the things people think they do—and they haven't done them for a long time," says Project



Director David Erdmann, director of undergraduate admissions at Rensselaer Polytechnic Institute. "Sitting down with the student, doing a thorough inventory of his or her strengths and weaknesses, and matching up a list of colleges and universities with those—that doesn't happen very often, except in private schools.

"We talked to a lot of students," says Erdmann, "and when asked how much time they spent with their college counselor in making their choices, the answer was often 'very little time' or 'no time'."

Even when counselors find time for the matching process, says Erdmann, it can be self-serving: counselors want students

ture, demonstration, discussion, exercise. And then they would set up a controlled experiment in which one class got the computer-assisted course and another the regular course. Then they would measure the impact on achievement—math or science scores, reasoning and writing ability, or whatever.

Until researchers begin to test different uses of computers in the classroom, Becker says, schools won't know what uses are educationally cost effective. There have been studies of using computers for drill and practice, for instance, and they "seem to show that if you compare students who use pencil and paper with those who use computers for mathematics drills, computers are at least as good as pencil and paper. But if you think of the expense, computers should be much more effective."

—ECE

to get into "good" schools, so "the matching process tends to be reputationally driven rather than institutionally driven." Also, suggesting possible schools is essentially subjective: "A good counselor in one school could sit down with a student, inventory strengths and weaknesses, and come up with a list of 10 schools. Another good counselor at another school would have 10 different schools on the list."

Erdmann, who describes himself as a former, "barely adequate" high school guidance counselor, says the project isn't out to condemn high school guidance counselors, but rather to suggest better ways of doing a difficult job.

To that end, the researchers are following up the survey with visits to U.S. high schools, selected to represent a cross-section of regions, incomes, affiliations, and so on. From this closer look, they plan to publish a formal report, complete with recommendations, this fall. Later in the 1985-86 school year, in the project's fourth and final stage, members will visit 20 schools across the country to help counselors set up the new guidelines.

Erdmann already has some suggestions: "College counseling can, and should, be a matter of establishing a process students can work through themselves. It doesn't have to be on a one-on-one level." The ideal program, he says, is one which "educates students about decision-making skills."

When university or college representatives visit a high school, Erdmann would like guidance counselors to request "a form of tithing" from the visitors: "Don't just let them sell their college. They should also be willing to give X percent of their time to educating students, for the good of colleges in the larger sense. They can talk to the students about writing an efficient essay, about what an interview really means, about what to look for when they visit a college campus."

The declining number of 18-year-olds means that "colleges are going to recruit more aggressively," says Erdmann, "therefore it's an imperative that kids learn how to deal with that flood of information." In short: "Good counseling is not coming up with a list of schools and handing it to a student. It is having a student go into the matching process in a scientific manner, not simply following the path of least resistance."

Did the survey turn up any surprises? "The economic disparities," says Erdmann. "It's not really surprising. But is it what we want to have happen?" —MRY

Teachers On Teaching

Paul Lambert, Hartwick '55; superintendent of schools, Cooperstown, N. Y., for the past nine years, he was an elementary school principal for nine years and has taught high-school social studies and history:

"Change has to begin in the classroom, with realistic standards and well-trained, caring teachers. Yes, that does mean finding a way to pay our teachers better salaries. If you had to choose between four years of college to get a starting salary of \$11,500, or a three-month tractor-trailer training course that would start you at \$20,000, why would you even look into teaching?"

"We certainly can't recruit the best people with the starting salaries we're offering. The industries are gobbling up the math and science teachers."

Mary Ann Dunevant, Hopkins, MEd '79; has taught English for 11 years at Archbishop Keough High School, Baltimore, Md.:

"I'd like to see more of the good teachers stay in the high schools—especially at the age that I am [32], a lot of people are getting out because they don't see teaching as a career with a future."

"What would keep them in the schools? A fair salary. Support from their administrators—perhaps having the administrator occasionally teach a class so there's not such a difference between teachers and administrators."

Lloyd A. Kelley, Jr., RPI '52; superintendent of the Rutland, Vt., city schools, he has held many teaching and administrative posts, including a stint as com-



missioner of education for the state of Vermont:

"We're working here toward what we call 'mastery.' We feel that any student, given the appropriate time, materials and staff can learn what you expect of all students. That *doesn't* mean you can make a silk purse out of a sow's ear. It simply means that students at a given level should master the core of knowledge that's been prescribed for them."

"This gets you into a competency-based education, where you are constantly re-assessing students and re-teaching them. ... The role of the teacher changes from the imparter of cultural heritage to a mediator of instruction. ... I favor the concept of a master teacher working with a group of teachers and instructional aides. This decreases the student-teacher ratio, which always means more money, but it creates more sophisticated, individualized classroom planning. We need to make that investment."

"I'm very fearful that secondary education is more a case of providing skills for

the present that worked in the past, rather than a case of providing skills for the future. For too long, our educational planning has been reactive rather than prospective."

Mike Brown, F&M '70; computer science and physics teacher at the Kiski School in Saltsburg, Pa., he has also taught at the Friendly High School in Prince Georges County, Md.:

"I'd like to see greater professionalism among the faculties, and that isn't going to happen until the school boards start treating us like professionals. School boards and administrations treat teachers the way that teachers treat students: they act as if they know best. Teachers *do* know better than students; for instance, I know better than the kids what I should be teaching in my physics course. But everyone on the school boards thinks he or she knows how to teach, and it simply isn't the case."

"Teachers are put in a factory assembly-line situation, where we're not involved in the decision-making. In a factory they don't expect the assembly-line guys to say 'hold it, I think we oughta do it like this.' They expect them just to be cogs in a wheel."

Timothy C. Doyle, F&M '73; teaches American and Russian history and Russian language at the Lawrenceville (N.J.) School:

"It's tough for me to comment on the public schools because I've never worked in them but my perception is that private school kids do a lot more homework. Also, I don't think public school teachers assign much writing, because they don't have the time to read it. Their classes are too big. The average public school teacher carries, what, a load of 60 to 100 students? I've got 40 to 50 tops where I am."

Can U.S. High Schools Learn from the Japanese?

High school in Japan is not compulsory, but even so 95 percent of the nation's young people enter high school—the same percentage as in the United States. And Japanese students enter high school already well prepared—the nation's 13- and 14-year-olds outscore students worldwide on math and science achievement tests.

"The average Japanese high school graduate," estimates Thomas P. Rohlen in *Japan's High Schools* (University of Cali-

fornia, Berkeley: 1984), "has the equivalent basic knowledge of the average American college graduate." When the longer Japanese school year (240 days) is taken into account, at the end of 12 years the Japanese high school graduate has actually had four more years of schooling than his U.S. counterpart. And that's not counting the time spent at *juku*.

Juku are after-school "cram" schools, preparing students for the annual competi-

tions, known as "examination hell," which determine entrance to the nation's universities—and more. Getting into a top school is the most important step toward a prestigious job: The top level of the government, for example, is dominated by graduates of Tokyo University; the statistical chances of a student entering Tokyo University are about 1 in 440.

Not everyone, of course, tries for entrance to Tokyo University. In fact, says Merry I. White, a Harvard sociologist specializing in Japanese education, "The Western perception of examination hell is a stereotype. Really, only 10 percent of high school kids go through the worst of

that." White points out that the competition for entrance into a good high school—public or private—may be even more intense: "If you want to go to a prestigious high school, you must take an entrance exam." So there are *juku* to prepare students for the high school exams—there are even *juku* which admit students by examination.

Although schools are ranked and entrance is competitive, White says that the premise behind the Japanese system "is still egalitarian, *i.e.*, intelligence and the ability to take tests are what counts. Super-bright kids make it even if poor or badly connected." The scales can be tipped, she concedes, in the case of "the middle-range kids, who need motivation, stimulation. That's where parental investment of money—for after-school programs or a tutor—or of time—as when mothers work with their children—can help." And, as John Zeugner, a Worcester Polytechnic Institute professor who has written on Japanese education, notes, money can be a help: "Certain schools with good rates of getting people into universities charge astronomical fees."

Sounds like a rat race? The situation for high school students (boys are more likely to aim for the best universities than girls, many of whom go on to junior college) isn't as bad as it may appear, argues White. "The student facing the exam has a lot of people on his side—mother, family, teacher—against the exam, which is seen as an outside enemy. Obviously, a lot is at stake, and if you fail, you're very upset, but there's something *integrating* about the pressure."

What about the relatively high rate of suicide among Japanese teenagers? "In Japanese culture, suicide is not viewed as as extreme an act as it is in the United States. It is viewed as a mode of self-expression, so there's a precedent," White notes. "When suicide happens, it usually involves a family dynamic which isolates the child rather than external pressures."

To the Japanese, the biggest problem facing their high schools—and junior highs—is school violence. "One education official has said that such episodes are clearly the fruits of the American occupation after World War II," says John Zeugner, "when Japanese schools were reorganized on the American model." What the Japanese mean by school violence, however, may seem child's play compared to school violence in the U.S. Although there have been (highly publicized) cases where teenagers have attacked or killed parents and teachers, the

numbers involved are very small. "Violence has a different cultural meaning," says Merry White. "A listing of violent episodes includes such categories as whether students have committed an act of violence against the required school uniform [meant to promote egalitarianism] or have dyed their hair. And, again, it's a matter of scale—the crimes reported in one year among school-age children in Osaka, for example, are equal to those reported in one day in New York."

The biggest difference between Japanese and American high schools may be the national consensus in Japan on the importance of education. The value

placed on education shows up in the status and pay accorded teachers: "Teachers are hired for life," writes White in *The Public Interest*, "at starting salaries equivalent to starting salaries for college graduates in the corporate world."

Does the American system do anything better? In *Japan's High Schools*, Thomas Rohlen suggests that Japan, with its common, fast-paced curriculum, falls short when it comes to the slower learners: "Those who leave school after ninth grade, and the small percentage who drop out of high school, face problems far more severe than those who stay to face the exam competition." —MRY

High School Index

Percentage of Americans aged 25 and older who had completed four years of high school in 1982: 71

In 1910: 13.5

Percentage of U.S. students enrolled in the general—rather than the academic or vocational—track in 1980: 37

Twenty years ago: 12

Number of minutes in the average U.S. class "hour": 57

Minutes of that hour spent on administration: 12

Of 19 academic tests given to students in industrialized nations the number of subjects in which the U.S. scored highest: 0

Second highest: 0

Lowest: 7

Of the six tests Japanese students took, the number in which they scored highest: 3

Percentage of U.S. students with jobs: 67

Percentage of Japanese male students with jobs: 18

Of female students: 11

Of 100 U.S. high school seniors, the number who own their own car: 50

Of 100 high school students in Japan, the number who have a driver's license and access to a car: 1

Number of hours the average U.S. student spends on homework per week: 3.9

The average Japanese student: 15

Percentage of U.S. parents who said in 1969 they'd like their child to be a public school teacher: 75

In 1983: 43

Percentage of decrease in real terms of U.S. teachers' salaries between 1972 and 1983: 12.2

Percentage of U.S. schoolteachers who report feeling unsafe on the job: 35

Average SAT scores (combined) of a National Merit Semifinalist: 1450 out of a possible 1600

Of U.S. college-bound students in 1982 who intended to major in education: 813

Teachers On What's Being Taught

Diane Jacobs, Hopkins, MLA '73, Hopkins doctoral candidate in gifted education; on sabbatical after 12 years of teaching English at Pikesville (Md.) Senior High School:

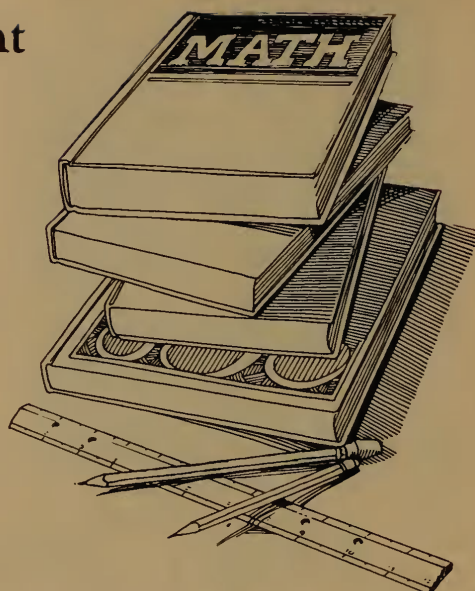
"I would like to see more career education in the high schools for students of all ability levels—career education beginning in ninth grade, with the purpose not of having students seal themselves into a career for life, but with the purpose of offering diversity of options and aspirations.

"Mentorship for high school students would be a great benefit in learning about career realities. It's a good experience for students to see that things are not just within four walls, that what you do in high school matters."

Kathi Fragola Hochber, Hartwick '73; French/Spanish teacher and soccer coach at Harrison (N. Y.) High School:

"We need some kind of national continuity in the writing of syllabi, in each subject area. I get kids in my language classes from out of state, and they're either too far behind or too far ahead. It would be good if we could even get some continuity within the state.

"Maybe this doesn't hold true in all subject areas—I can't see a biology course in New York being much different than one on the West Coast—but with languages, there's often a big gap. Of course,



that may have to do with money. The economic makeup of a community could determine the quality of its students, and also the amount of money it is willing, or can afford, to spend on language programs."

Thomas Zulick, Hartwick '61; math teacher at Saugerties (N. Y.) High School; he has taught for 25 years:

"We need to get back to the basics, the three R's. Kids can't read, they can't do arithmetic or logic. Everything else would fall in line if we got back to the basics.

"Grade values have gotten too political. Students and administrators aren't concerned about a core of knowledge, they're worried about averages."

Herman Finkle, F&M '50; guidance counselor at the Ewing High School in Trenton, N. J., he has worked 18 years as a guidance counselor and 10 years as a teacher with special education students:

"I think students need to have more of a liberal arts background in the ninth and tenth grades, and then a major for the last two years, the way colleges do."

Larry A. George, WPI, MA '78; principal, the Guilford School, Brattleboro, Vt.; he has also been a science teacher:

"We've got to reorganize the schools so that they're more student-centered than curriculum-centered. The amount of information there is to teach has grown to amazing proportions. In an information-oriented age, kids have to know where to find things and how, rather than a wealth of details.

"In science, for instance, there's a lot more to teach than simply facts. Kids need to know more about how science operates, how it affects their lives. We have to give them hands-on experiences, and make them relate the subject to the different kinds of things that are going on.

"Ted Sizer talks about doing away with the concept of separate teachers for different subjects in favor of, say, a combined social studies and language arts teacher. It's a more humanistic approach; in some ways it's like bringing a middle school environment to the high school level."

A Little Help From Higher Education

Now seems to be the time when all good colleges and universities are coming to the aid of secondary education. The long-term goals are altruistic; the short-term goals have to do with demographics. "Colleges are reaching toward high schools as student demographics are declining," says Dean Bradley R. Dewey of Franklin and Marshall College.

The current demographic dip is expected to curve back up in the mid-1990s, when the present baby "boomlet" comes of age. Meanwhile, the dip is forcing higher education to work with its

counterparts in secondary education, says Dewey, and that's good.

Some programs focus on teachers, others on students or on curriculum, still others on combinations of those basic elements. The important factor seems to be matching an institution's expertise to what the high schools want. "You can't force things on the schools," says Peter Christopher, a mathematics professor at Worcester Polytechnic Institute. "The schools have to come looking. The trick is to come up with programs that appeal."

WPI has done that with its Frontiers in Mathematics and Science program. Aimed at academically able students, Frontiers offers material traditionally not covered in high school: current unsolved problems in chemistry, physics, mathematics, and biology. The purpose: to spark the participants' interest and thus

counterbalance the national decline in the number of high school graduates who wish to major in science or mathematics. At the same time, the two-week program introduces WPI to potential applicants. So many students applied for the first tuition-free program (subsidized for the first two years by the George I. Alden Trust) that WPI upped the number of participants from 36 to 50 (65 attended in 1984).

Frontiers is one phase of a five-part program to include an honors workshop for science and mathematics teachers, regular discussion groups, visiting lectures by WPI faculty, and a scientist-in-residence program. WPI is also exploring collaborative efforts with a fledgling group in its area called SKIP—for School, College, and Industry Partnership.

In Troy, N. Y., the acronym is CETS, for Consortium for Educational Technol-

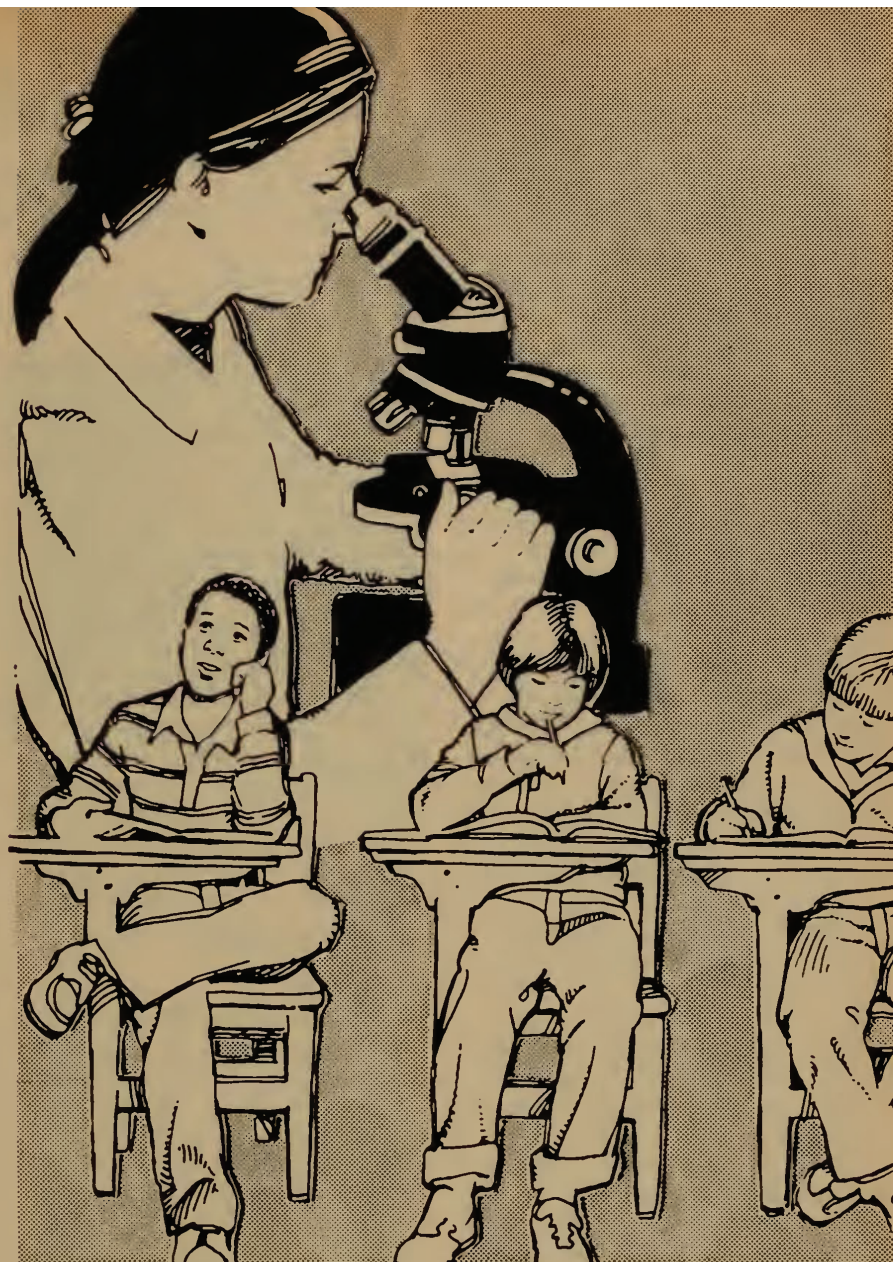
ogy and Science. Rensselaer Polytechnic Institute is among the institutions of higher education joining with high schools and industry to apply technology (primarily computers) to the teaching and learning of secondary school sciences and mathematics. The four-year project calls for summer workshops for research scientists and educators to produce and improve educational materials. It has lined up schools to try out the material—one by integrating it completely into the curriculum, the other by using it as a supplement.

While the project is making the grant-application rounds, RPI professors involved are going ahead on other work.

Mathematics professor Edith H. Luchins and colleagues have worked with the New York State Regents to revise the mathematics curriculum, used computer graphics to improve students' spatial skills, and set up an experimental reversal of the traditional order of science courses: physics first, then chemistry, then biology. "With this order," says Luchins, "students will be better prepared to understand the developments of microbiology, and the gap between high school and college biology will be much less."

The gap between high school and college courses, and the level of preparation the latter require, led 12 independent colleges and universities in Pennsylvania to issue a 1983 statement entitled "What We Expect." Those colleges have also initiated a series of humanities institutes for secondary school teachers—on literature in 1985, history in 1986, and foreign languages in 1987. They will be similar to national institutes once sponsored by the National Endowment for the Humanities: the faculty will be both professors and high school teachers, and the emphasis will be on content not pedagogy. But, says F&M Dean Bradley Dewey, "This attempts to be more than just a luminous summer experience—that glows very brightly for three or four weeks and then is allowed to stop." To encourage an afterglow of contacts between new colleagues, the geographic range will be narrow: each institute will really be four institutes—the colleges have divided Pennsylvania into four regions, and all participants at a given, centrally located institute will be from the same region. Funding for the first year comes from NEH, and several states, including Wisconsin and Florida, are interested in borrowing the concept.

Behind such projects lies the realization that it is high time to reforge the partnership between higher education and the high school. —MRY



Teachers On Responsibility

Lee C. Malbone, WPI, PhD '70; vice-principal at Burrillville Regional High School, Harrisville, R.I., since 1979:

"Parents have to monitor their children's behavior in high school, they have to communicate better with them and with their teachers. They have to emphasize the importance of education, and get re-involved in the process."

Charles W. Connolly, WPI '64; principal of the Classical High School, Lynn, Mass., where he has been a teacher and administrator for 25 years:

"I'd like to see education removed from

all political interference. The people in power have too much control, financial and otherwise, over the education system. . . . The fact is that the schools here have been underfunded for the past five years. The teachers haven't had a raise in four years. That makes for poor morale, which inevitably gets transmitted to the kids.

"I also don't have any say about the teachers who come into my building, and yet I'm held responsible for their performances. The school board chooses them, and there's a definite sense that we're not supposed to step on their toes. It makes it very difficult to run a school."

Teachers On What's Good About High Schools

Paul Lambert, Hartwick:

"We have some outstanding teaching going on. It's an exciting time to be in education, even with all the trouble. There are new tools, like high technology and, in New York, the new state regents plan—it's up to all of us to see how creative we can be in implementing them."

Lee C. Malbone, WPI:

"The teachers are our biggest strength. Most of them are working together with an amazing dedication to the education process."

Mary Ann Dunevant, Hopkins:

"I find a renewed interest in learning. I'm not sure of the source—sometimes I think the students feel they have to get good grades to get into a good college, but for many students it is wanting to do something well and having a sense of satisfaction out of doing something well. taking pride in what they're learning to do."

"Teachers are encouraging excelling more, not accepting substandards."

Lloyd A. Kelley, Jr., RPI:

"Today's public school kids are learning what I learned in college. They're better trained than any generation in the history of this country."

Jerry Dyer, Hopkins:

"The way high schools are set up, students come into contact with different teachers who can influence them, show them values and content. A lot of schools and teachers try to present a plurality of views; they don't just teach to student interests, but also teach against some of their prejudices and weaknesses. It can be very broadening."

"American education tries to be awfully broad—that's good, although it can go too far and become a smorgasbord, a K Mart of the soul—whereas in other countries, you are channeled into a particular field much earlier."

Timothy Doyle, F&M:

"I'm not sure I see any great strengths, beyond the fact that there are many good teachers doing the best they can do with too many kids."

Robert Cross, Hartwick:

"The teachers."

Kathi Fragola Hochber, Hartwick:

"There's an incredible diversity of subject matter being offered to students, at least in reasonably affluent areas. By comparison, in France after a certain level, students have to decide to follow either an educational or a vocational track. Here, both are offered in the same system, and there's more flexibility to change."

Mike Brown, F&M:

"The faculties are our strength, trying to do their jobs in light of all the problems. Also, we're starting to get back to basics, and that's becoming a strength. It was necessary to go the other way for a while, and now we're swinging back."

Thomas Zulick, Hartwick:

"The increased use of computers has opened a lot of areas in teaching, such as TV home computers. Unfortunately, the computer will only do what you are able to tell it to do; you have to have the knowledge to put into it."

Herman Finkle, F&M:

"There are a lot of dedicated people in education, the majority of the teachers are excellent, but you don't hear too much about that, or about the good kids either. We could both use some positive publicity."

Sister Christopher Pixley, RPI:

"Diversity and plurality are our biggest strengths, but I don't think we support them very well. Of course, I'm somewhat biased, but the bulk of public support goes to public schools, and I think that's a mistake."

Diane Jacobs, Hopkins:

"The best thing about the public high school system is that it has a great potential for change. I really believe the great diversity of people who attend public schools, and their needs, can be heard. They have to say what they want, make their wishes known, but the public high school is a receptive climate, not rigid or closed to change. The community has to work for that change."

"The best thing about public education is the public. If the high schools are going to get better, it's going to have to be the people—and not just the people in the schools."

Jobs And High School Graduates

A high school graduate out to get a job is graded at the interview on personality, not transcript.

In 1983, a survey of *Fortune* 1300 firms asked executives, Are American educational standards high enough to help U.S. industry meet its foreign competition? Almost everyone agreed on the answer—no. In fact, the National Commission on Excellence in Education's 1983 report, *A Nation at Risk*, charges that the U.S. economic slump can be linked to the declining worth of a high school diploma.

But Robert C. Crain, of the Johns Hopkins Center for Social Organization of Schools, reasoned that executives aren't likely to be hiring for jobs requiring a high school diploma. He decided to question those who do the hiring. He figured that if the hypothesis were true, personnel managers would say they were having trouble finding well-prepared high school graduates and would be looking for the students who did well at the best schools.

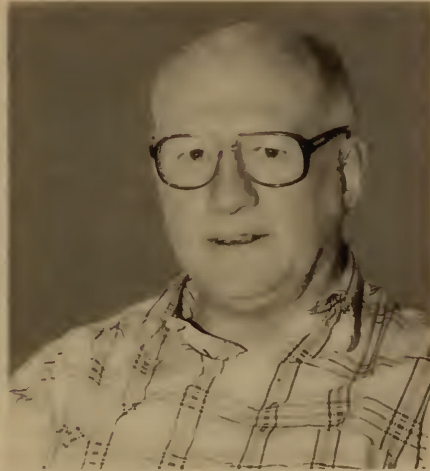
Crain tried to bait his questionnaire so subtly the managers wouldn't know they were being asked: "Is American education any good?" Each questionnaire included a vignette of a representative hiring situation. There were 40 vignettes, varied along six dimensions, including type of high school. Since it's popularly believed that suburban schools are better than city schools, the bait was hidden in the vignettes. But managers didn't seem to pay attention to high school quality.

Since many high school graduates are hired for bottom-level jobs, quality of training in mathematics, science and literature can seem irrelevant. Of 1,390 personnel officers answering to the initial questionnaire, 52 percent said recent high school graduates have the reading and math needed, leaving 48 percent whose new employees presumably don't. Yet only 6 percent said they provide instruction in basic reading and math for workers, and only 2 percent said they've had to simplify the reading or math requirements of jobs because of workers' weaknesses.

What personnel managers look for first in high school graduates is dependability, followed by a good attitude. They also want someone who is moral (translation: "doesn't steal company equipment"). Just below these qualities come the ability to read (on the level of the daily newspaper) and to do basic math. —CEB

Inside the Education Crisis, and Why You Should Get Involved

By Charles M. Richardson '46 EE



So you're in a profession other than education, be it engineering, medicine, business management, law or whatever. Undoubtedly, you hear the laments over the educational "mediocrity," the SAT sag, the language lag, etc., and you say, "So what? With all that fussing, the educators will get more money in their budgets next year, and they'll take care of it. I'll do MY job, and they'll do theirs (with my kids). After all, THEY'RE PROFESSIONALS, RIGHT?"

Before I yell, "Wrong!," I'm asking you, the reader, to hang in there with me for a few lines from an engineer turned educator who has seen it from the inside. Then you may be ready to yell with me, and together we'll be heard.

In the last 14 years, I have dealt with more than 2,500 students on an individual diagnosis and prescription (mostly remedial) basis. I see at all levels—K-adult—the damaging effects of poor teaching and school management practices. I feel that most of my students would not be remedial had they been taught properly in the first place. All this has given me grave doubts about the ability of the educational system to heal itself without outside help (yea, even intervention), even with Substantial ca\$h tran\$fu\$ion\$.

Ponder for a moment the history of educational governance in this country—long-standing practices founded on the rationale that "Education is too important to be left to the educators." That philosophy has led to the educational supervision by lay boards of education and boards of regents from society-at-large, and the writing of education laws by legislators. Our most fundamental and far-reaching decisions about education are being made by non-educators.

However, Don Stewart, like myself an engineer turned educator, points out in *Educational Malpractices: The Big Gamble in our Schools*, that only 10 to 15 percent of U.S. schools are considered to be using effective teaching practices. Yet, most educational decision-makers outside

A technologist turned teacher looks at education from the inside and describes what he sees from an engineering point of view: The system is worse than what has been made public. And the engineering-scientific community needs to take action.

education are urging decisions aimed at giving teachers higher salaries, merit pay, smaller classes, etc., with nary a word about improving the effectiveness of pedagogical practices. Who's really in charge here?

Simply granting more money to education has a poor track record: Make a logarithmic plot of the \$billion\$ spent on education over the last 30 years, and the \$billion\$ generated in the gross national product (GNP), extrapolate, and you'll get something like Figure 1. Thus if present

trends persist, education will devour the entire GNP by the year 2063!

Ironically, from our runaway investment we are reaping galloping illiteracy: 18 million illiterate adults in 1970, 23 million in 1975, and 75 million in 1983. Corporations are spending \$millions\$ annually teaching basic skills that should have been learned in public school. The Armed Services are re-writing manuals down to fifth-grade level, and half our youth don't vote and don't understand how our government works. It's no wonder that several states have already formed joint business-education "excellence" teams, most often chaired by a corporate CEO.

Persons outside education tend to assume that education operates as a profession, but I see much that persuades otherwise. It has ingrained practices of hypocrisy, fraud, conflict of interest, and ignorance of its own best research. The problem is one of technology, not in the sense of the use of technological products (e.g., computers), but of the basic technology of education itself: how humans learn. Educators have dropped their own ball, and the intellectual and political clout of our industrial/scientific community is needed to catalyze their recovery. From an engineering viewpoint, education needs a megadose of systems engineering.

The teacher training to which I was exposed included little discussion of developing an educational strategy on the basis of theory and evaluating the outcome of such; some material was downright misleading. In instructing student teachers, I felt coerced into participating in fraud by attesting to non-existent "competencies" in students I was teaching.

In the special-education field, the disconnection of theory from practice is even more bizarre: Dr. Gerald S. Coles's monumental research treatise on learning disability tests (*Harvard Educational Review*, August 1978) found NOT ONE test to have proven scientific validity for identifying something called a "learning disability," and that we are in effect "blaming the

**“The solution to the educational problem is
NOT more money, merit pay, teacher
exams or the like, but better management
of education.”**

victim for institutional failure.” What’s most alarming is that his paper has had *NO* effect: In the six years since its publication there has been not one serious rebuttal. But special-education “professionals” continue to use the tests to manipulate the lives of children and to assign them labels, supposedly in conformance with laws which call for scientific validation of tests used to determine access to programs.

It seems that too many educators ignore their own profession’s best research. They tend to treat fervently held opinion with the same reverence as scientific fact, and have been doing so for so long that they have lost the ability to tell the difference! Such inadequate professional training accounts for the “mindlessness” which Charles Silberman describes in *Crisis in the Classroom* and for the frenetic flitting from fad to fad which too often upsets without upgrading, e.g., modern math.

Management of Skill Progressions

Improper teaching methods in the first grade start a chain of “connections” leading large numbers of our young to reading failure, frustration, illiteracy, delinquent behaviors and, too often, crime. Psychologists tell us repeatedly that learning is a joyful experience. The psychotherapeutic value of a successful learning experience has been praised as a “virtually unparalleled emotional discharge.” Yet, this “success therapy” tends to be underestimated or ignored by the educational establishment.

Mismanagement of students’ “time on task” and of their learning progressions (especially in the basic skills) has deprived far too many of the pleasures of learning. Experiences of failure bring on frustration and a poor self-image which can lead to maladaptive behaviors. Students become convinced that they can not succeed if they play by establishment rules, and so seek alternatives which bring them personal satisfaction, sometimes at establishment expense. Poor behavior is blamed for poor learning, but the chicken and egg relationship is mostly the other way around.

This line of “connections” would be purely speculative were it not for the existence of school districts managed by mastery learning systems, where increased academic success has been accompanied by dramatic decreases in discipline and vandalism problems! There are, as well, mountains of depressing data showing high rates of illiteracy in our prisons, and otherwise linking violent behavior with academic deficiencies.

In management parlance, the above conditions are a result of operating “open-loop,” and bespeak the need to control quality (verify learning). Fortunately, an active, growing program is available as a model: the Network for Outcome-Based Schools (NO-BS—a cogent acronym!). It espouses a system for restructuring entire

school districts to operate on a mastery learning basis. Its successes need to be brought to the attention of every school district, but it will still take an influx of management expertise and encouragement from other professions to effect meaningful change.

Reading: The Pivotal Issue

At the core of the problem is the controversy over how to teach beginning reading: phonics (letter sounds) first vs. whole-word memorization first. You may have heard educators say that it doesn’t matter about the method “as long as the teacher is good,” or they may advocate an “eclectic” method (a euphemism for a shotgun approach).

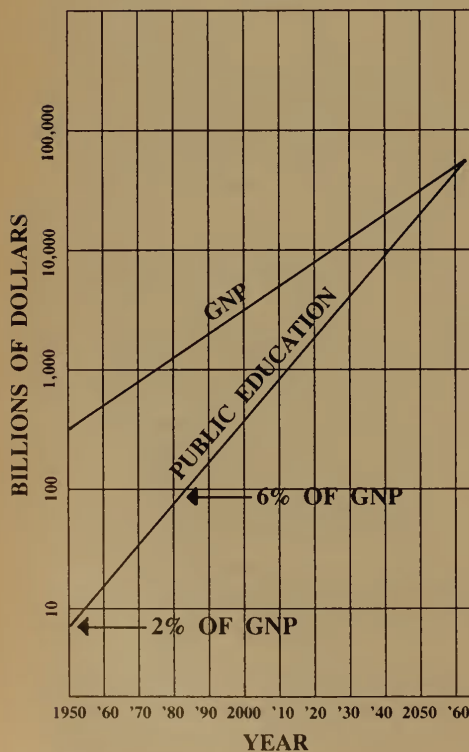
If children are first taught to memorize words by sight without identifying letter sounds (“sounding out,” “decoding”), they are being conditioned that reading is a guessing game that depends on the teacher’s telling them each new word. This approach confines children to a limited reading vocabulary (approximately 300 words in the crucial first grade) which allows only trivial and inane (See Spot run!) material to be handled.

On the other hand, if children are taught phonics first, they view each new word as a problem they can solve by recovering the spoken word from the “code.” A problem-solving attitude is fostered early. A phonics-trained first grader can read about 2,000 words! [Some authorities put the number much higher.]

Let’s review some of the other arguments so that you can be prepared to deal with them:

- a. “Phonics instruction produces ‘word-callers’ who do not read for meaning.” This is refuted by research (see below).
- b. “English is too irregular.” English is 85 to 90 percent regular. Several computers have been “taught” to read phonetically. The human brain is much more capable.

Figure 1



“Most people outside of education assume that, by and large, the educational system knows what it’s doing and how to correct its ills if given more re\$ource\$\$\$.”

c. “Reading is a psycholinguistic guessing game. A child should not be corrected if he reads ‘house’ for ‘home’ or ‘pony’ for ‘horse’ because he’s ‘reading for meaning.’ ”

d. “A child should be encouraged to guess an unknown word from context rather than sound it out. He can look at the first letter and then guess from the length and ‘shape’ of the word.”

As a foundation for precise reading (c) and (d), above, are patently ridiculous, and a child with such for guidance can’t distinguish between “form” and “from,” nor can he be sure whether the boat contains a load of carp or crap!

e. “TV is to blame for children not reading.” This is another chicken and egg argument: The printed word is a much better entertainment device than the bulk of TV fare, but children who lack confidence in handling new reading material will not attempt it as pleasure.

Even though you may think sounding out words is just plain common sense and nobody would do it any other way, there are thousands of teachers who have been taught that “phonics is bad,” and who inflict upon parents a broadside of the above arguments. Reasons favoring phonics are:

a. The most basic reading reflex is to recover speech sounds from the printed symbols, thus recovering linguistic structures (syllables) which are crucial to meaning. Whole-word memorization obscures linguistic analogies such as good:goodness = bad:badness.

b. A phonics method fosters an analytical, problem-solving approach to new learning tasks; a word-memorization approach fosters guessing.

c. Whole-word memorization overloads the memory banks, and leaves one impatient in expanding one’s horizons later in life. (I see older students and adults, with sight-word habits, who flounder in unfamiliar material.)

d. The alphabet is one of civilization’s most powerful inventions. Sight-word

methods ignore the alphabetic nature of English.

e. Research on learning shows that children do not initially learn whole concepts, but rather learn in segments in a “serial-apprehension” fashion. This argues that beginning with analysis of words by individual letters is more in keeping with children’s actual learning modes.

Studies over the past 60 years show a preponderance of favor for initial phonic-emphasis methods. Jeanne Chall (Harvard Graduate School of Education, probably the foremost reading researcher extant), in her latest book, *Learning to Read: The Great Debate, Updated Edition*, comes down squarely in favor of initial structured phonics upon criteria of fluency, comprehension and speed. “. . . the research of the 1970s continues to support beginning programs that are code-oriented. . . . Indeed the research support seems even stronger than in 1967.” She feels it “. . . disturbing to find reputable researchers . . . and teachers claim that direct phonics destroys reading for meaning when the research evidence indicates the opposite.”

Much fanfare has been made about teaching comprehension (“reading for meaning”), but its handling makes it a red-herring issue. Not that comprehension isn’t important, but the current practice of teaching myriad “comprehension skills” obscures the real problems: inadequate decoding skills and language and information deficits. More productive would be teaching children and getting them to think clearly.

An appropriate analogy is that of average adults trying to read a book on brain surgery. Although they may be able to read every word, they would comprehend little. But to help them comprehend, they would look not for a reading teacher but rather for someone who knows the subject, to teach the needed vocabulary and content.

Despite all the evidence, three out of four U.S. schools still use initial whole-word methods, and the “establishment” continues to blame failures on the student,

his home environment, TV, etc. Senator Edward Zorinsky (D., Neb.) in introducing Senate Resolution S.J. 138 to examine teacher training, poses the question, “Why has remedial reading become institutionalized instead of training teachers to teach it right in the first place?”

Part of the reason is economic, in that certain publishers make handsome profits from the basal readers necessary for whole-word methods, and from the “special” materials used in the “remediation.” (It costs little to equip a class for phonics: a \$12 manual, paper, chalk and a teacher who knows what he or she is doing.)

There is much anecdotal evidence of publishers’ wining and dining of textbook selection committees, particularly in states where state-wide uniformity is mandated, e.g., Texas. It is not uncommon for a publisher to run two separate versions of crucial texts (one just for Texas), or to tailor his national product toward the demands of Texas.

The waters are muddied still further by the fact that so many of the same anti-phonics educators who serve as professors in teacher-training institutions are also leaders in professional organizations (e.g., the International Reading Association) and are members of the editorial boards of the involved publishers.

Mathematics and Science Education

Reading is the basic basic, providing the information-handling capacity needed for mathematics and science. I have been tutoring a high school senior in physics. She is a bright girl who is applying to (and will probably be accepted by) the Massachusetts Institute of Technology (MIT). She attends a decent private school, but has trouble reading some of the physics material, because she lacks phonic skills for attacking unfamiliar words. I see many like her.

Everyone knows that math is a hierar-

“You may think sounding out words is just common sense. But there are thousands of teachers who have been taught that ‘phonics is bad.’ ”

chically structured subject: You learn addition before subtraction and multiplication before division, and so on. But the broader spectrum of the hierarchy is not understood or applied by many teachers and school systems. For example: Subtraction with “borrowing” or “regrouping” was taught to me in terms of strictly mental operations, i.e., I was not allowed to write any extra notations on the paper (I had to keep thinking). Contrast this with the various levels of auxiliary marks I have seen children using as part of their school-mandated processes:

12345	123 12345	01235 12345
<u>-6789</u>	<u>-6789</u>	<u>-6789</u>
5556	5556	5556

Not only are the marked regroupings a non-thinking and time-consuming procedure, but can you imagine what it's like doing the long-division algorithm when every subtraction operation is like one of those at the right?! Also, some students are never taught short division, and every one-digit division is performed via the long division algorithm.

Fractions is another key level of hierarchy, with which my learning center spends more time than any other math item because it is so poorly taught. Common fractions form the basis for understanding of both decimal fractions and percentage. Algebra and trigonometry use the fraction to express intrinsic divisional relationships, a situation which becomes incomprehensible to students who flounder in fractions.

I have spoken with a number of math and science teachers whose chief gripe was pressure from the administration to pass deficient students just to get them out. Students perceive these situations, and use them in ways which deprive good teachers of the satisfaction of being able to do a good job. Improved management is needed to maintain the healthy academic rigor in which mathematics and science can flourish.

Remedies, Resources, and References

There are already many parents and parent groups who know that something is wrong, but who feel impotent against the stonewalling of the establishment. There are also insightful educators inside the system, who sometimes can do little reforming without suffering administrative reprisals.

The role I see for the industrial/technological community is that of infusing the “excellence” effort with professional expertise and leadership through critical advocacy of whatever curricula and methods can stand up to scientific examination for effectiveness. The intellectual clout of persons who are skilled in the management of resources, who can interpret statistics, recognize misuse or distortions of data, and advocate clearly for strategies with proveable pragmatics, is a necessary element of national efforts for enabling children not only to “learn to read,” but also to “read to learn.”

To provide some ammunition for parents and “trapped educators,” consider the following recommendations:

1. Start a campaign to eliminate the general use of whole/sight-word teaching as an initial approach to reading. Legislation may become necessary.
2. Press local school administrators to justify their curriculum choices on scientific grounds. Reading Reform Foundation (RRF) can furnish information on phonic-based systems which have good track records, and evaluation guidelines and brief tests to see if your child is learning to read properly. Members of the Orton Dyslexia Society also have expertise.
3. Urge your school board to investigate (possibly emulate) examples of good educational management, such as the Network for Outcome-Based Schools. Consider also the “quality control” proposal

formulated by the National Committee for Citizens in Education and described by Copperman in *The Literacy Hoax*, namely, an independent group to manage all testing in a school district, responsible solely to the Board of Education.

4. Get to know and support other organizations with expertise to offer: Feingold Association, Fortune Society, Council for Basic Education, National Committee for Citizens in Education.
5. Increase the use of nutrition management (instead of drugs) in treating hyperactive children and as an aid in optimizing student performance in general.
6. Consider support for Senate Resolution SJ 138 for a National Commission on Teacher Education, and other means of illuminating important problem areas.
7. Above all, open and maintain dialogue between the education professionals and the professional/scientific community. Form study/action coalitions that meet regularly. As a starting point, I can provide you a bibliography; it will lead your group(s) to more.

Be wary of “research” writings that fly in the face of reason and common sense. Get in to the nitty-gritties of curricula, learning processes and testing technologies. (A good statistician is necessary here.) There are good educators in the system who can help root out ineffective practices, and who will need more than just moral support in sensitive areas where the establishment defenses will be up to protect territorial sacred cows.

After 25 years in engineering, in 1970 Charles M. Richardson, P.E. '46 EE, opened a basic-skills learning franchise, Learning Foundations Tutoring Center, in Dix Hills, NY. He holds an M.S. in education from C.W. Post College, plus three New York State teaching certificates. In 1983 he returned to engineering in the radar transmitter section of Sperry Corporation while continuing to direct Learning Foundations. His address is 270 Deer Park Avenue, Dix Hills, NY 11746.

WPI CLASS NOTES

WPI Alumni Association

President, Harry W. Tenney, '56
Senior Vice President
Paul W. Bayliss, '60
Vice President
Richard B. Kennedy, '65
Secretary-Treasurer
Stephen J. Hebert, '66
Past President, Peter H. Horstmann, '55

Executive Committee

Members-at-Large
Henry P. Alessio, '61
Walter J. Bank, '46
William J. Firla, Jr., '60
Patricia A. Graham Flaherty, '75

Fund Board

Allen H. Levesque, '59, Chair
Edwin B. Coghlin, Jr., '56
Richard A. Davis, '53
Michael A. DiPierro, '68
C. John Lindegren, Jr., '39
David B. Denniston, '58
Francis W. Madigan, Jr., '53
George P. Strom, '56

1925

Reunion May 30–June 2, 1985

1930

Reunion May 30–June 2, 1985

The August issue of the *Harvard Business School Bulletin* ran an update on **Carl Backstrom**, which told of his alumni involvement at WPI, including his co-chairmanship of the 50th class reunion in 1980. "Am now working on letters to the class for our 55th in 1985," he says. He keeps busy with traveling and gardening.

Stanley Fillion writes, "We are pleased to be back in the East." The Fillions, who had lived in Illinois, now live in a hillside ranch house surrounded by trees, shrubs and flowering plants in Norwood, MA. Stan recently learned that an unbreakable railroad car centerplate

(corset) that he designed during his last year of employment is still being manufactured by Dresser, keeping 125 men employed continuously.

George Fitt, who retired in 1972, formerly owned and operated apartment complexes in Fort Lauderdale and Delray Beach, FL. Earlier, he had been in the restaurant and hotel business as manager and owner. During his career, he was also an analytical chemist for Molybdenum Corp. of America in York, PA, and a chemist at Pacific Print Works, Lawrence, MA.

Carl Backstrom, Class Secretary

1933

Hugo "Duke" Borgatti, who lives in Dune-din, FL, is one of many who says he had a great time at our reunion, his first since our 5th. He's kept busy since his 1974 retirement from Uniroyal with volunteer work three days a week at a local hospital. He traveled some with his wife, Kay, until her death in 1981, and he continues to do so on his own.

Duke has found a unique way to see the Canadian Rockies, the Purcell Mountains in British Columbia. He took the Tauck Bugaboos tour in August and enjoyed several helicopter drops and pick-ups each day, as well as hikes on glaciers, mountain tops and alpine meadows with flowers in bloom. "Even saw a beautiful rainbow below us one morning." Duke visits **Art Glow** and **John Rigney** in Massachusetts nearly every year.

Ellis Brown writes that his retirement consists of enjoying the same "stuff" he's been doing for years, designing and building in the commercial and industrial area, but at a more leisurely and selective pace. He says that his operation is now reduced to a manageable one-man staff, "and surprisingly enough it puts some of the fun back into the construction business."

Barbara and **Al Brownlee** recently made a whirlwind tour through Italy, Switzerland and France, going from Rome to Paris in 10 days by train, by bus and on foot. After getting deep into art, religion and architecture, and into museums and cathedrals and basilicas, "it was a welcome relief on the last night in Paris to take in the exciting show at the famed Moulin Rouge."

Al Fuller and his wife, Jean, are spending a leisurely retirement in East Providence, RI, where he is still active in the Rotary Club and serves his church as a deacon. There are the usual visits with children and grandchildren, and special this year was the recognition he received for a half century of membership in the

American Chemical Society, as well as recognition as a 50-year Mason. (Seems like you've been around a long time, Al!) He also continues his interest in genealogy and is treasurer of the Society of Mayflower Descendants in Rhode Island.

Art Glow retired at age 62 (way back in 1973!) after nearly thirty years at the East Pepperell plant of the Bemis Co., where he was supervisor of machine development, procurement and maintenance, as well as of building construction and maintenance. He and his wife, Margaret, traveled extensively, including a week high up in the Andes and another camping on the Amazon. In July of '81, she suddenly became ill when they were playing golf, and in November of that year she died. Art says that although he has the "normal amount of rattles, dents and loose bearings," he remains busy keeping house, cutting wood, playing golf, gardening and visiting and being visited by three married children and seven grandchildren.

Another '33 graduate who is enjoying his retirement, which is in its 12th year, is **Linval Harvey**, who spends his winters in Vero Beach, FL, and his summers in Swansea, MA. He is a sailor, and this season is the sixth one in which he and his wife will have traveled the Intercoastal Waterway between Massachusetts and Florida. More than one of your classmates surely envies you in this endeavor, Lin. It was good to hear from you.

Here's a man who refuses to give up the challenge of design and invention. It's **John Magee**, who was just issued his 15th patent. John's firm is the Elevator Research Co. in New York, and several of his patents have been safety oriented. Based on his own experience, he offers in his letter the following suggestions, "It strikes me that other 'antique' engineers might use their spare time to rethink safety implications in their areas of expertise."

Another classmate who says that our 50th was great and confesses it was the first one he'd attended since 1938 is **Dick Merrell**. Dick, who lives in Walnut Creek, CA, says he'll try to get to our 55th in '88. (Looks like we'd better start planning for a good crowd!) Dick writes: "I play golf once or twice a week. Score's not too good, but we have fun. The rest of my time is spent keeping our yard and garden in fair shape. Retirement is wonderful!"

Sumner "Sunny" Norton is keeping up with the times. He just bought an IBM PC Jr., after taking an introductory course in computers, which he says he found "interesting but difficult." Also, he's still working, finishing his 50th year with Potdevin Machine Co., covering six states as a sales agent! He evidently hasn't been listening to the rest of us (correction, *most* of us!) praising retirement.

Our class was represented at the dedication of a new materials processing lab in honor of **Arthur Smith** at the newly renovated Washburn Shops on Oct. 19. Art's wife and son, Ken, represented him, because he was unable to attend due to illness. We also had a chance to see the very spacious and useful classroom on the third floor, which was made possible by our 50th reunion gift to WPI.

Sumner Sweetser writes that retirement continues to be very pleasant, with perhaps the best feature being the freedom to set one's priorities. He splits his time between New Jersey and Massachusetts, with occasional visits to Florida and Louisiana. He tells of a whale watch out of Plymouth which proved exciting: A pair of the giant mammals "jumped almost clear out of the water, and spouted so close to the boat as to spray the passengers. They then stood on their heads as they dove so that their identifying markings on the underside of their huge tails could be seen clearly." He also notes that "whales have a very bad breath."

Jerry Vail, our eminent reunion master of ceremonies, claims he and Glad haven't done anything spectacular this past year, but that it's still been enjoyable. In September they visited their son, Dave, a professor of economics at Bowdoin in Brunswick, ME. Later, they celebrated their 45th wedding anniversary by spending four days in New York City, where they took in the opera at the Met, the new Seaport, the Metropolitan Museum of Art and the Broadway show, "My One and Only." They'll be staying in Florida, for three months starting in January. Their address is: 52 Woodland Drive, Apt. 201, Vero Beach, FL 32962. Tel. (305) 569-6646.

Attending the 55th class reunion of Worcester's South High were **Bob Ferguson** and **John Dwyer** of Worcester and **George Lyman** of Suffield, CT. If **Art Smith** had been well, he

probably would have attended, too. Bob is president of the South High Class of 1929 and George is president of our Class of 1933.

Participation by the Class of '33 in the 10 a.m. (monthly) second-Thursdays Tech Old-Timers meetings at WPI has been good. Among those attending have been **Ed Allen, Al Brownlee, Norm Clark, Ed Conway, Tom Decker, John Dwyer, Al Glenn, Ed Johnson, Art Klebart** and **George Lyman**.

Your secretary is enjoying the responses he is getting to the recent requests for news and views from our members. He will soon be contacting those we haven't heard from, since our objective is to get everyone into the act. Incidentally, he took **Sumner Sweetser's** advice and went whale watching in October on the *Dolphin* out of Provincetown. Just as **Sumner** described, it's fascinating!

Al Brownlee, Class Secretary

1935

Reunion May 30-June 2, 1985

1937

Allen Benjamin, who retired in 1980 as a professor in WPI's civil engineering department, had a show featuring his watercolors, "Travel Impressions," at Babson College in Wellesley, MA, from Oct. 18 to Nov. 12. He began painting only three years ago, taking classes at Arts/Wayland. Since 1982, he has produced more than 30 landscapes, Indian figures and portraits. Prior to his retirement, he had also served as a planning consultant with the Alliance for Progress for many years. In this capacity, he

traveled extensively in Central America, recording his travel impressions in a photographic slide collection. These slides, along with New England photographs, provided the subject matter for most of the paintings in the Babson exhibit, his fifth exhibit since his first in the Wayland Public Library in 1983.

1939

Since his retirement from Norton in 1983, **Robert Bergstrom** has served as a part-time consultant for industrial distributors. He has an MBA from Harvard.

1940

Reunion May 30-June 2, 1985

Clark Goodchild continues with his volunteer computer work in the administrative office at Beverly (MA) Hospital. He also likes photography and amateur radio. He is a licensed operator, and his radio call letters are KA1ACM. A few years ago he had six antique cars, but now is down to one, a 1931 Model A Ford roadster. He enjoys repairing aluminum lawn chairs for friends. Instead of charging for the service, he asks the owners to donate to the Church in the Cove. At one time, he wrote a column for the *Beverly Times* called "Aviation News."

1942

Recently, **Paul Disario** was project director for the demolition of the old brick Stamford, CT,



Michael Curmill

Homecoming '84: Four of WPI's greatest athletes and 1984 Hall of Fame inductees, before a record Homecoming crowd at Alumni Field.

railroad station. This year, with the expenditure of \$50 million of federal, state and city funds, a new aluminum, concrete and steel depot will be completed over the railroad's four tracks.

1945

Reunion May 30–June 2, 1985

Francis Johnson serves as chief engineer at Smith Valve Corp., Westboro, MA.

The Rev. **Edward Swanson** has been interim rector of St. Andrew's Church, Kansas City, MO, since May 1. He writes he expects to hold the post for one or two years.

1946

Gary Hovhanesian has retired after 38 years in GE Housewares, following the sale of that business. He says, "After making all the house repairs long overdue, I'll try to keep busy either teaching or consulting."

1947

Philip Scott writes that he is in his 28th year with Pratt and Whitney's Government Products Division near West Palm Beach, FL. He serves as a project engineer in the advanced engine design group, specializing in high technology exhaust nozzles for AF fighter aircraft engines. His earlier work was with the AF's airborne high-energy laser, NASA's Space Shuttle main engine, and the J-58 and F-100 jet engines. He says he and his wife, Betty, are looking forward to his retirement "quite soon."

1948

Frank Holby, manager of compensation for Ozalid Corp., of Binghamton, NY, was the author of "How to Avoid the Comparable Worth Trap," which appeared in the June issue of *Personnel Administrator*. He has an MBA from Columbia University.

A.S. Kelsey works for Grumman Aerospace Corp., Bethpage, NY.

Edwin Strain is retired from Dayton Power & Light in Ohio.

1950

Reunion May 30–June 2, 1985

John Cocker is a member of the technical staff with Bell Communications Research in Red Bank, NJ.

Raymond Costine continues as director of process engineering at Cryovac, Duncan, SC. He has been with the firm, a division of W.R. Grace & Co., for 25 years.

Andre Tasso has won the best paper in corporate and organizational management from the Foundation for Administrative Research, with the support of the Society for North American Corporate Planning. His paper, entitled "The

Outrigger Principle: A 'New' Model for Dynamic Stability and Continuity in Management and Government," was presented at the Academy of Management's annual meeting in Boston in August.

1951

Alan Hansen works as a sales engineer at Medsker Electric in Farmington, MI.

Donald Lewis is general sales manager for Uniroyal Inc., Middlebury, CT.

Frank MacPherson was recently named head of the special business section of the Westfield (NJ) United Fund. Currently he serves as a member of the United Fund board of trustees. He also has been a member of the town council and president of the Y's Men's Club and the

local Jaycees.

John Seguin, an account executive for Norton Co., Worcester, resides in Newport News, VA.

Donald White is a sales engineer for Norton Co. in Livonia, MI.

1953

Alfred Bafaro, owner of Four Oak Realty Trust and Albro Construction Co., Framingham, MA, has been building condominium complexes for nearly 18 years. His most recent endeavor is the construction of Bolton Oaks Condominium, a \$24 million, 340-unit community in Clinton, MA.

Francis "Bud" Madigan, president of Worcester's F.W. Madigan Co. Inc., is president of

All in the Family

When Lincoln Thompson '21 (MS '23), trustee emeritus, and his wife, Anna, celebrated their 60th wedding anniversary last summer, three generations of Thompsons came together under one roof—all WPI graduates! Besides Lincoln, there were his son, Ronald, Sr. '52 and *his* son, Ronald, Jr. '83.

"It was like a family reunion and WPI mini-reunion rolled up in one," says Ronald, Sr., who hosted the anniversary party at his home in Madison, CT, Aug. 25.

Also on hand for the festivities, were Lincoln's cousin, Milton Ekberg '32 and his grandnephew, Roland Brooks '79 (MS '84). Other guests included Robert Chapman '21 and Harold Berg '20.

Lincoln Thompson, a pioneer in the sound recording industry, originally worked for the Victor Talking Machine Company,

which became RCA. He was a founder of the Soundsciber Corp. in New Haven and later became president and CEO of Raymond Engineering in Middletown. He retired from Raymond in 1968, after leading the company for 15 years.

His son, Ronald, Sr., is the founder and president of TAT Engineering of North Branford. He designed, manufactured and is currently distributing a line of pumps for industrial purposes. Grandson Ronald works for the United Bank in Denver.

Milton Ekberg is president and treasurer of his own business, Abrasives and Tools Inc., West Springfield, MA. Roland Brooks is involved with computer graphics at Synermation Inc., Woburn, MA.

Harold Berg has retired as head of Stone and Berg, the family lumber business in Worcester, and Robert Chapman is retired as chairman of the board of R.E. Chapman Co., Oakdale, MA.



60th anniversary guests: Lincoln Thompson, r.f., Harold Berg, l.f.; standing l. to r., Ronald Thompson, Sr., Milton Ekberg, Ronald Thompson, Jr., and Roland Brooks.

the 15-member Worcester General Building Contractors Association. Also, he is active in the Associated General Contractors of Massachusetts and in its 10,000-member Associated General Contractors of America. An article spotlighting Madigan and his company appeared in the April issue of *Business Digest of Central Massachusetts*.

1954

Donald Ross has been promoted to president of MPB Corporation, Keene, NH. He is responsible for MPB's divisions, including Miniature Precision Bearings of Keene, Split Ballbearing and New Hampshire Industries of Lebanon, NH, Andrews Bearing Company, Spartanburg, SC, MPB Europa in the Netherlands, and an affiliate company, Pneumo Precision Inc., also of Keene. Prior to his promotion, he had held several divisional management posts. He has served as a director and president of the Lebanon Chamber of Commerce and as a director of the National Bank of Lebanon, United Way, Lebanon Industrial Development Association and the local Boy Scout council. Don is a former executive vice president of the WPI Alumni Association and a past chairman of Alumni Publications Committee; he now serves on the Association's Budget Audit Committee.

1955

Reunion May 30-June 2, 1985

Stanley Clevenger is president of Walston Woodcraft in Spofford, NH. He holds an MBA from Northeastern.

1956

Michael Gordon has been named senior director of product marketing at the Kearfott Division of the Singer Company. He is responsible for directing the division's domestic product-applications marketing functions and the field marketing departments.

John Nash holds the post of safety and environmental manager at Koppers Co. Inc., Cicero, IL.

Roy Stone is supervisor of software engineering at DEC, Merrimack, NH.

1957

John Braley holds the post of regional sales manager for Information Handling Services in Santa Ana, CA.

Daniel Fisher, Jr. of Chelmsford, MA, has been appointed manager of development engineering at BTU Engineering Corporation. The company produces manufacturing equipment, software and controls for the semiconductor, electronics packaging and specialty materials industries. Fisher has responsibility for BTU's product development in areas that include diffusion and furnace automation, gas system electronics and continuous process furnaces. Previ-

ously, he was an engineering manager at Design Technology Corporation, working on the automation of high-speed testing machines. Also, he was a project manager at Leesona Corp. and General Dynamics. He is a certified manufacturing engineer.

Donald Girard is employed at Raytheon Co., Bedford, MA.

Joseph Weber is assistant materials project engineer at Pratt & Whitney Aircraft, West Palm Beach, FL.

1959

Fred Blonder owns F&M Electronics/Radio Shack in Jay, ME.

George Fotiades is co-owner of the Webster House Restaurant in Worcester. The restaurant, which serves 800 to 1000 customers daily, is 2½ times larger than it was in 1978.

Winthrop Wassenar has been named a director of the Bank of New England-Berkshire County in Williamstown, MA. He is director of physical plant at Williams College. A registered professional engineer, he has done graduate work at MIT.

1960

Reunion May 30-June 2, 1985

Dr. **John Haavisto** is slated to be the guest speaker on March 14 at a meeting of the 1984-85 seminar series planned by the Boston chapter of the IEEE Quantum Electronics and Applications Society. Haavisto, a senior technical staff

member of the Northrop Corporation, Norwood, MA, will discuss "Laser Gyros Using Integrated and Fiber Optics."

1961

Edmund Wozniak has been named vice president and general manager of the Sterling Die Operation of the Pratt & Whitney Machine Tool Division of Colt Industries Inc., Cleveland, OH. Since 1979, he has been manager of manufacturing services and materials at the P&W machine tool division plant in West Hartford, CT. He joined the machine tool division as a plant engineer in 1968 and subsequently served as supervisor of technical plans and services, manager of manufacturing systems and manager of planning and product development. He has an MBA from Babson College.

Rimas Zinas has been named technology program manager of control systems and energy at Bethlehem Steel Corporation.

1962

William Shepherd is now assistant vice president for information services at Citicorp, New York City.

1963

Dr. **Harry Hoyen** of Eastman Kodak Research Labs, delivered an invited paper at the East-West Symposium on the Fundamentals of Pho-



"The beauty of this system is that Substance 'A' is perfectly harmless, and Substance 'B' is perfectly harmless, and only if they mix together . . . oops . . ."

tographic Imaging in Hawaii in November. The meeting was composed of about 100 scientists and engineers, most from Japan, China and the U.S. In November 1985, he will serve as general chairman of the Symposium on Imaging Science in Washington, DC. Four areas will be discussed: Graphic arts-prepress; education in imaging sciences; image analysis; and electronic imaging— analog to digital/digital to analog systems.

Dr. **Richard Iacobucci**, as director of the Nature Preserve Inc., a wildlife sanctuary in Pembroke, MA, has announced the expansion of the preserve's holdings to 70 acres, including 22 acres of undisturbed woodland. He says classmates living in the area are welcome to inquire about free membership for picnicking, camping or jogging on the extensive trails. Tel.: 617-826-8888.

Robert Jamaitis has been named vice president of operations at Norden Systems, Norwalk, CT. He will provide management direction over all Norwalk operations activities, including manufacturing, manufacturing-engineering, production programs and administration, production planning and control, materials, plant engineering and product assurance. Also, he will provide functional management direction for all operating units, including United Space Boosters Inc. and Chemical Systems.

Richard Marcy, Jr. is vice president of the First National Bank of Boston.

Steve Mozden is senior engineer for preliminary design at Hamilton Standard, Windsor Locks, CT. Last year, he received his MBA from Western New England College.

Arthur Pratt continues as principal engineer at Edwards & Kelcey in Livingston, NJ.

John Slovak is with The Water Factory in Costa Mesa, CA.

1965

Reunion May 30–June 2, 1985

Robert Cahill has been elected to the board of directors of the Manufacturers' Association of Delaware Valley in Pennsylvania.

Jim Fee is the founder of Data Innovations in Lowell, MA.

1966

MARRIED: **Stephen Hebert** and **Carol Price** on October 26, 1984, in West Boylston, MA. **Tom Benoit** was a member of the wedding party. Carol, WPI events coordinator, graduated from Becker Junior College and attended Worcester State College. Steve is director of development and alumni relations at WPI.

Brian Gallagher works as a sales engineer for GE in Charlottesville, VA.

1967

Charles Blanchard is environmental products manager at CPC Engineering Corp., Sturbridge, MA. One of the firm's products is the "Internalift," a machine that can lift large



Heikki Elo at work.

Fuel Pellets From Garbage—Wave of the Future?

Heikki Elo '50 CE, president of Lehigh Forming Co. of Easton, PA, has a really "neat" idea for disposal of solid wastes. Instead of using land-gobbling landfills, which have no payback, why not use a waste-to-fuel-to-energy system, which takes up less space and pays off in fuel?

His firm, Lehigh Forming Co., turns solid wastes into fuel pellets. "We offer a service that is a viable alternative to landfills," he says. The firm takes waste and mechanically separates materials. Then, the combustibles are extruded into pellets to be used as fuel in year-round steam-employing operations.

Although his company does not collect waste, it is under contract with its customers to deliver the fuel pellets, install the necessary boiler equipment and haul away the resulting ashes. It offers a much

flows of water, other liquids and solid-liquid mixtures to heights of 40 feet or more. Internalift is used in the environmental and industrial waste removal fields.

Curtis Carlson was recently promoted to director of information systems research by RCA, where he has responsibilities in artificial intelligence, home computers and communications networks. Previously he was head of digital image processing and high-definition TV research and worked in physical optics at RCA Laboratories in Princeton, NJ. He has a PhD in geophysical fluid dynamics.

Dr. **Richard Gutkowski**, associate professor of civil engineering at Colorado State University, has been appointed chairman of the admin-

istrative committee on bridges of the American Society of Civil Engineers. The committee directs national efforts related to bridges by promoting better design and construction, encouraging needed research and effecting technology transfer pertinent to engineering and safety requirements. Gutkowski has done research on glued laminated timber bridges and recently led a national inspection team which examined experimental Forest Service timber bridges in seven states.

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Response to the Lehigh Forming System has been overwhelming, according to Elo. "Garbage disposal is a worldwide problem," he says. "We've received inquiries from as far away as the U.S.S.R."

Paul Kennedy, general manager of Kennedy Die Castings, Worcester, has been elected second vice president of the Society of Die Casting Engineers (SDCE), a Chicago-area based professional group representing the industry inter-



Michael Curran

Homecoming '84: Gerry Buzanoski '74 with sons Timothy and Todd, under the spell of magician Steve Dacri '74.

nationally. Active with SDCE New England for 10 years in numerous positions, in 1978 he became a national director. He had served as chairman of the education committee and as a member of the publications and constitution/bylaws committees. In 1983, he was elected SDCE secretary.

Alan Larson serves as analyst of computer techniques for GE in Burlington, VT.

Jack Rahaim has been named corporate manager of personnel systems, administration and finance at Digital Equipment Corporation. A DEC employee since 1980, Jack was most recently corporate manager of personnel administration. Previously, he worked as a technical product manager and planner in the building controls industry. He has an MBA from the University of New Haven.

George Rand, Jr. is employed at Union Carbide in Long Beach, CA.

1968

Currently, **Donald Bergstrom** serves as project engineering manager for Cianbro Corp., Windsor Locks, CT, covering construction projects in Connecticut and Western Massachusetts.

Israel Mac holds the post of vice president of Mac Steel Co., Rutland, VT. He and Bette reside in Pittsford and have two children.

1969

Robert Magarian serves as plant manager at Lloyd Mfg. Co. in Warren, RI.

Ronald Roberts is engineering manager for AT&T Technologies Inc. in Newark, NJ.

Frederick Spreter holds the position of district manager for the Masoneilon Division in Houston.

1970

Reunion

September 28, 1985

MARRIED: Alexander Murdoch and Claudia Zawilinski on September 8, 1984, in Gloversville, NY. Claudia, a graduate of Amsterdam High School, serves as a senior programmer at GE in Schenectady, where Murdoch is employed as an application engineer.

Joe Cascio works for Cadre Tech, Inc., Providence, RI.

Roger Etherington is now senior technical service representative for Vulcan Chemicals in Birmingham, AL.

Domenic Forcella has resigned as executive director of the Connecticut Council on Environmental Quality. While with the council, "Dom" was concerned with a number of issues, including hazardous waste, drinking water contamination and solid waste. Currently, he is studying for a PhD in environmental design and planning at Virginia Polytechnic Institute, where he is doing research on the public's perceptions of hazardous waste facilities.

John Garrity was recently named manager of the Maine Yankee nuclear power plant in Wiscasset. With the Central Maine Power Co. since 1970, he began his career with Maine Yankee two years prior to the plant's completion. He served as an assistant engineer in the reactor and computer engineering department and worked on-site through the plant's construction and start-up. In 1981, he was named senior director of nuclear engineering licensing at Maine Yankee's Augusta headquarters.

Chip Hassett has joined Environmental Resources Management Inc., Washington, DC, as manager of engineering design. His specialties are engineering design of wastewater treatment facilities, wastewater collection and transmission systems, industrial waste treatment facilities and water management systems.

Bradford Myrick is a senior engineer at Northern Research & Engineering Corp., Woburn, MA.

Kenneth Oberg is a senior management analyst for Florida Power & Light in Miami.

Roger Wilson wrote "Study for Decommissioning Coal-fired Power Plants," which appeared in the August issue of *Power Engineering*.

1971

MARRIED: John Oscarson and Martha Parry on September 15, 1984, in Mystic, CT. She received her bachelor's degree from the University of Pennsylvania School of Occupational Therapy and her master's from UConn. She is an environmental designer in North Kingston for the state of Rhode Island. He is a research engineer at Pfizer Inc., Groton, CT.

Michael Kajen has joined the Bloomsburg (PA) University faculty as assistant professor of computer and information science. Previously, he was a database analyst at the University of Massachusetts. He holds an MS in computer and information science from UMass.

Paul Pakus serves as branch supervisor at the Naval Ocean Systems Center in San Diego, CA.

Michael Santora, previously a consulting engineer with Shoenfield Associates Inc. of Boston, has been appointed town engineer in Milford, MA. A registered engineer, he was formerly assistant to the Holden town engineer.

Fred Szufnarowski was recently promoted

to senior engineer in the generation engineering department at Northeast Utilities. He holds degrees from WPI and UMass, Amherst.

1972

Michael Rapport is an assistant actuary at Penn Mutual Life Insurance Co., Philadelphia.

The Fiberoptic Division of Augat Inc., Attleboro, MA, has announced the appointment of **Robert Roland** as interconnection development engineer. Formerly, he was senior project engineer at Brewer Engineering Laboratories, a unit of Teledyne Engineering Services.

1973

MARRIED: Garry Boynton to Debra Arberdale in Housatonic, MA, on August 11, 1984. Debra has a bachelor's degree in nursing from Russell Sage College, Troy, NY. Garry is an environmental chemist for the state of New York.

William Ault holds the post of supervisor of product engineering at Norton Co., Worcester.

Dave Cirka writes that he has "made it to the top." On June 18, he and 11 companions reached the 20,320-ft. summit of Alaska's Mt. McKinley, the highest peak on the continent. The ascent took 13 days, the descent 2 days. He says that in his dreams, the climb began 12 years ago when he joined the WPI Outing Club, where his "appetite was whetted for the vertical parts of the world."

Ronald Lak is a facility engineer at Uniroyal Chemical in Gastonia, NC.

William Mawdsley was recently elected second vice president and actuary at State Mutual in Worcester. He joined State Mutual in 1973, was named associate actuary in 1978 and assistant vice president in 1981. He is a fellow of the Society of Actuaries, a chartered life underwriter and a chartered financial consultant.

Robert Nacheman has been named an associate of the affiliated organizations of Lev Zetlin Associates Inc. and Thornton-Tomasetti, Engineers and Designers, in New York. He has been involved in the design and administration of several projects, including the \$85 million, 40-story Continental Center in New York City.

Edward Peczynski has been promoted to manager of process computer engineering at Northeast Utilities' general offices in Berlin, CT. He joined the firm in 1973 as an assistant engineer in the System Planning Department. Prior to his promotion, he was manager of information resources planning and controls. Earlier he had been supervisor of engineering computer services and senior engineer in engineering software and development. A registered professional engineer, he has an MS from RPI.

1974

MARRIED: Michael Graham and Theresa Ritter in Quechee, VT, on August 18, 1984. She graduated from Regis College in Denver, CO, with a degree in psychology and from Albany (NY) Medical Center as a physician's

assistant. He is an associate consultant with the Wyatt Company, actuaries and consultants, in Wellesley Hills, MA. . . . **John Mathews** and Barbara Allen of Enfield, CT, on October 13, 1984. Barbara graduated from Wesleyan University. John, who is a senior engineer at Northeast Utilities, recently passed his professional engineer licensing exam in Connecticut. . . . **Steven Quist** to Wanda Burton in West Boylston, MA, on July 7, 1984. Wanda attended Evangel College and graduated from Atlantic Union College, Lancaster, MA. She is an RN at St. Vincent Hospital, Worcester. Steve graduated from Wentworth Institute and Fitchburg State College. He is employed by C.R. Quist, Contractor.

In April, *Boston Magazine* quoted **Garry Balboni**, project manager for the Perini Corporation, concerning the transformation of Harvard Square, Cambridge, during the Red Line construction project.

Stephen Rubin is president of Intellution Inc., which he founded in Westwood, MA, in 1980. The company's expertise ranges from system design and integration of small real-time systems to custom software packages for a wide variety of applications. Typical of the products offered by Intellution is its fully integrated control systems software called "The Fix." It provides big-system process control and monitoring capability with a personal computer-sized system. Rubin has lectured on industrial control using microcomputers and contributed to *The Layman's Dictionary of Computer Science*.

Ron Sarver continues as president of New England Party Supply Inc., Randolph, MA.

1975

Reunion

September 28, 1985

MARRIED: **John Bunzick** and Carol Parker in Belmont, MA, on April 21, 1984. Carol graduated from Oberlin College and is employed by Survey Tabulation Services of Cambridge, MA. John, assistant engineering manager for Wonder Market Companies of Worcester, is also studying organizational psychology at Lesley College. . . . **Dr. Francis Kiernan** to Carol Ann Montanye in West Hartford, CT, on July 21, 1984. She graduated from Hartford Hospital School of Nursing and is an RN with the Visiting Nurses of Hartford. He received his MD from the University of Connecticut School of Medicine and served his internship at the Hartford Hospital, where he was a fellow in cardiology.

Raymond Acciardi was recently appointed senior quality assurance engineer by Construction Materials Consultants Inc., Colorado Springs, CO. He will supervise field and laboratory operations and coordinate operations with Lincoln-DeVore, CMC's sister firm. Previously, he was with the Bureau of Reclamation, where he was responsible for soil testing section research programs and the development of state-of-the-art geotechnical testing equipment designs. A registered professional engineer, he has an MBA from New Hampshire College in Manchester, NH.

Michael Ball, supervisor of maintenance of buildings and grounds for the Rutland (MA) School Department, also makes handmade wooden rocking horses and other play equip-



Michael Shanley

Now You See Him—

Steve Dacri '74, the actor-magician known professionally as the "Fastest Hands in the World," concluded his entertainment at his tenth class reunion by proving in spectacular style that he may well be the fastest escape artist as well.

After tying up his escape-artist wife, Marlene, and locking her in a trunk on stage at Alden Memorial Auditorium, Steve leaped onto the trunk, and hid behind a cloth. When the cloth dropped a split second later, Marlene was on top of the trunk with Steve locked and tied inside!

Another crowd pleaser was the disappearing \$50 bill trick. After "borrowing" the bill from reunion chairman Garry Balboni, Steve "accidentally" burned it to a crisp with a cigarette lighter. Later, the bill, which had been signed by Balboni, was discovered rolled up inside a classmate's cigarette!

During Steve's performance, in which the phrase "sleight-of-hand" took on a whole new meaning, streams of colored

handkerchiefs and decks of cards seemed to take on lives of their own—something of which the Las Vegas dealers had best be wary when Steve is in town. Steve often performs at clubs in Las Vegas and Atlantic City, as well as the world-famous Magic Castle in Hollywood.

"I've appeared with Bob Hope, Charo, Rodney Dangerfield, Phyllis Diller and Tony Orlando," Steve says. His TV credits include "Merv Griffin," "Candid Camera," and "That's Incredible!"

Recently, he completed his first book for the general public, *Fooling People: Magic Secrets for Everyone*, which will be published soon. "Early in the year, I'll be in video stores with my new home video instructional series. 'Magic Secrets,'" he reports. "My home video series is the first that reveals and teaches 'miracles' which are easy to do."

A Worcester native, Steve had not appeared in his hometown for four years prior to his September reunion performance. Hearing his classmates' applause and receiving the keys to the City of Worcester made it a happy homecoming.

ment for children at his company, Wood Products, in Holden. Besides the rocking horses, he makes rocking seaplanes and roadsters and a limited line of children's furniture, including toy chests and toolboxes. Currently, he sells his wood crafts wholesale to retailers in all six New England States, as well as to several stores in the Worcester area.

Mark Drown works for McIntire Co., Thomaston, CT.

Ed Griffin has been named international applications engineer for Megatek Corporation, San Diego, CA. He is responsible for Far East sales and supports the international sales office in Lausanne, Switzerland. In September, Ed,

his wife, Alice, and their daughter, Sheena, went to Lausanne for two months, where he supported European computer graphics trade shows, including shows in Copenhagen and Berlin. In August, he completed his MBA degree in marketing at National University in San Diego.

Frank Moitoza is program manager at Naval Sea Systems Command, Washington, DC. Last May, he received his MS in systems management from the University of Southern California. The Moitozas and their two children reside in Springfield, VA.

Vance Rowe was recently promoted to production manager of the precipitated calcium



Homecoming '84: Gerald Masi, David Scott, Class of '74 members, and Dave Taracani.

carbonate department at Pfizer Inc., Adams, MA. He joined the firm in 1976 as a process engineer, became a project engineer in 1977 and was promoted to production supervisor in 1978.

Capt. Douglas Sargent, USAF, has been chosen as base company grade officer of the quarter at Thule Air Base in Greenland. The chief of programs and engineering with the 1012th Air Base Group, he was selected in competition among contemporaries for professional skill, duty performance and exemplary conduct.

Frank Vanzler now holds the post of project

superintendent for Turner Construction Co., Boston. He was recently transferred from Turner's Cleveland operation.

1976

MARRIED: Kenneth Korcz to Patricia Shane in Syracuse, NY. Patricia holds an associate's degree from Onondaga Community College, a bachelor's from Syracuse University and a master's of divinity from Trinity Episcopal School of Ministry. She is employed by R.E. Dietz.

Kenneth, who has a master's from Virginia Polytechnic Institute, works for Niagara Mohawk.

Robert Milk is a senior bank systems officer at Bank of Virginia in Richmond.

David Reid works for Arrington-Hobbs & Assoc. in Kissimmee, FL.

For the third time, Steve Silva has been selected as the Masters Award recipient by Tektronix Inc. The annual international award recognizes the company's top managers and salesmen. A Caribbean cruise is included as part of the recognition. Currently, Steve is the Northeast regional manager of the Tektronix Design Automation Group. He joined the firm, a manufacturer of electronic test equipment, in 1976. He has an MBA from Syracuse University.

David Vogt is an actuarial for American Universal, Providence, RI.

Paul Wheeler works as a project engineer at Perini Corp., Washington, DC.

Jeffrey Wilcox serves as administrative and controls manager for Mobil Oil Corp., Atlanta, GA.

1977

MARRIED: Norman Marshall and Wendy Walsh in Etna, NH, on June 23, 1984. Wendy graduated from Middlebury College and has a master's degree from Dartmouth College. Norman, a research associate for the New Alchemy Institute in Falmouth, MA, also holds a master's degree from Dartmouth.

Enrico Betti, who has an MSCE from Carnegie-Mellon University, is with Stone & Webster in Boston.

Douglas Elliot works as general foreman at General Dynamics, Groton, CT.

Thomas Kintz, who has an MBA from RPI, has been promoted to engineer at the Northeast Utilities Montville Station in Connecticut. He started as associate engineer at Montville in 1979.

Elizabeth Ernst-Mullin is employed as a



process development engineer at Norplex in La Crosse, WI.

Albert Riggieri has been elected associate actuary of the Paul Revere Companies. Most recently, he served as assistant actuary in the product actuarial area. He is a fellow in the Society of Actuaries.

Edward Smith is a project engineer at Marion Laboratories in Kansas City, MO.

Kurt Sonstroem works for Burton & VanHouten Engineering Inc., West Hartford, CT.

John Swalec, Jr. works as a research engineer for Union Oil Co. in Brea, CA. He has an MS in chemical engineering from the University of Washington.

1978

MARRIED: **Bruce Bertrand** to Joan Metivier in Worcester on June 24, 1984. Joan, personnel and operations manager at Home's department store in Pittsburgh, PA, received a master's in business degree from Anna Maria College. Bruce is attending the University of Pittsburgh School of Medicine. . . . **Albert Schutz** and Joan Kasputis in Shrewsbury, MA, on June 17, 1984. Joan graduated from Millbury Memorial High School and is employed by New England Power Service Co., Westboro. Schutz works for Du Pont's N.E.N. Products Division, Billerica. . . . **Robert Zawistowski** to Diane Wight at Old Sturbridge Village, MA, on May 11, 1984. She attended Worcester State College and plans to enter the University of Southern Maine in Portland. He is a utilities technical and training director at S.D. Warren Co., Westbrook, ME.

Thomas Edwards holds the post of technical director at PAR Technology Corp., Huber Heights, OH.

Michael Gantick now holds the post of director of public works and town engineer in Monroe, CT.

Keith Laird serves as a project engineer at Johnson Controls Inc., North Perry, OH.

Marc McCalmont serves as technical coordinator at Technical Communications Corp., Concord, MA.

Paul Peterson is now assistant to the plant manager at the American Hoechst Corporation's high-density polyethylene plant in Bayport, TX. Previously, he was in the company's sales and marketing office in Leominster, MA, where he conducted market research surveys.

John Wallace, a member of the technical staff at AT&T Bell Labs in Naperville, IL, was the co-author of "Designing for Ultrahigh Availability: The Unix RTR Operating System," which appeared in the August issue of *Computer*. He has worked in the Operating Systems Laboratory on the Unix RTR kernel since 1980 and is currently designing the kernel for a distributed multiprocessor system.

1979

MARRIED: **John Arnold** and Gail Wojnar in Westboro, MA, on June 23, 1984. A graduate of Holyoke Community College and Westfield State College. Gail is a systems consultant with Digital Equipment Corporation in Stow, MA. John serves as a software engineer with DEC in



Peter Bates

Vice President Judy Nitsch

Judy Nitsch Takes Top-Notch ASCE Young Engineer Award

Judy Nitsch '75, vice president and chief civil engineer with Allen & Demurjian Inc., Boston, was awarded the Edmund Friedman Young Engineer Award for Professional Achievement by the American Society of Civil Engineers at ASCE's annual convention in San Francisco in October.

The award is given annually to ASCE members who are 32 years of age or less, who are judged to have shown service to the advancement of the profession, who have demonstrated technical competence, character, integrity and leadership, and who have contributed to public service. This year two members received the award.

In 1982, Judy was honored by the Boston Section of the Society of Women Engineers (SWE) as the recipient of the National Distinguished New Engineer

Hudson. . . . **Louis Feula, Jr.** and Georgia Panteleakis on August 26, 1984, in Cranston, RI. An assistant manager at Florsheim Thayer McNeil, Warwick Mall, Georgia graduated from Community College of Rhode Island. Louis works for Monsanto Co., Everett, MA, and is also enrolled in the MBA program at the University of Hartford. . . . **Seth Martin** and Deborah Slowe on September 29, 1984, in Harwich, MA. Deborah graduated from South-eastern Massachusetts University and works at The Gap. Seth is with Jim Dooley Realty,

Award. She is president of the SWE Boston Section and vice president of the Boston Section of ASCE. A director of the Charles River Watershed Association, she also belongs to the National Society of Professional Engineers and to the Massachusetts Association of Land Surveyors and Civil Engineers.

At Allen & Demurjian, a consulting civil and structural engineering, architectural and surveying firm, Judy specializes in site planning and development. She has had assignments throughout the U.S. for companies like Showcase Cinema, McDonald's Corporation and General Cinema Corp. A registered professional engineer in twelve states, she was recently offered a partnership in Allen & Demurjian.

In 1980, Judy was featured on the "New England Today" TV program and on NBC radio's "The Woman's Program." A co-author of *Terry's Trip*, a coloring book introducing engineering careers to grade-school girls, Judy is also vice chairman of the WPI Alumni Publications Advisory Committee.

South Yarmouth, MA. . . . **Fred Siino** and Barbara Goody in July. Barbara is a graduate of Becker Junior College. Fred received his MSCE from Northeastern last fall.

BORN: to Debra and **Jeffrey Bouyeya** a son, Jeffrey Michael, on December 1, 1983. Jeff is controller at P. Francini & Co., Derby, CT. Last year, he received his MBA from the University of Houston. . . . to Anna Jean and **Kenneth Oriole** a daughter, Jessica Anne, on August 8, 1984.

Joanne Beckett, who is currently a research



Michael Carnall

Homecoming '84: Susan and Tom Rockwood '79 at the Alumni Fund celebration.

engineer for Union Carbide, holds two degrees from WPI.

Chris Corpuz is a consultant for Deloitte Haskins & Sells in Costa Mesa, CA. He holds a master's degree from Harvard.

Since 1982, **John Gordeuk** has been a systems engineer for the Space Shuttle mission simulator at Singer Co./Link Division. He studied for his master's degree at Rice University in the space physics and astronomy department.

Peter Gould works for Raytheon in Sudbury, MA.

Robert Hart serves as Southern California regional sales representative for Artel Communications Corporation.

Currently, **Bruce Jenket** is a quality assurance engineer at Varian Assoc., Palo Alto, Ca.

Paul Keary recently received his MSME from Oregon State University in Corvallis. He is a composite structural engineer at Boeing Aircraft, Seattle, WA.

Norman Lacourse has been promoted to project supervisor of natural polymer research at National Starch and Chemical Corporation, Bridgewater, NJ. In 1979, he joined the firm as a chemist.

Henry Lapa is with the U.S. Navy Patrol Squadron Sixteen in Jacksonville, FL.

Stephen Lesniewski writes that he has a year of veterinary studies remaining with the veterinary faculty of Warsaw (Poland) Agricultural University.

Sheng-Lung Lien is now a technical programmer/analyst at Nalco Chemical Co., Naperville, IL.

Christopher Mather has been promoted to district manager of instrumentation at Hewlett-Packard in Syracuse, NY. He is responsible for the management of sales in the Syracuse-Albany area. In 1979, he joined the firm as a field engineer. In 1983, he received the Upstate District Award and the Region Manager's Award for outstanding performance in sales.

Gary Pearson holds the post of Eastern regional distribution manager for Priam Corp., Needham, MA.

William Razeto works as a stress engineer at Boeing Aircraft in Seattle, WA.

Jim Rudolph is with High Voltage Engineering, Burlington, MA.

Robert Schifiliti of Westfield, MA, a fire protection engineer and systems consultant with Mass. Fire Alarms Co., has been chosen an Outstanding Young Man of America. He manages sales and engineering for the Lowell firm in western Massachusetts and Vermont. Currently, he is studying for his master's in fire protection engineering at WPI. He belongs to the Society of Fire Protection Engineers and is chairman of a task force trying to establish a nationwide computer system for rapid transfer of fire protection information.

Felix Vargas is a design engineer for Prime Computer in Framingham, MA.

1980

Reunion September 28, 1985

MARRIED: **Mihran Aroian** and **Karen Frankian** in Worcester on May 6, 1984. She attended Ripon and York St. John College, York, England and graduated from Connecticut College, New London. She is a copywriter for William Newhouse Advertising Agency, Houston, TX. He is a technical sales representative for Bethesda Research Laboratories.

... **Michael Coomey** and **Susan Higgins** in Worcester on June 9, 1984. Susan, a sales promotion specialist at Data General, Westboro, graduated from Clark and is a graduate student at Anna Maria College, Paxton. Michael is a senior test engineer at DEC, Shrewsbury, and a graduate student at WPI. ... **Thomas Egan** and **Mary Krull** in Marblehead, MA. Mary graduated from MIT and is working on a master's in material science at Stanford. Tom is a controls engineer at Axel Johnson Engineering Corp. in San Francisco. ... **Wayne Isaac** and **Nancy Catsam** in Holliston, MA, on July 22, 1984. Nancy, a technical editor for Wang Laboratories of Lowell, graduated from Lake Erie College, Painesville, OH. Wayne works for the Mitre Corporation, Bedford.

MARRIED: **Kevin Kelley** and **Cheryl Ann**

Campbell in Altomonte Springs, FL. Employed as a paralegal in Dallas, TX, she received her BA from the University of Central Florida. He is with InteCom Inc. of Dallas. ... **Angelo Scangas** and **Stephanie Pouloupoulos** recently in Lynn, MA. Stephanie graduated from Boston College and works for Jenis Insurance Agency in Lynn. Scangas is with Emhart Corporation of Middleton. ... **James Torrey, Jr.** to **Leslie Melkonian** on September 15, 1984, in New Britain, CT. Leslie graduated from Boston College. ... **David Weiss** to **Rhonda Friedman** in Providence, RI, on August 12, 1984. Rhonda graduated from URI and has a master's degree in social work from Adelphi University. She is employed by the New Bedford Area Center for Human Services. David holds a master's degree from Carnegie-Mellon and is with Teradyne in Boston.

Herb Dunnington holds the post of electronic engineer at Norton/Christensen in Salt Lake City, UT.

John Gusha, DMD, who graduated from Boston University Dental School last year, has opened a dental office in the Medical Arts Building in Holden, MA.

Capt. Stephen Lawry, USAF, is assistant professor of aerospace studies at St. Joseph's University, Philadelphia.

William Mangano, Jr. has been promoted to senior systems analyst within the systems organization at State Mutual in Worcester. He started with the company in 1982 as a programmer analyst and was promoted to systems analyst the following year.

Joseph Mayall serves as resident engineer at Babcock & Wilcox, Boston, MA.

John Pardo works for Kodak in Rochester, NY. In December, he received his MS from Penn State University.

Doreen Sa Vieira, an applications engineer in the microlithography division at Perkin Elmer, Wilton, CT, has been doing a lot of business traveling to the West Coast, the Southwest and Switzerland.

Gary Sawicki is a manufacturing project engineer at Medi-Tech in Watertown, MA.

Scott Sawicki serves as a senior test engineer at National Semiconductor, Santa Clara, CA.

Peter Sherer is a machine design engineer at Kodak, Rochester, NY.

David Wilson is a software engineer for Terak Corporation in Scottsdale, AZ.

1981

MARRIED: **James Blickle** and **Diane Mowe** in Hanover, NH, on September 8, 1984. Diane graduated from Becker and is employed by Allan Hirsch, DMD. Jim is attending Amos Tuck Business School at Dartmouth. ...

Stephen Leslie and **Mary Jane Montville**, '83, on June 3, 1984, in Worcester, MA. She is a process engineer at National Semiconductor, Danbury, CT, and he serves as a senior computer analyst at Travelers Insurance Co., Hartford. ...

Scott Nisula and **Debra Grant** in Sharon, MA. Debra has a BS degree in human services from Fitchburg State College and is a child counsellor in San Leandro, CA. Scott is a chemical engineer with Chevron Oil Company of Richmond, CA. ...

Marylou Place and **John Domino** on August 31, 1984, in New Bedford, MA. Marylou is administrative assis-



Joanne Beckett and Jack Tracy in Nepal.

Journey to the Ends Of the Earth

As children, many of us dreamed of taking wondrous journeys to faraway kingdoms nestled in storied mountain ranges. Recently, Jack Tracy '79 CE and his wife, Joanne Beckett '79 CH, made their childhood dreams come true. For two months, they trekked in the mountainous Asian kingdom of Nepal.

"Nepal, home to Mt. Everest, is the last frontier," Jack says. "On our trip there, we were accompanied by our friends Joe Gill and Jon Martinson of the Appalachian Mountain Club. We had perfect, post-monsoon, fair weather!"

Nepal is wrapped along the tectonic spine of the Himalayas, between India and Tibet. The capital, Kathamandu, is a symbol of the East with its busy open-air markets and Buddhist and Hindu temples. Nepal is a small kingdom, measuring roughly 500 by 150 miles. "However," says Joanne, "that description loses significance while negotiating its massive maze of ridges and 18,000-ft. passes."

tant to the vice president of engineering at ADE Corp., Newton. John, who holds a BS and an MSCE from RPI, is currently a student at Harvard Graduate School of Business Administration.

Richard Buckley is with Harris Co./RF Communications Div., Rochester, NY.

Jim Eilenberger continues as a project engineer at United Illuminating in New Haven, CT. Last summer, he played goalie on Willy J's soccer team out of Old Saybrook, CT. After the team won the state championship, it made a ten-day soccer tour of Ireland.

Mary-Jane Hall, a registered professional

The adventurers found a rugged landscape and a people whose smiles brushed aside the Third World realities of poverty. According to Jack, the Nepalis and transplanted Tibetans welcome strangers with the traditional, melodic "Namaste!"

Even by Nepali standards, the hikers were traveling in a remote region, amid the snow-capped Dhaulagiri and Annapurna Range, often called by veterans the greatest trekking area in the world. The group traveled more than 300 miles through mountainous Buddhist settlements, sharing homes and meals with the villagers. Meals consisted of rice, lentils and tea cooked in typical, one-room shelters.

"Life revolved around a central, primitive, smoky, clay stove," Joanne reports. "Conversations were clumsy streams of broken English and Nepali accompanied by mutual laughter as the Nepalis observed our strange Western manner and clothes."

Jack and Joanne found Nepal to be an amazing adventure. "The memory of the friendly faces of the Nepalis and the mountain peaks shrouded in alpenglow," Jack says, "will stay with us always."

civil engineer in the state of California, is now a senior design engineer at Nasland Engineering in San Diego.

Maureen Higgins is currently a finance major and an MBA student at New York University Graduate School of Business Administration.

Mark Malenbaum is a space center planning engineer for the USAF in El Segundo, CA.

Lt. **Michael McDermott** is stationed at Minot AFB, ND.

Brian Minns, who works for 3C Electric, a testing and consulting firm in Ashland, MA, has been named as town underground foreman

by the Electric Division, Wellesley, MA.

Tom Palmer serves as a senior manufacturing engineer for Harvey Hubbell Inc., Bridgeport, CT.

Ruth Adams-Teixeira is with the Massachusetts Department of Public Works.

Thomas Warnick works as a manufacturing engineer at Honeywell in Lexington, MA.

Dennis Wysocki is a supervisor for Clairol in Stamford, CT.

1982

MARRIED: Stephen Balcewicz and Donna Bourn on June 10, 1984, in Worcester. Donna, a graduate of Quinsigamond Community College, is a computer operator at Worcester Memorial Hospital. Stephen is with Guerriere & Halnon Inc., Franklin, MA. . . . **Paul Doe** to Susan Moll on June 23, 1984, in Bedford, MA. Susan, a clinical dietitian at the Catholic Medical Center, Manchester, NH, graduated from Framingham State College. Paul is assistant plant manager at Gemini Valve Co., Raymond, NH. . . . **John Erb** and **Lynn Beauregard** on July 28, 1984, in Gardner, MA. Lynn is with Western Electric in Burlington and John with GE in Lynn. . . . **Stephen Kaneb** to **Andrea Fielding**, '84, in Taunton, MA, on June 2, 1984. Andrea works for Hughes Aircraft, Fullerton, CA. Stephen is with Pacific Lighting Energy Systems in Commerce, CA. . . . **George Oliver** and **Karen Zalewski** on May 5, 1984, in Webster, MA. Karen is a software engineer for DEC and attends Northeastern University. George, a mechanical engineer for GE, is also attending Northeastern.

MARRIED: Barry Paquin to Deborah DuVerger in North Grafton, MA, on July 7, 1984. She graduated from Anna Maria College and is a laboratory technician at the Fallon Clinic. He is an electronics technician at DEC in Marlboro. . . . **Timothy Smith** and **Ellen McPherson** in Beverly, MA. Ellen graduated from Becker and from Centenary College in New Jersey. She is employed by Lee Jay Bed and Bath in Salem. Tim works for Varian Associates in Beverly, MA. . . . **Terry Soule** and **William Witowsky** on September 29, 1984, in Middletown, MD. William graduated from Stevens Institute of Technology, Hoboken, NJ. Both are employed by M/A-Com DCC Inc., Germantown, MD.

MARRIED: Philip Viall and Claudette-Anne Roy Morrissey on September 14, 1984, in East Freetown, MA. An RN with the Society for Human Advancement Through Rehabilitation Engineering Foundation Inc. (SHARE), she works with vocally impaired individuals. She holds degrees from Bristol Community College, the New England Institute of Applied Arts and Sciences and Southeastern Massachusetts University (SMU). He graduated from SMU with his BSEE and MSEE and serves as vice president and treasurer of SHARE, North Dartmouth, MA, which he helped found. . . . **Joseph Vignaly, Jr.** and **Katherine Kruczek**, '84, in West Springfield, MA, on September 8, 1984. Kathy is employed in management at New England Telephone & Telegraph, Framingham, and Joe, who is attending the master's program at Babson, works for GTE Systems Corp., Westboro, MA. . . . **Dana Whitney** and **Lisa Miller** on August 11, 1984.

in Cotuit, MA. She graduated from Worcester State College-University of Massachusetts Medical Center and is a nuclear medicine technologist at Cardinal Cushing Hospital, Brockton, MA. Dana holds the post of construction project manager for W-W Construction, Hopkinton.

Thomas Barrett serves as a process analyst at Pratt & Whitney Aircraft, East Hartford, CT.

John Bellantoni, who has been a design engineer for Alpha Industries, Lawrence, MA, is now working for his master's degree at Cornell.

Michael Bickford is a system sales engineer at Westinghouse, I/C Projects Division, Pittsburgh.

Mark Brown works for Westinghouse Electric Corp., Baltimore, MD.

James Diemer serves as analyst for Science Applications Inc., Falls Church, VA.

Cindy Gagnon finished first in the women's division of the Monmouth County Parks Sprint Triathlon (440-yd. ocean swim, 14-mile bike ride, four-mile run) in Long Branch, NJ. Until a year ago, she had never run, swum or bicycled seriously. Currently a member of Technical Staff Digital Support Systems at Bell Communications Research, Freehold, NJ, Cindy has an MS in computer engineering from the University of Southern California.

Stephen Hennigar holds the post of assistant superintendent at Turner Construction Co., Boston.

Steven McNary is about 85 percent of the way through the renovation of his 1926 Chevrolet Superior Model V grocery delivery wagon, a dream he's had since he was 16. The truck has all of its original gauges, but he had to build the wooden body. Since starting the renovation eight years ago, he's learned woodworking, engine rebuilding and welding. "I learned as I did it. It was great," he says. Steve works for GTE in Needham, MA.

John Nixon is a design engineer at General Dynamics-Electric Boat, Groton, CT.

David Rielly serves as an automation systems specialist with MCC Powers, Waltham, MA.

Patrick Sheridan holds the post of program manager for the U.S. Air Force at Hanscom AFB, MA.

Tim Stanley works for Digital in Maynard, MA.

Miguel Vassallo is employed as general manager at Vassallo Inc., Lake Wales, FL.

1983

MARRIED: **Michael Brousseau** and **Sherri Ann Pitt** in Connecticut on July 7, 1984. She graduated from Becker Junior College with an associate degree in accounting. He is employed by Digital Equipment Corporation. . . . **Howard Davidson** to **Lisa Moreau**, '84, in Sharon, MA, on August 18, 1984. Lisa works for American Management Systems, Arlington, VA, and Howard is with ITT-Dialcom, Silver Spring, MD. . . . **James Dolan** and **Monique Gelineau** in Mattapoisett, MA, on September 29, 1984. Monique, a health fitness specialist for the Hartford Insurance Group, graduated from UMass, Amherst. Jim works for Hamilton Standard. . . . **Chris Erikson** and **Karen Eklof**, '84, in East Greenwich, RI, on Septem-



Homecoming '84: Kathleen Devlin, sister of Patrick Devlin '86, of Norton, MA, gets fitted for Pat's football helmet with a hand from Mom, Mrs. Audrey Devlin.

ber 1, 1984. Karen is a project engineer at Procter & Gamble, Quincy, MA. Chris is a graduate student at MIT. . . . **Matthew Falco** and **Orena Deveau** in East Haven, CT, on September 29, 1984. Orena works for Coan & Bunnell Inc. Matthew is employed by MacDermid Inc. . . . **Christine O'Connor** and **Michael Cataldo** on October 7, 1984, in Worcester. She is employed by Computer Vision Corp., Bedford. Michael, who is with TDX Systems, Cambridge, graduated from Columbia University.

MARRIED: **Robert Plante** to **Denise Christopher** in Norwalk, CT, on September 7, 1984. She has a master's degree from UConn and has served as assistant director of school relations at California State University, Long Beach. He is a systems analyst for Parsons Co. in Yanbu, Saudi Arabia. . . . **Mark Robichaud** and **Robin Richard** in Fitchburg, MA. Robin, a medical technologist at Burbank Hospital, Fitchburg, graduated from Anna Maria College. Mark serves as a management engineer at International Medical Industries, Watertown. . . . **Derek Speed** and **Jennifer Reardon** in Dudley, MA, on June 9, 1984. Jennifer is a senior at Nichols College. Derek is a technical support specialist at DEC in Marlboro. . . . **Walter Towner, Jr.** to **Carolyn Kachanis** on September 1, 1984, in Providence, RI. Carolyn is operations manager of Compufab in Avon, MA, and he is operations manager of Thorsen Steel Products, also in Avon. . . . **James Welch** and **Michelle Girouard** in Spencer, MA, on September 15, 1984. She graduated from Anna Maria College and is employed at the Worcester County Convention and Visitors Bureau. He was recently named a senior systems engineer at Intellution Inc., in Westwood, MA. His responsibilities include project support and related activities.

Patricia Allard is an Edison Program engineer at GE Medical Systems, Milwaukee, WI.

Kimberly Berg was recently promoted to production engineer at Rockwell International Corp. in Duluth, GA.

Richard Cass works as an applications engineer at P/A Industries, Bloomfield, CT.

Martin Morra serves as a research assistant at MIT.

Joe Phelan, who has been with GE since graduation, has been transferred from the Pitts-

field (MA) plant to the GE plant in Cincinnati, OH. Currently, he is in the management training program in the robotic engineering quality and production division.

Nicholas Pirog II works as a sales promotion coordinator at Analogic Corp., Danvers, MA.

David Sauerbrey has been transferred to San Antonio, TX, to assume the post of senior manufacturing engineer for the Isotronics Division of Augat Corporation. Previously, he was a production engineer for Augat in New Bedford, MA.

Mark Scott is now attending the University of Maryland as a full-time graduate student studying aerospace engineering in pursuit of his master's degree. Previously, he had worked for a year at Sikorsky Aircraft.

Paul Skerker is a graduate student in the School of Chemical Engineering at Cornell University.

1984

MARRIED: **William Andrews, Jr.** and **Cheryl Spargo** on August 4, 1984, in Amherst, NH. She attended Clark University, Worcester, MA, and Cambridge University in England, and she graduated from UNH with a BS in music education. He works for NBI in Boulder, CO. . . . **Frederick Groll** to **Claire Connor** in Northboro, MA, on June 16, 1984. An occupational therapist, she graduated from Boston University and Sargent College of Allied Health Professions, Boston. Groll, who has his MSEE from WPI and graduated from Boston University College of Engineering, is employed at DEC. . . . **Thomas Levergood** to **Fran Jurgrau** on June 23, 1984, in Framingham, MA. Fran graduated with a degree in psychology and elementary education from Southeastern Massachusetts University. Tom works for DEC in Maynard. . . . **Philip Litchfield** to **Trayce Taras** in Worcester on June 23, 1984. She graduated from Fitchburg State and is a kindergarten teacher in Derry, NH. He works for RCA, Burlington, MA.

MARRIED: **Michael McInnis** and **Donna McRae** in Worcester on June 16, 1984. Donna is employed by RCA and Michael by Sanders

Michael Curmill

Can't Get Around to It? Call Bruce Jacobson

How many times have you said, "I'll do it when I get around to it," and "it" never gets done? Well, Bruce Jacobson '80 ME has designed just the thing for procrastinators, "a round tuit" that you can carry right in your pocket.

Bruce, who is general manager of Photopanel of New England Inc., Princeton, MA, and who has an interesting sense of humor, designed the metal disk as a trade show giveaway to illustrate his company's unique photo process.

Last year, Bruce came up with another popular giveaway with roots right on the WPI campus—a round ruler. "Prof. Hal Corey, in questioning the length of a line on a mechanical drawing, would place a finger at each end of the line and say the line was 'yea long', hence, 'yea long' was always the right length," he says. Bruce's round ruler, or "Yea Gage," is as long as it needs to be, with every revolution representing 10 inches.

According to Bruce, Photopanel, which was founded by his father, Burton, in 1963, was the second authorized processor in the country using the process whereby a photographic image is embedded and sealed within the surface of anodized aluminum. The panels withstand extreme wear and high temperatures, will not peel, are impervious to salt spray and are unaffected by organic solvents, oil or grease. The process is used, among other things, for custom machine control panels, instruction panels, data plates, dial



Roger Perry '85

Jacobson and "Yea Gage".

faces and outdoor signs.

"Some of our panels are on submarine decks and in use on space shuttles," Bruce says. They are used by industries in Detroit and by companies such as Heald, Norton and Raytheon in Massachusetts. They are also on the new dedication plaques in Washburn Shops at WPI. Washburn is a fitting site for Photopanel: Bruce's grandfather, Enoch Sandstrom, once taught there.

Bruce is vice president of the Princeton Businessmen's Association, a captain with the town fire department and an emergency medical technician.

"I had a happy emergency last spring," he reports. "I brought a baby girl into the world right in the hospital parking lot!"

Associates. They reside in Nashua, NH. . . . Kenneth Nylan and Janet Driscoll in Duxbury, MA, on September 15, 1984. Janet, an RN at UMass Medical Center, Worcester, graduated from St. Vincent Hospital. Ken has been working on the energy management project at DEC, Northboro. . . . Timothy Proch and Victoria Fazo in Southington, CT, on August 12, 1984. Victoria graduated from Western Connecticut State University with a degree in elementary education. Timothy is with IBM in Boca Raton, FL. . . . John Roberts and Iris Papaioanou in Haverhill, MA, on June 23, 1984. She graduated from Bates College, Lewiston, ME. He works for RCA, Burlington, MA. . . . Richard Testa, Jr. and Donna Lee Stetson in Natick, MA, on August 11, 1984. She graduated from UMass, Amherst, and is currently a graduate student at Northeastern. He is a graduate student at MIT.

MARRIED: Roger Uszakiewicz to Lori Zemeir in Naugatuck, CT, on September 8, 1984. Lori holds a degree in physical therapy from Russell Sage College. Roger works for Turner Construction Co., New York City. . . . Douglas Valentine to Allyson Twomey in East Brookfield, MA. Allyson is a student at Assumption College, Worcester, and Douglas an assistant pharmacist for Pfizer Pharmaceuti-

cals. . . . Paul Vanslette and Cynthia Chapman in Medfield, MA. Cynthia is employed at Digital. Paul works at Intellution. . . . David Viens and Nancy Zimmerman on August 18, 1984, in Barrington, RI. Nancy works for GE and David for Procter & Gamble. . . . David Wesche to Wendy Larson in Shrewsbury, MA, on July 27, 1984. Wendy attended Becker and is a secretary at Norton Co. David is supervisor of personal computer software manufacturing at DEC, Northboro.

Carl Benda continues as a graduate student in the ME department at WPI.

Lawrence Bis works for Westinghouse Electric Corp.

Stephen Breininger has been employed by GenRad.

Paul Bresten is a graduate teaching assistant in the EE department at WPI.

Michael Briere is with IBM.

David Brin has been named to the staff at Westinghouse Electric Corp.

Karen Brock has been employed by General Electric.

Harold Broker is with IBM.

Robin Brown works for Raytheon Company.

Paul Brozek is studying at UMass.

Robert Bunce has been employed as a test

equipment engineer by IBM in East Fishkill, NY. He is directly involved with the design of state-of-the-art computers for testing semiconductor devices.

Jeffrey Burdick works for IBM.

Randy Burnham is with Mitre Corporation.

Scott Burton has joined American Telephone & Telegraph.

James Cadman has been employed by Data General.

Ronald Caldwell works for IBM.

Fabio Carrera has been employed by BTU/Bruce Corp.

John B. Carroll is a nuclear engineer and an officer in the U.S. Navy.

John P. Carroll works for DEC.

John Casey has been employed by Mitre Corporation.

John Cassidy has joined IBM.

Christine Cataldo is employed by General Electric.

Loring Chadwick is serving with the U.S. Air Force.

Lee-Anne Charbonneau serves as an associate engineer at Westinghouse Electric Co., Annapolis, MD.

Laurence Chin works for Data General.

Robert Chin has been employed by Tera-dyne Inc.

Pyong Tae Chong has joined AT&T Teletype.

Todd Cimino is with Schlumberger Well Service.

Laurie Cocchi works for Westinghouse.

David Coffin is currently with the Raytheon Company.

Mark Coggeshall has been employed by Data General.

Brian Coleman serves with the U.S. Army.

Kevin Collamore is serving with the U.S. Air Force.

Raymond Comporetta is now with Daniels Construction Co.

Kevin Conlon has been employed by Data General.

Susan Coombs holds the post of programmer for decision support evaluation at IBM in White Plains, NY.

Karen Crall works as a research chemist at Sannor Industries in Leominster, MA.

Steven Criscione has joined the Charles Stark Draper Lab.

Kathy Cronin is a student at Virginia Tech.

Brian Cull is now with GE.

Catherine Culnane has been employed by American Management Systems.

Matthew Cummings works for EPSCO Inc.

Michael Curtin works for Raytheon Company.

Gayle Dalawrak is with the U.S. Air Force.

Cathryn Dalton works for General Electric.

Bruce Daube is studying at California Institute of Technology.

Elenora Davies serves as a technical systems programmer for Paul Revere Insurance, Worcester.

Jennifer Davis has joined Engenics.

Karen DeGrace works for BETAC Corp.

John Delaney is at Rockefeller University.

Robert DeMattia is with the Department of Defense, Ft. Meade, MD.

Kenneth Dieselman works for the American Hospital Supply Corporation.

Gianni Dintino has been employed by Consolidated Edison.

Michael Dowd holds the post of product

manager at Wright Line in Worcester. He has an AB from Assumption College.

Randall Drabczuk is serving with the Air Force.

Gregory Durand has joined General Dynamics' Electric Boat Division, Groton, CT.

David Dymek is a systems engineer at Hewlett-Packard, Andover, MA.

Maura Eagen is on the staff at Norton Co.

Brett Edelson works for Data General.

John Ekberg is a supervisor for DEC in Littleton, MA.

Daniel Farrar works for GE.

Brett Feddersen is studying at the University of Illinois.

Alan Feitelberg is at MIT.

Andrea Fielding was recently employed by Hughes Aircraft Co.

Michael Fields has joined Raytheon.

Stephen Fiorelli has joined the staff at IBM.

Tim Fitzpatrick is studying for his MS at Stevens Tech. He resides in Allendale, NJ.

Timothy Fitzsimmons continues as a grad student at WPI.

Glenn Flanigan works for Raytheon.

Mary Foley has been employed by AT&T Technologies.

Jeffrey Forsythe is now with Digital Equipment Corporation.

Paul Fortier has been employed by Clairol.

Joseph Fortunato is a graduate student at the Polytechnic Institute of New York.

John Foundas has been employed by Raytheon Company.

John Franzini is employed by the Naval Underwater Systems Center.

Daniel Fretz works for RCA.

Tracy Gamble has joined Hamilton Standard.

Charles Garland has accepted a post with Procter & Gamble Company.

Daniel Genis is with Westinghouse Electric Corp.

Victor Geraci works for United Nuclear Corp.

Michael Gilbert works for General Dynamics' Electric Boat Division.

Paul Gingrich, who has his MS in computer science from WPI, is currently with Schlumberger Research Corp., Ridgefield, CT, where he is involved in research on new software for the company's oilfield services.

Lawrence Glennon II works for AVCO Systems Division.

Paul Graham, Jr. is employed by New England Power.

Derek Granquist is on the staff at Raytheon Company.

Paul Grautski is now with The Gillette Co.

Frederick Gummow works for IBM.

Jeffrey Gwynne has joined Bell Labs. He holds an MSE from WPI.

James Hagerott has accepted a post with Schlumberger Well Services.

Greg Hagopian works for McDonnell Douglas Corp.

Richard Hajec has joined AT&T.

David Hall is in the manufacturing management program at General Electric in Syracuse, NY.

Harry Hall serves as a programmer at IBM in Owego, NY.

Steven Hall is on the staff of Schlumberger Well Services.

Philip Hallee has accepted a post with GenRad.

Nicholas Hannon is on the staff at IBM.

Paul Harriman works for Manufacturer's Business Systems.

Sandra Harris is studying at UMass.

Deborah Harrow serves as a systems engineer for IBM in Savannah, GA.

Robin Hart is employed as a manufacturing engineer at Digital in Marlboro, MA.

Gregory Hauck is a member of the technical staff at Mitre Corp., Bedford, MA. He has a BS in engineering science and math from Regis College, Denver, CO.

George Hayeck continues as a full-time MBA student at WPI.

John Henderson works for Camp Dresser & McKee.

G. Christopher Heyl has accepted a post with the firearms division of Colt Industries.

Dean Holman is now with Mitre Corporation.

William Holman works for Teradyne Inc.

Paul Holmes is with Fairchild-Weston systems.

Jack Holzman holds the post of associate engineer at General Dynamics' Electric Boat Division, Groton, CT.

Roy Hopgood continues with Alloy C.P.D.

Paul Huehmer works for Computervision.

James Huffnagle has been employed by RCA.

Peter Hunt is working for Stone & Webster.

Scott Hunt is now at Newport News Shipbuilding.

Robert Hunter is with Sanders Associates.

William Hyland has been employed as a product engineer at Teradyne, Nashua, NH.

Natural Science Program

Robert Raymond, '79, is starting his 16th year as a chemistry teacher in the science

department at Mahar Regional School in Orange, MA. . . . **Francis Gingras**, '81, has retired as a science teacher at Gardner (MA) High School following 16 years of service.

School of Industrial Management

Charles Adams, '55, director of procurement for Wright Line Inc., Worcester, was recently elected president of the Purchasing Management Association of Worcester. He has served the group as vice president, director and chairman of the professional development committee. In 1981, he earned the professional designation of certified purchasing manager. . . . **Stephen McCabe**, '64, serves as executive vice president of J.C. Carter Co. in Costa Mesa, CA.

Richard Alliegro, '67, has been elected vice president of high-performance ceramics by Norton Co., Worcester. He is responsible for the overall management of the firm's high-performance ceramics business unit. Previously, he had been divisional vice president and general manager of U.S. operations for the industrial ceramics business unit. He graduated from Alfred University's College of Ceramics with bachelor's and master's degrees in ceramic engineering. Throughout his Norton career, he has been involved in the development of new business opportunities for the Industrial Ceramics Division. Some of these were armor used in military aircraft protection; Crystar, which is used in diffusion components in the electronics field; igniters and ceramic kiln furniture. Besides WPI's School of Industrial Management, Alliegro attended the Advanced School of Management at Northeastern University.

COMPLETED CAREERS

George E. Chick, '13, the retired treasurer of John F. Chick & Son Inc., died at the Fryeburg (ME) Health Care Center on June 16, 1984, following a short illness.

He was born on Sept. 10, 1891, in Silver Lake, NH. Graduated with his BSME from WPI, he spent his entire career with John F. Chick & Son, a lumber company in Madison, NH, where he had been a partner, proprietor, president, general manager and treasurer.

Mr. Chick was a past master of his local Masonic lodge, a charter member of the Ossipee Rotary Club and a past director of the Northeastern Retail Lumber Dealers Association. He was a past president of the New England Architectural Woodwork Institute and of the Carroll County YMCA, which he had also served as original director. He belonged to ASME, the Baptist Church and Lambda Chi Alpha.

Albert J. Lorion, '13, a retired industrial engineer, died in Morristown, NJ, on July 10, 1984. He was born in Worcester on Oct. 9, 1891, and he received a BSCE from WPI.

During his career, he was with the Freight Container Bureau, the Grand Trunk Pacific

Railroad, Cambria Steel Company, and Westinghouse, Church, Kerr & Co. At one time, he was traffic manager for C.P. Perin-S.M. Marshall, consulting engineers. He retired as an industrial engineer from Uniroyal Co. He had served as a lieutenant colonel in the U.S. Army.

A member of Tau Beta Pi and Sigma Xi, Mr. Lorion had also belonged to the Montclair Engineers Society. He was a former vice president of the New York chapter of the Alumni Association.

Arthur W. Knowlton, '14, of Rockport, MA, died on April 14, 1984. He was born in Boston on Sept. 2, 1890.

A graduate civil engineer, from 1914 to 1921, he was with the Boston & Maine Railroad. From 1921 to 1961, when he retired, he was employed by Tredennick-Billings Co., Boston. He belonged to Phi Sigma Kappa, the Boston Society of Civil Engineers and the Masons. He was the father of **Donald Knowlton**, '51.

Dick G. Wong, '16, passed away in Providence, RI, on March 22, 1984. He was 89 years old and a native of San Francisco.

Robert W. Stoddard

(Editor's note: Shortly before press time, the college and the community learned of Mr. Stoddard's death. Thus the brevity of this notice.)

Robert W. Stoddard, a WPI trustee emeritus, chairman of the Worcester Telegram & Gazette Inc., former chairman of the board of Wyman-Gordon Co., and a founder of the John Birch Society, died December 14, 1984, at his home in Worcester. He was 78.

Mr. Stoddard served as a WPI trustee from 1941 to 1946, was named a life trustee in 1952 and a trustee emeritus in 1980. In 1952, he received an honorary doctorate from the college. (His father, Harry G. Stoddard (1873-1969) was awarded an honorary doctorate from WPI in 1941.) The Stoddard family gave major support for construction of WPI's Stoddard Residence and is responsible for the Stoddard Professorship in Management.

Besides his doctorate from WPI, Mr. Stoddard held honorary degrees from Assumption College, Worcester, and Piedmont College, Greenwood, SC. He was born in Trenton, NJ, in 1906.

Robert Stoddard was a successful businessman, community leader and philanthropist. He succeeded his father as president of Wyman-Gordon, had served as chairman of the Worcester Airport Commission, and as a director of numerous institutions including the First National Bank of Boston, the International Paper Company and Raytheon Company. He had been a trustee of the Worcester Foundation for Experimental Biology, Worcester Academy and the Worcester Art Museum.

As his father gradually retired from active responsibility for the *Telegram* and *Gazette*, Robert Stoddard's role became more significant. In 1963, he was named chairman of the board of the newspapers. He was strongly com-

mitted to maintaining the Worcester newspapers and Radio Station WTAG under local control and ownership and for keeping editorial policy entirely separate from news reporting, while remaining conservative politically.

Mr. Stoddard, a graduate of Yale University and Harvard Business School, retired as chairman of the board of Wyman-Gordon in 1972 after 43 years with the company. He was named honorary chairman of the company's board of directors. Wyman-Gordon is the Western world's largest supplier of forgings to the automotive, aerospace and gas turbine industries.

In 1958, Mr. Stoddard became one of the founders of the John Birch Society, serving as a member of its council and executive committee. He was a firm believer in the strengths of the American economic system and a leading proponent of free enterprise.

As a philanthropist, Mr. Stoddard was a strong supporter of the Boy Scouts of America, and was a recipient of the Silver Beaver Award, the highest honor granted by the Boy Scouts for service by adult leaders to youth. He was a prime benefactor in the growth of the Worcester Science Center. An avid big-game hunter, he donated many specimens to the science center for its African exhibit, regarded as the finest of its kind in the country.

Mr. Stoddard also enjoyed flying, photography and travel, but he claimed that salmon fishing was his first love. He belonged to the First Baptist Church, the American Antiquarian Society, the Worcester Club, Worcester Country Club and Tatnuck Country Club. His grandson Thomas Loring is a member of the WPI Class of 1988.

WPI and the Worcester community have lost a leading friend of education, science, the arts, philanthropy and commerce. We join his family, friends and colleagues in mourning his death but rejoice with them in his memory.

Gifford T. Cook, '28, of Harpers Ferry, WV, an internationally known fire prevention engineer, passed away last summer. He was born in Fall River, MA, on Sept. 11, 1907. He received his BSCE from WPI.

During his career, he was a fire prevention engineer for the National Board of Fire Underwriters in Chicago; assistant manager of the International Association of Fire Chiefs, New York City; and a fire prevention engineer for the U.S. War Department, office of the chief engineer, Washington, DC, and later with the U.S. Air Force, also in Washington.

In 1946, he was awarded the Emblem for Meritorious Civil Service by the War Department in recognition of his services as chief of the fire prevention section, air installations division, Army Air Forces (AAF). He was cited for the reduction in fire losses within the AAF because of his success in perfecting the AAF's organization and for his training of fire prevention and protection personnel.

A registered professional engineer in Wisconsin, he was also a member of the Federal Fire Council, the President's Conference on Fire Prevention, the National Fire Protection Association and the American Society of Fire Protection Engineers. He belonged to ATO, Skull and the Poly Club, and he had served as class secretary. Last winter he and his wife, Marianne, spent 86 days skiing in Austria.

Edward N. Wooding, '28, of Hamden, CT, passed away on May 22, 1984. He was born on June 9, 1905, in Wallingford, CT, and he studied mechanical engineering at WPI.

After two years with Henry R. Kent Co., Rutherford, NJ, he worked for the Central Cold Storage Corp. of New Haven, CT, first as manager, then as president-owner. He retired in 1975.

Mr. Wooding belonged to Lambda Chi Alpha. Active with the Rotary club, the Masons, and the local library, he also served 20 years as treasurer of his church.

Whitney F. Schuka, '30, a longtime employee of the Newport (RI) Naval Base, died in Weymouth, MA, on July 24, 1984. A Worcester native, he was born on Dec. 7, 1908.

A graduate civil engineer, during his career he was with Fred T. Ley & Co. and the Rural Electrification Survey in Worcester. For many years, he was associated with the U.S. Navy Public Works Center in Newport, RI, as well as with the Navy's ammunition depot in Hingham, MA. From 1941 to 1951, he was a civilian assistant to the manager of all Navy projects at the Boston Navy Yard.

In 1972, he was named building commissioner in Hingham, MA. He belonged to Sigma Xi.

C. Stanley Brewer, '33, a veteran employee of the New England Power Company, died on July 12, 1984, in Hanover, NH. He was 73 and a native of Worcester.

Following his graduation as an electrical engineer, he joined New England Power Co. In 1974, he retired as superintendent of the hydro division after 40 years of service. He was a professional engineer in Massachusetts. An active member of the Congregational Church and the Shrine, he also had served as master of the Masonic Lodge in Shelburne Falls, MA. He belonged to Phi Sigma Kappa.

Mr. Wong owned the former Hong Hong Restaurant, now the Players Corner Pub. in Providence for 40 years prior to its closing in 1970.

Louis E. Jacoby, '17, of Woodmere, Long Island, NY, died on March 26, 1984, at the age of 88. He was born on Oct. 12, 1895, in New York City. He studied civil engineering at WPI.

For many years, he was a sales executive with Century Industries Inc. of New York, retiring in 1970. He was a member of Theta Chi.

Clarence B. Tilton, '17, a former ceramics engineer for Norton Co., died in Ravenna, OH, on June 4, 1984. He was 90 and a Fitchburg, MA, native.

He graduated as a chemist from WPI and soon joined Norton's research lab in Worcester. In 1918, he was with the Chemical Warfare Service. From 1919 to 1937, he was vice president and general manager of Cortland Grinding Wheel Corp. and from 1937 to 1948, he held the same posts with the Safety Grinding Wheel & Machine Co. He had been assistant to the president and research director at Simonds Worden White. In 1959, he retired.

He was a member of both the Dayton and Springfield (OH) engineering societies and a former vice president of the Clark County TB and Health League. He belonged to the Executives Club and to Sigma Phi Epsilon.

Ernest Thompson Jr., '20, former chief engineer at Wilputte Coke Oven Corp., died in Worcester on August 26, 1984, at the age of 86. He was a Worcester native and a graduate civil engineer from WPI.

During his career, he was with McClintic-Marshall, Morgan Construction and Koppers Construction. From 1937, until his retirement in 1962, he was chief engineer for Wilputte Coke Oven Corp., a division of Allied Chemical Corp. in New York City.

Mr. Thompson, brother of **Lincoln Thompson, '21**, belonged to Phi Sigma Kappa, Tau Beta Pi and the Salem Covenant Church. He was a veteran and subsequently served in the Army Reserves.

C. Freeman Hawley, '23, a longtime employee of Riley Stoker Corp., Worcester, died in Worcester on August 7, 1984, at the age of 82. A native of Brattleboro, VT, he was a graduate mechanical engineer from WPI.

In 1967, he retired as chief mechanical engineer at Riley Stoker, Worcester, following 44 years of service. He belonged to Theta Chi, Tau Beta Pi, the Tech Old-Timers, the Worcester Engineering Society, ASME, the Massachusetts and New York societies of professional engineers and the Worcester County Mechanics Association.

Mr. Hawley was the father of **Bradford Hawley, '51**, and the grandfather of **David Hawley, '78**.

Walter J. Kowal, '34, died June 13, 1984, at the University of Massachusetts Hospital in Worcester. He was 72. A native of Spencer, MA, he graduated from WPI with a BSME.

Prior to retiring in 1972, he had been a metallurgist at Lombard Governor Corp. in Ashland for 29 years. At one time, he was with Morgan Spring Co., Worcester. He was a member of Our Lady of Czestochowa Church.

Charles R. Varney, Jr., '34, passed away at his home in North Brookfield, MA, on June 24, 1984, at the age of 72.

Until retiring several years ago, he owned and operated Varney's Electrical Service Inc. since founding the firm in 1947. Previously, he owned Varney's Radio & Electrical Shop. During World War II, he was in the Navy.

Mr. Varney had served on the town board of library trustees and on the town finance board. He belonged to the Massachusetts Electrical Contractors Association and Meridian Sun Lodge of Masons.

Edward E. Turner, '38, who was retired from Hughes Aircraft after 22 years of service, died on May 9, 1984. He was born in New Haven, CT, on June 10, 1916.

In 1938, he received his BSME from WPI. After working for Seamless Rubber, the New Haven Railroad and Austad Steel, in 1952 he joined Hughes Aircraft, Tucson, AZ, where he served as plant engineer. A registered professional engineer in Arizona, he also belonged to Phi Sigma Kappa and the Poly Club.

Lawrence C. Neale, '40, an internationally known hydraulic expert and former professor of mechanical engineering and director of Alden Research Laboratories at WPI, died in St. Louis, MO, on October 24, 1984, while on a business trip.

He was 66, a native of Wayland, MA, and a graduate civil engineer from WPI. In 1958, he received his MSME.

After leaving WPI in 1975, Prof. Neale joined Chas. T. Main Inc., Boston, as chief flow specialist and chief hydraulic engineer. He was with the international consulting engineering firm at the time of his death.

In 1940, he joined the WPI faculty as an instructor at Alden Hydraulic Laboratory, where he conducted studies in river models, structural models, flow calibrations and machinery studies. In 1950, he was named assistant director of Alden Research Laboratory; he was named assistant professor in 1957, a director of the laboratory in 1968 and a professor in 1965.

At Main, he dealt with hydraulic aspects of design, including hydraulic problems experienced during construction and operation. He was concerned with spillways, energy dissipation, shore protection, thermal plumes and flow measurement. His field testing included hydraulic turbines, pumps, flow and ocean current surveys and inspections of hydraulic equipment in North America, Europe and Asia. He was a registered professional engineer in Massachusetts.

Prof. Neale taught courses at WPI in fluid mechanics and aided in thesis work for advanced engineering degrees. At Alden Laboratories, he was responsible for all activities, including model studies of thermal effects from condenser discharge

Fluent in French and Russian, Prof. Neale served as U.S. representative for the International Electrotechnical Committee and was a member of the board on Performance Test Codes, the Fluid Meters Committee and the International Standardization Committee, all for the ASME. He was a fellow of the ASME and the ASCE, as well as a director of the Boston Society of Civil Engineers and a member of the International Association of Hydraulic Research and of the American Geophysical Union.

He was honored as a John R. Freeman fellow in 1954 and 1955 and received the Worcester Engineering Society Scientific Achievement Award in 1974 and the ASME Centennial Award in 1980. The author of numerous engineering publications, he belonged to Sigma Xi, Pi Tau Sigma, Chi Epsilon and Lambda Chi Alpha.

In World War II, Prof. Neale served in the Pacific and the Philippines with the U.S. Navy, later retiring from the Navy Reserve with the rank of lieutenant commander.

Alan N. Sanderson, '43, of Houston, TX, passed away recently. A native of Milton, VT, he was born on Oct. 15, 1922. He was a graduate chemical engineer.

During his career, he was with the U.S. Army Air Corps from 1943 to 1947, then served many years as principal meteorologist with the U.S. Weather Bureau and as chief of spaceflight meteorology at the NASA Manned Spacecraft Center in Houston. He was a member of the American Meteorological Society and Lambda Chi Alpha.

Bernard L. Beisecker, Jr., '46, died in Warwick, RI, on July 5, 1984, following a long illness. He was 59.

A native of Ellwood City, PA, he later graduated as an electrical engineer from WPI. In 1959, he graduated from WPI's School of Industrial Management. During his career, he was vice president of manufacturing at Reed & Prince Co., Worcester, and vice president of Microdot Inc., Frankfort, KY. He retired in May as vice president of manufacturing at Industrial Fastener, Long Island, NY.

Mr. Beisecker, a Mason, and a member of Lambda Chi Alpha, was a lieutenant in the U.S. Navy in World War II. He was the father of Wayne Beisecker, '78.

Walter D. Allen, Jr., '49, a marketing executive, died July 9, 1984, at his home in Glastonbury, CT, at the age of 59. He was born in Worcester.

A graduate mechanical engineer, for many years he was an executive in the marketing division at Pratt & Whitney Aircraft Division of United Technologies in East Hartford, CT. He belonged to Sigma Phi Epsilon, the Congregational Church, the Connecticut Parachuting Corp., ASME and the American Society of Experimental Test Pilots. An Army Air Corps veteran of World War II, he also served in Korea.

Robert R. Atherton, '50, of Jupiter, FL, passed away on July 7, 1984. Born on July 4, 1927, he was a native of Pittsburgh, PA, and received his BSME from WPI.

From 1950 to 1955, he was with Westinghouse Electric Corp. For many years he

was an employee of Pratt & Whitney Aircraft, in East Hartford, CT, and West Palm Beach, FL. He served as a project engineer and manager for the firm.

Mr. Atherton belonged to SAE, Sigma Xi, ASME and the American Rocket Society.

Alexander T. Cyganiewicz, '50, chief estimator at S.J. Curry & Co., Albany, GA, died on June 23, 1984. He was born in Gardner, MA, on Feb. 26, 1918.

In 1950, he graduated as a civil engineer from WPI. Prior to joining Curry, he had been associated with the Massachusetts State Highway Dept. and J.B. Lowell Inc., Worcester. He served in the Army Air Force for six years and was discharged as a lieutenant colonel.

Stuart P. Roberts, '60, founder and president of S&S Electronics Inc., Lowell, MA, died July 15, 1984, in Concord, MA. He was 46, a native of Lakewood, OH, and a graduate electrical engineer.

During his career, he was with General Radio Co., Non-Linear Systems and Wang Laboratories. In 1970, he founded S&S Electronics. He was a 32nd-degree Mason and a former trustee of the Methodist Church of Westford. Other memberships were with the National Rifle Association, the Boat Owners' Association of the United States and Lambda Chi Alpha.

A talented musician, he was a member of the Chelmsford Community Band and also participated in jazz concerts. He was a licensed ham radio operator, as well as a licensed pilot. He was the brother of Alan Roberts, '63.

William A. St. John, Jr., '83, died recently. He was born in Holyoke, MA, on Jan. 26, 1961. In 1983, he graduated with his BSEE from WPI.

He was a customer service engineer for Hewlett-Packard Co., Colorado Springs, CO, and belonged to Tau Beta Pi and Eta Kappa Nu.

FEEDBACK

On Rainbows

Editor:

Re: The interesting article on rainbows, especially the last paragraph, page XI, in the August 1984 issue.

I am reminded of the passage in the Bible, Genesis Chapter 9, where Noah was extricating himself from the flood.

God said as recorded in verses 14-18 that he would establish the rainbow as a covenant that there would be no more floods.

Perhaps this helps explain the continuing questions to which Mr. Lee refers.

Allen H. Gridly Jr., '38

Syracuse, NY

Editor:

An editorial error has been introduced into my article on rainbows (August 1984

AMPERSAND

The End of Blah Weekends

issue): It is not true that "at each bounce, 94 percent of the ray's energy is refracted out of the drop" (page IV). The amount of light refracted or reflected by a raindrop is not constant. Among other things, it depends on the angle at which a light ray meets any air-water boundary.

In addition, I disagree with several of Ed Thorsett's "Photographing Tips."

You should not always underexpose rainbow pictures, as he advises in tip (1). Apparently, Mr. Thorsett is referring to the fact that the interior of the main bow may appear considerably brighter than the background. However, this is not always the case. His best advice is in tip (2): bracket your exposure.

Neither Alistair Fraser nor I recommend you abandon your polarizing filter when photographing rainbows (tip 5). Although these filters will reduce the intensity of the bows (the amount depending on the filter's orientation), you can partly compensate for this when setting the exposure. The important point here is that rainbow light is itself highly polarized. Far from being a disadvantage, a polarizing filter can let you see new subtleties. Case in point: some of the photographs appearing in the article were shot using a polarizing filter.

Finally, as nearly as we can tell without examining the original photograph, Mr. Thorsett may have given you a sample of lens flare, not a rainbow. Note that the red is toward the inside of the arc, that the waterfall is not sunlit, and that the scene appears to be backlit.

In any event, I hope your readers will find that both natural bows and artists' bows can be great fun to study. If they have any questions about either, they may write to me.

Raymond Lee, Jr.

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Higgins House Revisited

Editor:

Kudos to Lora Brueck for her excellent story on the Higgins House (August 1984). As a member of one of the early classes to occupy Goddard Hall, I can recall looking out from the top floor to a partially obscured view of Higgins House, wondering about its unique architectural and mystical qualities. Ms. Brueck has unraveled the mysteries in an enjoyable narrative and pictorial which melds history and art.

John B. Feldman '67

Lexington, MA

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