9/20/80

REMARKS OF VICE PRESIDENT WALTER F. MONDALE
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASSACHUSETTS
SEPTEMBER 25, 1980

EXCELLENCE

John Gardner once put a list together that included these items: Confucius teaching the feudal lords to govern wisely ... Lincoln writing his second inaugural ... Mozart composing his first oratorio at the age of eleven ... Galileo dropping weights at Pisa ... Eli Whitney pioneering the manufacture of interchangeable parts ... and Ruth saying to Naomi, "Thy people shall be my people."

What binds the list together is the idea of excellence. And though these images taken collectively suggest that civilization has done a respectable job of exploring the full range of human excellences, Gardner points out that "a particular society at a given moment in history is apt to honor only a portion of the full range."

He goes on to ask some hard questions: Is our society honoring the excellences which are most fruitful for our own continued vitality? To what excellences are we relatively insensitive? And what does that imply for the tone and texture of our lives?

This morning I want to address those questions. I believe that the excellence pursued at our institutions of higher learning must be counted among our greatest national assets. I believe that the time has arrived for a dramatic renewal of our national commitment to those centers of excellence. And I believe that every goal on the American agenda -- from energy independence to social justice; from industrial productivity to national security: I believe there is scarcely a single task we face that can be met without new respect and increased support for our finest research universities.

WHAT UNIVERSITIES HAVE CONTRIBUTED

Scholarship and research are valuable for their own sake: we are blessed to be the kind of society that understands the inherent worth of knowledge. But research also contributes to our economy, and has helped raise the standard of living around the world.

Consider the story of American agriculture. About the time that Boston harbor was being filled with tea, it took one American farmer to feed three Americans for a year. At the time that M.I.T. was founded, one farmer could feed five of us. But today, one farmer feeds 60 people -- and by the turn of the century, one farmer will feed 80 of us.

That story -- unmatched in human history -- is the result of American investment in research and education. In fact, one careful study suggests that up to one third of the increase in America's total national income in the last half-century has arisen from advances in knowledge.

The greatest share of those advances have occurred at our research universities. When the National Science Foundation looked at the 85 most significant advances in four fields -- mathematics, chemistry, astronomy, and earth sciences -- they found that university-based research was responsible for 70% of them. Call the roll of this century's scientific miracles, and you will also be naming our great universities. Penicillin, hybrid corn, the maser, the laser, the computer, FM radio, polio vaccine, nuclear fission, nuclear fusion: all were born at universities.

Here at M.I.T., biochemists in one laboratory are creating strains of bacteria that can convert cellulose to alcohol. At another, high-energy physicists are lifting the curtain on the nature of matter. At another, pioneers in linguistics are building new models of the human mind. From electrical engineering to computer science, from immunology to economics, the work underway at M.I.T. actually defines the boundary of human knowledge. And what is happening here is also occurring in pockets of excellence all across the country.

WHY UNIVERSITIES

Why have universities have been so successful? Three reasons quickly come to mind.

First, universities encourage fundamental basic research. Ever since Francis Bacon counseled us 350 years ago to "seek for experiments of Light, not for experiments of Fruit," scientists have understood the worth of pure knowledge -- pursued as an end in itself, chased wherever it might lead.

• For example, we have developed organisms that can combat oil slicks not because we set out with that goal, but because academic freedom permitted decades of pure research in molecular biology.

• We have developed drugs to combat infectious diseases not because there was a quick profit to be made, but because -- as Lewis Thomas reminds us -- for fifty years a great mass of interesting knowledge was stored up by gifted scientists, "none of whom had the faintest idea that penicillin and streptomycin lay somewhere in the decades ahead."

• We have developed transistors and solid state circuits not because someone set out to build miniature electronic components: if they had, they would have tried to invent smaller vacuum tubes. Instead, we owe our enormous leaps in computers and integrated circuits to pure research on the properties of semiconductors.

Second, the university has been home to so many discoveries because it is also home to so many discipliens. For example the presence on the same campus of first rate mathematicians, computer scientists, and economists has meant breakthroughs in all three fields that would have been possible in none of them alone.

Third, the unique mix of teaching and research on university campuses has not only turned students into researchers; it has also turned research into great research. Students are more than apprentices: they are colleagues. Their freshness makes them invaluable critics. You will never catch gifted professors yearning to be free of students and teaching. But you will often hear them remark how a student's question threw open the door to a whole new line of inquiry.

THE GOVERNMENT'S ROLE

Today, more than half of the basic research conducted in America is pursued at our universities. And more than 70% of that univeristy research is paid for by the Federal government. The government's contribution -- fostered by M.I.T. presidents James Killian and Jerome Wiesner, serving as farsighted White House science advisors -- was launched in earnest in the wake of Sputnik, growing to nearly $2 billion a year.

At the same time, a second revolution in public support for education was underway. Our nation's eyes had opened to poverty, and racial discrimination, and unequal opportunity -- and we rightly saw our schools and colleges as an instrument of social justice. We also understood the power of learning -- expressed in this advice from a Chinese philosopher of the third century B.C.:

If you are thinking a year ahead, sow seed.
If you are thinking ten years ahead, plant a tree.
If you are thinking a hundred years ahead, educate the people.

As a new Senator, I was proud to be part of the effort to aid local schools; to strip away laws that held so many of our young people behind; and to create new laws that protected their civil rights.

As the Chairman of the Subcommittee on Equal Educational Opportunity, I helped write and strengthen landmark programs like Head Start and Title I and Bilingual Education and Education for the Handicapped -- all designed to improve basic skills.

As Vice President, I am pleased to have seen Federal support to elementary and secondary education grow by ____% in the last four years -- $_____ billion that is the largest increase in such an interval in our history. Today, with children's test scores improving from Boston (CHECK) to Oakland, we are seeing evidence that our commitment has made a difference.

In postsecondary education as well, public support grew -- from $30 million at the close of the 1950s, to a hundred times that in the mid-'70s, to $5.2 billion today. Those grants and loans and work-study programs have enabled millions who could not afford to attend college to do so.

Yet as our commitment to access increased steadily, our commitment to excellence slackened. By the late '60s, Federal support for our superb centers of research and instruction hit a plateau -- and began a long decline reaching to the mid-'70s.

But surely our two national goals in higher education -- access and excellence -- are not incompatible. They strengthen one another. By broadening the pool from which universities draw, we increase the number of gifted students whose talents can be developed. But if at the same time, we let our centers of excellence loose their sharp edge, everyone suffers.

The time has come to match our commitment to access with a comparable commitment to excellence. The American people understand that our nation will lose its competitive advantage unless we do something to maintain it. Our elected officials understand that a growing constituency for excellence is ready to be mobilized. And our great universities understand that the surest route to new discoveries is to support our major research centers, protect their academic freedom, help them get the equipment and talent and facilities they need -- and leave them alone to do their job.

I am proud that the long slide in Federal support for basic research has ended. President Carter has increased funding for basic research by $(change from 77 to 82). That represents a total real growth of ____% -- and an annual real growth of ____%. For the first time in history, a President has asked Congress to appropriate over $1 billion for the National Science Foundation.

Last month President Carter outlined a new program to revitalize American industry. $600 million in that effort has been earmarked for research and development -- with a large portion of that to support basic science at our research universities. Last week I was privileged to meet at the White House with the presidents of a number of our greatest research institutions, including Dr. Gray. The immediate purpose of that meeting was to begin designing the ways in which that $600 million will be used.

But there were broader purposes as well. For I believe government must begin listening to the needs of research universities -- rather than imposing its own ideas on them. I believe government and universities must begin working their way toward a new social contract between them -- ensuring reasonable standards of accountability on the one hand, and scrupulously guaranteeing academic freedom on the other. And I believe government and universities share a responsibility to educate the public: to nourish our growing national commitment to the unembarrassed pursuit of excellence.

THE CRITICAL NEEDS

This morning I want to outline briefly the consensus of our meeting at the White House. The problems identified will not all be solved with $600 million -- but from now on, each of those problems has gained the legitimacy it deserves. The process begun in designing this program will not redress all the grievances between government and the universities -- but from now on, we will have a benchmark of cooperation with which to compare our future work.

Three areas stand out as most cirtical. First, people: faculty, research and technical staff, support personnel, and above all, students. If we do not act, we are in danger of losing an entire generation of researchers in key fields. As fellowships have declined in value and even disappeared, the promising physicist who might have made a brilliant theoretical contribution to micro-electronics instead goes into industry. The gifted medical student who might have transformed our understanding of immunology or transplantation biology instead goes into clinical disciplines.

Large-scale integrated circuits are the essence of America's technological advantage -- but today we have only a thousand people who can design them. While the need for doctorates in computer science is growing, we are turning out fewer of them than we were five years ago. While American agricultural genius is admired by nations around the world, we have fallen sharply behind in training young people able to meet the challenge of world hunger. Newton's famous aphorism about the cumulative nature of science is still true: "If I have seen farther, it is by standing on the shoulders of giants." The Newtons of the year 2000 will stand -- or fall -- on the young giants searching for fellowships today.

The second critical need is tools: instruments, equipment, facilities, laboratories, libraries. One university researcher who recently toured a number of private-sector laboratories commented, "The ivory towers are now in industry." University research equipment is twice as old as industry's equipment.

Students are learning and training on instruments which are already obsolete. And where we do have peerless facilities -- such as our linear accelerators -- they are often operating at far less than their effective full capacities.

Our research libraries need help -- not only because it costs increasingly more to acquire and conserve and microfilm and computerize information, but also because the amount of knowledge is growing faster than our ability to store it usefully. Our laboratories need help -- not only because the cost of equipment is rising, but also because leaps in science leave the instruments we do have behind. In 1960, a Nobel Prize was awarded for the development of the bubble chamber; today, that technique has largely been replaced by drift and wire chambers controlled by computers. Let us make our equipment catch up with our minds -- not our minds slow down to the museum pieces they have left behind.

Third, our universities need help as they meet national needs. I recall how research done at the University of Minnesota on the extraction of taconite created a new steel industry in my state. That example is one of hundreds -- and today, as our country seeks to strengthen our economy, our social well-being, and our long-term national security, those examples must be multiplied.

That will require new emphasis on national problems -- like energy. It will require new cooperation between universities and industries -- like steel and autos. Benefits will flow in both directions. We should not forget that Irving Langmuir won a Nobel Prize in chemistry for work begun to improve light bulbs.

Louis Pasteur's work in microbiology began as a consulting project for the French beer industry.

And as universities seek to meet national needs, let us focus on the root causes of our problems -- like the decline in foreign language and area studies. Our economic strength depends directly on our international competitiveness. But today -- while there are ten thousand Japanese salesmen in the United States who speak perfect English -- very few of the thousand American salesmen in Tokyo speak Japanese. Our security depends as much on our understanding as it does on our military defenses. But today there are more teachers of English in the Soviet Union than there are students of Russian in the United States.

AMERICAN GREATNESS

I have emphasized our problems -- but I also want to underline our advantages. American productivity is still the highest in the world. American scientific and technological strength are still the envy of the world. Our military defenses are unsurpassed. Our natural resources are unequalled. Our human resources are the most highly trained and best paid on earth. There is no system of government more strong or more free than our own. No society can match our commitment to economic and social justice at home -- and to human rights and arms control and peace around the world.

These blessings we owe to many sources -- a benevolent God, a rich land, a brilliant Constitution, an open society, a restless spirit, a relentless pursuit of excellence. In that pursuit, we will have higher education to thank -- not only for whetting the blade of our intellect ... but also for leavening and kneading and forming and coaxing our vlaues.

Last week, at the United Nations, I was privileged to take part at a ceremony honoring a gifted American political scientist, and an internationally respected peacemaker -- Ralph Bunche. Before I went to the UN, I had a chance to look through some of what he had written and said over the years, and I came across one passage that seems appropriate to recall today. It was 1927. Ralph Bunche, a black man, was graduating summa cum laude from the University of California. He gave the commencement address -- and this is part of what he said:

> Here this morning, after four arduous years of higher education, we confront a new world. If the mission of this education be filled, ... we shall have become more altruistic -- and less selfish. We shall love more -- and hate less. We shall have become more internationally minded -- less insular-minded. We shall have succeeded in slipping into the skins of others. We need not be less intellectual -- we need only feel more. We shall not only have developed the intellect -- we shall have educated the heart.

Today, let us rededicate our nation to the pursuit of excellence. And let us always ensure that our learning serves the ends of the educated heart.

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Control *

THANK YOU, MR. JOHNSON, FOR THAT VERY, VERY KIND INTRODUCTION.

PRESIDENT GRAY; PRESIDENT WIESNER; DR. LOW; MEMBERS OF THE M.I.T. COMMUNITY; DISTINGUISHED GUESTS, FRIENDS:

Teddy Follow

JOKES

DR. GRAY, YOU'RE A LUCKY MAN TO HEAD AN INSTITUTION AS DISTINGUISHED AS THIS ONE -- AND ONE OF YOUR GREATEST BLESSINGS IS A MARVELOUSLY ENTHUSIASTIC STUDENT BODY. IN FACT, ON THE WAY OVER HERE I HEARD ONE STUDENT YELLING SOMETHING AT THE TOP OF HIS LUNGS OUT OF A DORM WINDOW: I COULDN'T QUITE CATCH IT, BUT I BELIEVE HE WAS SAYING, "TECH IS SWELL."

THIS MORNING, AT BREAKFAST, I ASKED DR. GRAY WHAT NUMBER PRESIDENT OF M.I.T. HE'LL BE, AND HE SAID, THE 14TH. THEN HE ASKED ME WHAT NUMBER VICE PRESIDENT OF THE UNITED STATES I AM -- AND I SAID, I'M GLAD YOU ASKED.

YOU SEE, THERE HAVE BEEN 39 PRESIDENTS -- ACTUALLY 38 INDIVIDUALS, WITH GROVER CLEVELAND COUNTED TWICE, SINCE HIS TWO TERMS WERE NOT CONSECUTIVE. OF THOSE PRESIDENTS, 35 HAD VICE PRESIDENTS -- BECAUSE 4 OF THESE MEN SUCCEEDED TO THE PRESIDENCY, WERE NOT SUBSEQUENTLY ELECTED IN THEIR OWN RIGHT, AND NEVER HAD VICE PRESIDENTS. SINCE 8 OF THE 35 HAD TWO VICE PRESIDENTS AND SINCE ONE HAD 3 VICE PRESIDENTS, THERE HAVE ACTUALLY BEEN 45 PRESIDENTIAL/VICE PRESIDENTIAL TEAMS. HOWEVER, ONLY 42 INDIVIDUALS HAVE HELD THE OFFICE OF VICE PRESIDENT, BUT 2 OF THE 42 EACH SERVED UNDER TWO DIFFERENT PRESIDENTS.

I'M GLAD YOU'VE GIVEN ME A CHANCE TO CLEAR THAT UP.

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MIT

I AM HONORED TO SPEAK AT ONE OF THE FINEST CENTERS OF LEARNING NOT ONLY IN THE UNITED STATES, BUT THROUGHOUT THE WORLD. THOUGH THIS IS THE MIDDLE OF A HOTLY-CONTESTED POLITICAL CAMPAIGN, I HAVE BEEN MAKING A NUMBER OF SERIOUS STATEMENTS AROUND THE COUNTRY ABOUT THE DIRECTION OF OUR NATION'S FUTURE. AND I AM ESPECIALLY PLEASED TO MAKE THIS ADDRESS TODAY AT M.I.T. -- BECAUSE THIS UNIVERSITY IS AN EXAMPLE OF EVERYTHING I WANT TO EMPHASIZE.

FOR OVER A CENTURY, THE WORK DONE HERE HAS EXPANDED HUMANITY'S UNDERSTANDING OF THE UNIVERSE, AND OF ITSELF. THE INSTITUTE HAS SET STANDARDS OF TEACHING AND RESEARCH ADMIRED BY UNIVERSITIES EVERYWHERE. BY INCREASING THE NUMBER OF WOMEN AND MINORITIES IN SCIENCE AND ENGINEERING, YOU HAVE ENRICHED US ALL. WHAT'S MORE, A KEY REASON THE BOSTON-AREA ECONOMY IS SO STRONG IS THE GROWTH IN HIGH TECHNOLOGY INDUSTRIES WHICH OWE THEIR EXISTENCE TO THIS AND OTHER GREAT UNIVERSITIES HERE. THERE IS AN UNDENIABLE LINK BETWEEN WORK DONE ON THIS CAMPUS -- AND OUR COUNTRY'S SECURITY, ITS ECONOMIC VITALITY, AND ITS LONG-TERM SOCIAL AND INTELLECTUAL WELL-BEING.

I'M DELIGHTED TO SPEAK DURING PAUL GRAY'S INAUGURAL WEEK. I AM SURE HE WILL BE A GIFTED AND SENSITIVE AND TRUSTED UNIVERSITY PRESIDENT. AND HE WILL ALSO JOIN A LONG LINE OF M.I.T. LEADERS -- FROM JIM KILLIAN AND JERRY WIESNER, TO GUY STEVER AND FRANK PRESS AND SO MANY OTHERS -- WHO HAVE SHAPED THIS COUNTRY'S COMMITMENT TO SCIENCE.

AND MAY I ADD -- AS SOMEONE WHO WATCHED THE PRESIDENTIAL SCIENCE ADVISORY SYSTEM ABOLISHED IN THE '70S BECAUSE THEY TOLD ONE PRESIDENT THINGS HE DIDN'T WANT TO HEAR; AND AS SOMEONE WHO WORKED WITH SENATOR KENNEDY TO RESTORE THAT CRUCIAL SCIENTIFIC PRESENCE IN THE WHITE HOUSE -- MAY I SAY THAT I HOPE THIS NATION NEVER AGAIN ALLOWS THAT OFFICE TO BE DESTROYED.

EXCELLENCE

JOHN GARDNER ONCE PUT A LIST TOGETHER THAT INCLUDED THESE ITEMS: CONFUCIUS TEACHING THE FEUDAL LORDS TO GOVERN WISELY ... LINCOLN WRITING HIS SECOND INAUGURAL ... MOZART COMPOSING HIS FIRST ORATORIO AT THE AGE OF ELEVEN ... GALILEO DROPPING WEIGHTS AT PISA ... ELI WHITNEY PIONEERING THE MANUFACTURE OF INTER-CHANGEABLE PARTS ... AND RUTH SAYING TO NAOMI, "THY PEOPLE SHALL BE MY PEOPLE."

WHAT BINDS THE LIST TOGETHER IS THE IDEA OF EXCELLENCE. AND THOUGH THESE IMAGES TAKEN COLLECTIVELY SUGGEST THAT CIVILIZATION HAS DONE A RESPECTABLE JOB OF EXPLORING THE FULL RANGE OF HUMAN EXCELLENCES, GARDNER POINTS OUT THAT "A PARTICULAR SOCIETY AT A GIVEN MOMENT IN HISTORY IS APT TO HONOR ONLY A PORTION OF THE FULL RANGE."

HE GOES ON TO ASK SOME HARD QUESTIONS: IS OUR SOCIETY HONORING THE EXCELLENCES WHICH ARE MOST FRUITFUL FOR OUR OWN CONTINUED VITALITY? TO WHAT EXCELLENCES ARE WE RELATIVELY INSENSITIVE? AND WHAT DOES THAT IMPLY FOR THE TONE AND TEXTURE OF OUR LIVES?

THIS MORNING I WANT TO ADDRESS THOSE QUESTIONS. I BELIEVE THAT OUR INSTITUTIONS OF HIGHER LEARNING MUST BE COUNTED AMONG OUR GREATEST NATIONAL ASSETS. I BELIEVE THAT THE TIME HAS ARRIVED FOR A DRAMATIC RENEWAL OF OUR NATIONAL COMMITMENT TO THOSE CENTERS OF EXCELLENCE. AND I BELIEVE THERE IS SCARCELY A TASK AMERICA FACES THAT CAN BE MET WITHOUT NEW RESPECT AND INCREASED SUPPORT FOR OUR FINEST RESEARCH UNIVERSITIES.

HUMAN CAPITAL

WHAT ARE THOSE TASKS? OUR WORKFORCE IS SKILLED AND DEDICATED -- BUT TODAY, DEPENDENCE ON FOREIGN OIL ERODES THEIR JOBS AND EARNINGS. OUR INDUSTRIAL CAPACITY HAS TRANSFORMED OUR QUALITY OF LIFE -- BUT TODAY, OTHER NATIONS CHALLENGE OUR PREEMINENCE. OUR DEFENSES, WHICH ARE STRONG AND GROWING STRONGER, PROTECT OUR FREEDOM -- BUT TODAY, OTHER NATIONS ARE NEVERTHELESS ATTEMPTING TO OUTSTRIP US.

I BELIEVE THERE IS A GROWING CONCERN IN OUR COUNTRY THAT UNLESS WE DO SOMETHING ABOUT IT, WE COULD LOOSE OUR ADVANTAGES. A PROGRESSIVE NATIONAL POLICY FOR THE '80S BEGINS WITH THAT UNDERSTANDING -- AND ADDS TO IT THE TAX CREDITS, AND LIBERALIZED DEPRECIATION SCHEDULES, AND REGULATORY REFORM, AND TARGETED DEVELOPMENT AID, AND SUPPORT FOR THE ECONOMIC INFRASTRUCTURE, AND THE REST: ALL THE TOOLS FOR CAPITAL FORMATION AND INVESTMENT AND MODERNIZATION THAT THE COUNTRY CAN COMMAND.

BUT IF WE DO ONLY THAT, WE WILL HAVE IGNORED THE GREATEST RESOURCE WE POSSESS: THE TRAINED MIND. IT IS OUR GENIUS FOR NEW INVENTIONS WHICH HAS BOOSTED OUR PRODUCTIVITY. IT IS SCIENCE AND TECHNOLOGY WHICH HAVE CARRIED US DECADES AHEAD IN OUR DEFENSES. IT IS OUR HUMAN CAPITAL WHICH IS THE BASIS OF TWO HUNDRED YEARS OF FREEDOM AND PROGRESS.

AND IF WE ARE TO BECOME MORE COMPETITIVE, AS WE MUST; IF WE ARE TO CREATE NEW SOURCES OF ENERGY WHICH ARE BOTH ABUNDANT AND SAFE, AS WE MUST; IF WE ARE TO BUILD NEW CARS WHICH ARE BOTH EFFICIENT AND ENVIRONMENTALLY SOUND, AS WE MUST -- IF THIS GENERATION IS TO SCALE THE PEAKS OF THE '80S, WE WILL NEED NOT ONLY THE MONEY TO BUY THE ROPES AND PITONS (PEE-TONS) AND CRAMPONS. WE WILL ALSO NEED THE ONE THING WITHOUT WHICH THEY WILL BE USELESS: THE POISED, SKILLED, TRAINED, TALENTED, GIFTED HUMAN MIND.

WHAT UNIVERSITIES HAVE CONTRIBUTED

WE ARE BLESSED TO BE THE KIND OF SOCIETY THAT UNDERSTANDS THE INHERENT WORTH OF KNOWLEDGE: WE KNOW THAT SCHOLARSHIP AND RESEARCH ARE VALUABLE FOR THEIR OWN SAKE. BUT THEY ALSO CONTRIBUTE TO OUR ECONOMY, AND HAVE RAISED THE STANDARD OF LIVING AROUND THE WORLD.

CONSIDER THE STORY OF AMERICAN AGRICULTURE. ABOUT THE TIME THAT BOSTON HARBOR WAS BEING FILLED WITH TEA, IT TOOK ONE AMERICAN FARMER TO FEED THREE AMERICANS FOR A YEAR. AT THE TIME THAT M.I.T. WAS FOUNDED, ONE FARMER COULD FEED FIVE OF US. BUT TODAY, ONE FARMER FEEDS 60 PEOPLE -- AND BY THE TURN OF THE CENTURY, ONE FARMER WILL FEED 80 OF US.

THAT STORY, UNMATCHED IN HUMAN HISTORY, IS THE RESULT OF AMERICAN INVESTMENT IN RESEARCH AND EDUCATION. IN FACT, ONE STUDY SUGGESTS THAT UP TO ONE THIRD OF THE INCREASE IN AMERICA'S TOTAL NATIONAL INCOME IN THE LAST HALF-CENTURY HAS ARISEN FROM ADVANCES IN KNOWLEDGE -- AND I THINK THAT SUBSTANTIALLY UNDERSTATES IT.

THE GREATEST SHARE OF THOSE ADVANCES HAS OCCURRED AT OUR RESEARCH UNIVERSITIES. WHEN THE NATIONAL SCIENCE FOUNDATION LOOKED AT THE 85 MOST SIGNIFICANT ADVANCES IN FOUR FIELDS -- MATHEMATICS, CHEMISTRY, ASTRONOMY, AND EARTH SCIENCES -- THEY FOUND THAT UNIVERSITY-BASED RESEARCH WAS RESPONSIBLE FOR 70% OF THEM. CALL THE ROLL OF THIS CENTURY'S SCIENTIFIC MIRACLES, AND YOU WILL ALSO BE NAMING OUR GREAT UNIVERSITIES AND FACULTY SCIENTISTS. PENICILLIN, HYBRID CORN, THE MASER (MAZE-UR), THE LASER, THE COMPUTER, FM RADIO, POLIO VACCINE, NUCLEAR FISSION, NUCLEAR FUSION, INERTIAL GUIDANCE SYSTEMS: ALL WERE BORN AT UNIVERSITIES.

HERE AT M.I.T., BIOCHEMISTS IN ONE LABORATORY ARE CREATING STRAINS OF BACTERIA THAT CAN CONVERT CELLULOSE TO ALCOHOL. AT ANOTHER, HIGH-ENERGY PHYSICISTS ARE LIFTING THE CURTAIN ON THE NATURE OF MATTER. AT ANOTHER, PIONEERS IN LINGUISTICS ARE BUILDING NEW MODELS OF THE HUMAN MIND. FROM ELECTRICAL ENGINEERING TO COMPUTER SCIENCE, FROM IMMUNOLOGY TO ECONOMICS: AT A GIVEN MOMENT, THE WORK UNDERWAY AT M.I.T. IS A SNAPSHOT OF THE BOUNDARIES OF HUMAN KNOWLEDGE. AND WHAT IS HAPPENING HERE IS ALSO OCCURRING IN POCKETS OF EXCELLENCE ALL ACROSS THE COUNTRY.

WHY UNIVERSITIES

WHY HAVE UNIVERSITIES HAVE BEEN SO SUCCESSFUL? THREE REASONS QUICKLY COME TO MIND.

FIRST, UNIVERSITIES ENCOURAGE FUNDAMENTAL, BASIC RESEARCH, CONDUCTED IN A CLIMATE OF ACADEMIC FREEDOM. EVER SINCE FRANCIS BACON COUNSELED US 350 YEARS AGO TO "SEEK FOR EXPERIMENTS OF LIGHT, NOT FOR EXPERIMENTS OF FRUIT," THE UNIVERISTY HAS UPHELD THE WORTH OF PURE KNOWLEDGE -- PURSUED AS AN END IN ITSELF, CHASED WHEREVER IT MIGHT LEAD.

. FOR EXAMPLE, WE HAVE DEVELOPED ORGANISMS THAT CAN COMBAT OIL SLICKS NOT BECAUSE WE SET OUT WITH THAT GOAL, BUT BECAUSE THE UNIVERSITY PERMITTED DECADES OF PURE RESEARCH IN MOLECULAR BIOLOGY.

. WE HAVE DEVELOPED DRUGS TO COMBAT INFECTIOUS DISEASES NOT BECAUSE THERE WAS A QUICK PROFIT TO BE MADE, BUT BECAUSE -- AS LEWIS THOMAS REMINDS US -- FOR FIFTY YEARS A GREAT MASS OF INTERESTING KNOWLEDGE WAS STORED UP BY GIFTED SCIENTISTS, "NONE OF WHOM HAD THE FAINTEST IDEA THAT PENICILLIN AND STREPTOMYCIN LAY SOMEWHERE IN THE DECADES AHEAD."

. WE HAVE DEVELOPED TRANSISTORS AND SOLID STATE CIRCUITS NOT BECAUSE SOMEONE SET OUT TO BUILD MINIATURE ELECTRONIC COMPONENTS: IF THEY HAD, THEY WOULD HAVE TRIED TO INVENT SMALLER VACUUM TUBES. INSTEAD, WE OWE OUR ENORMOUS LEAPS IN COMPUTERS AND INTEGRATED CIRCUITS TO PURE RESEARCH ON THE PROPERTIES OF SEMICONDUCTORS.

SECOND, THE UNIVERSITY HAS BEEN HOME TO SO MANY DISCOVERIES BECAUSE IT IS ALSO HOME TO SO MANY DISCIPLINES. FOR EXAMPLE, THE PRESENCE ON THE SAME CAMPUS OF FIRST RATE MATHEMATICIANS, COMPUTER SCIENTISTS, AND ECONOMISTS HAS MEANT ACHIEVEMENTS IN ALL THREE FIELDS THAT WOULD HAVE BEEN POSSIBLE IN NONE OF THEM ALONE.

THIRD, AMERICAN CAMPUSES PRIZE THEIR UNIQUE MIX OF TEACHING AND RESEARCH. NO ONE UNDERSTANDS THAT BETTER THAN THE M.I.T. COMMUNITY -- WHERE MOST INSTRUCTORS WOULD BE HARD PRESSED TO SAY WHETHER THEY'RE TEACHING OR DOING RESEARCH AT A GIVEN MOMENT. THAT MIX HAS NOT ONLY TURNED STUDENTS INTO RESEARCHERS; IT HAS ALSO TURNED RESEARCH INTO GREAT RESEARCH. STUDENTS ARE MORE THAN APPRENTICES: THEY ARE COLLEAGUES. THEIR FRESHNESS MAKES THEM INVALUABLE CRITICS. YOU WILL NEVER CATCH GIFTED PROFESSORS YEARNING TO BE FREE OF STUDENTS AND TEACHING. BUT YOU WILL OFTEN HEAR THEM REMARK HOW A STUDENT'S QUESTION THREW OPEN THE DOOR TO A WHOLE NEW LINE OF INQUIRY.

THE GOVERNMENT'S ROLE

TODAY, MORE THAN HALF OF THE BASIC RESEARCH CONDUCTED IN AMERICA IS PURSUED AT OUR UNIVERSITIES. AND MORE THAN 70% OF THAT UNIVERSITY RESEARCH IS PAID FOR BY THE FEDERAL GOVERNMENT. THE GOVERNMENT'S CONTRIBUTION WAS LAUNCHED IN EARNEST IN THE WAKE OF SPUTNIK, GROWING IN A DECADE TO NEARLY $2 BILLION ANNUALLY.

AT THE SAME TIME, A SECOND REVOLUTION IN PUBLIC SUPPORT FOR EDUCATION WAS UNDERWAY. OUR NATION'S EYES HAD OPENED TO POVERTY, AND RACIAL DISCRIMINATION, AND UNEQUAL OPPORTUNITY -- AND WE RIGHTLY SAW OUR SCHOOLS AND COLLEGES AS AN INSTRUMENT OF SOCIAL JUSTICE. WE ALSO UNDERSTOOD THE POWER OF LEARNING -- EXPRESSED IN THIS ADVICE FROM A CHINESE PHILOSOPHER OF THE THIRD CENTURY B.C.:

IF YOU ARE THINKING A YEAR AHEAD, SOW SEED.
IF YOU ARE THINKING TEN YEARS AHEAD, PLANT A TREE.
IF YOU ARE THINKING A HUNDRED YEARS AHEAD, EDUCATE THE PEOPLE.

AS A NEW SENATOR, I WAS PROUD TO BE PART OF THE EFFORT TO AID LOCAL SCHOOLS; TO STRIP AWAY LAWS THAT HELD SO MANY OF OUR YOUNG PEOPLE BEHIND; AND TO CREATE NEW LAWS THAT PROTECTED THEIR CIVIL RIGHTS.

AS THE CHAIRMAN OF THE SUBCOMMITTEE ON EQUAL EDUCATIONAL OPPORTUNITY, I HELPED WRITE AND STRENGTHEN LANDMARK PROGRAMS LIKE HEAD START AND TITLE I AND BILINGUAL EDUCATION AND EDUCATION FOR THE HANDICAPPED -- ALL DESIGNED TO IMPROVE BASIC SKILLS.

AS VICE PRESIDENT, I AM PLEASED TO HAVE SEEN FEDERAL SUPPORT TO ELEMENTARY AND SECONDARY EDUCATION GROW BY 66% IN THE LAST FOUR YEARS -- A $3.1 BILLION INCREASE WHICH REPRESENTS THE LARGEST RISE IN SUCH AN INTERVAL IN OUR HISTORY. TODAY, WITH CHILDREN'S TEST SCORES IMPROVING FROM BOSTON TO OAKLAND, WE ARE SEEING EVIDENCE THAT OUR COMMITMENT HAS MADE A DIFFERENCE.

IN POSTSECONDARY EDUCATION AS WELL, PUBLIC SUPPORT HAS GROWN, AND IN THE LAST FOUR YEARS WE HAVE NEARLY DOUBLED IT. THAT STUDENT FINANCIAL AID -- GRANTS AND LOANS AND WORK-STUDY AND THE REST -- EACH YEAR HAS ENABLED MILLIONS WHO COULD NOT AFFORD TO ATTEND COLLEGE AND VOCATIONAL SCHOOL TO DO SO. TODAY, OVER HALF THE STUDENTS IN AMERICA WHO ARE CONTINUING THEIR EDUCATION BEYOND HIGH SCHOOL ARE RECEIVING SIGNIFICANT AID FROM THOSE PROGRAMS. THE NUMBER OF MINORITY STUDENTS IN POST SECONDARY EDUCATION HAS MORE THAN TRIPLED. THOSE PROGRAMS WORK, THEY ARE FUNDAMENTAL, THEY ARE JUST, AND THEY MUST BE PROTECTED.

YET AS SUPPORT FOR ACCESS HAS INCREASED STEADILY, SUPPORT FOR EXCELLENCE HAS SLACKENED. BY THE LATE '60S, THE FEDERAL INVESTMENT IN OUR SUPERB CENTERS OF RESEARCH AND INSTRUCTION HIT A PLATEAU -- AND BEGAN A LONG DECLINE REACHING TO THE MID-'70S.

BUT SURELY OUR TWO NATIONAL GOALS IN HIGHER EDUCATION -- ACCESS AND EXCELLENCE -- STRENGTHEN ONE ANOTHER. BY BROADENING THE POOL FROM WHICH UNIVERSITIES DRAW, WE INCREASE THE NUMBER OF GIFTED STUDENTS WHOSE TALENTS CAN BE DEVELOPED. BY HELPING OUR CENTERS OF EXCELLENCE KEEP THEIR SHARP EDGE, EVERYONE BENEFITS.

THE TIME HAS COME TO MATCH OUR COMMITMENT TO ACCESS WITH A COMPARABLE COMMITMENT TO EXCELLENCE. THE AMERICAN PEOPLE UNDERSTAND THAT OUR NATION WILL LOSE ITS COMPETITIVE ADVANTAGE UNLESS WE DO SOMETHING TO MAINTAIN IT. OUR ELECTED OFFICIALS UNDERSTAND THAT A GROWING CONSTITUENCY FOR EXCELLENCE IS READY TO BE MOBILIZED. AND OUR GREAT UNIVERSITIES UNDERSTAND THAT THE SUREST ROUTE TO NEW DISCOVERIES IS TO SUPPORT OUR MAJOR RESEARCH CENTERS, PROTECT THEIR ACADEMIC FREEDOM, HELP THEM GET THE EQUIPMENT AND TALENT AND FACILITIES THEY NEED -- AND LEAVE THEM ALONE TO DO THEIR JOB.

AND LET US NOT ONLY FACE THE RESOURCE PROBLEM: LET US ALSO CONFRONT THE REGULATION AND PAPERWORK PROBLEM. I BELIEVE UNIVERSITIES NEED NOT MORE DIRECTION FROM WASHINGTON, BUT MORE SUPPORT FROM WASHINGTON. IF A RESEARCH TEAM IS FIRST RATE, THEY DON'T NEED THE PAPERWORK. AND IF IT IS A SHODDY RESEARCH PROJECT, ALL THE PAPERWORK IN THE WORLD WON'T HELP. SURELY GOVERNMENT AND UNIVERSITIES MUST BEGIN WORKING THEIR WAY TOWARD A NEW SOCIAL CONTRACT BETWEEN THEM -- PROVIDING REASONABLE STANDARDS OF ACCOUNTABILITY ON THE ONE HAND, AND SCRUPULOUSLY GUARANTEEING ACADEMIC FREEDOM ON THE OTHER.

THE CRITICAL NEEDS

I AM PROUD THAT THE LONG SLIDE IN FEDERAL SUPPORT FOR BASIC RESEARCH HAS ENDED. PRESIDENT CARTER HAS INCREASED FUNDING FOR BASIC RESEARCH EACH YEAR IN OFFICE. IT HAS RISEN BY $1.6 BILLION -- AND IN THE NEXT TWO YEARS WE HAVE BUDGETED FOR 3% REAL GROWTH IN BASIC RESEARCH FUNDS. FOR THE FIRST TIME IN HISTORY, A PRESIDENT HAS ASKED FOR AND RECEIVED OVER $1 BILLION FOR THE NATIONAL SCIENCE FOUNDATION.

LAST MONTH PRESIDENT CARTER OUTLINED A NEW PROGRAM TO REVITALIZE AMERICAN INDUSTRY. $600 MILLION OF THAT EFFORT HAS BEEN EARMARKED FOR RESEARCH AND TECHNOLOGICAL DEVELOPMENT. MORE NEEDS TO BE DONE -- BUT THIS SIGNIFICANT FIRST STEP SYMBOLIZES THE CRUCIAL NATURE OF THE OBJECTIVE.

IN THE PRESIDENT'S ECONOMIC MESSAGE, THE COMMITMENT TO RESEARCH WAS MADE CLEAR; THE INITIAL AMOUNT WAS SPECIFIED; BUT WE DEFERRED THE SPECIFICS OF THE PROGRAM UNTIL WE COULD CONSULT WITH YOU, AND WITH OTHERS AT CENTERS OF EXCELLENCE ACROSS THE COUNTRY.

IF YOU HAVE IDEAS FOR REVITALIZING OUR GREAT RESEARCH UNIVERSITIES, AND I SUSPECT YOU DO -- I INVITE YOU TO CORRESPOND WITH ME. IN THAT SAME SPIRIT, I INVITED THE PRESIDENTS OF MANY OF OUR GREATEST INSTITUTIONS, INCLUDING DR. GRAY, TO BEGIN DESIGNING THE WAYS IN WHICH THAT INITIAL $600 MILLION SHOULD BE USED IN A MEETING I HOSTED AT THE WHITE HOUSE LAST WEEK. THAT MEETING -- AND THIS ONE, AND OTHERS -- WILL HELP US ASSEMBLE A PACKAGE WE WILL SEND TO THE CONGRESS VERY EARLY IN THE NEXT YEAR. WE WANT TO LAY THE GROUNDWORK FOR A LONG-TERM NATIONAL COMMITMENT TO OUR RESEARCH CENTERS.

AND THIS MORNING I WANT TO REPORT BRIEFLY TO YOU THE CONSENSUS OF OUR MEETING AT THE WHITE HOUSE.

THREE PROBLEMS STAND OUT AS MOST CRITICAL. FIRST, PEOPLE: STUDENTS, FACULTY, RESEARCH AND TECHNICAL STAFF, SUPPORT PERSONNEL. I HAVE HEARD IT SAID THAT IF WE DO NOT ACT, WE WILL BE IN DANGER OF LOSING AN ENTIRE GENERATION OF RESEARCHERS IN KEY FIELDS. OF COURSE WE NEED FIRST-RATE PEOPLE GOING INTO APPLIED WORK AND THE PRIVATE SECTOR.

BUT IF THE UNIVERSITIES LOSE THEIR CRITICAL MASS OF RESEARCHERS, BOTH THE CAMPUS AND INDUSTRY WILL BE DIMINISHED. IT IS INCREASINGLY CLEAR THAT -- AS THE NUMBER OF FACULTY OPENINGS HAS DWINDLED, AS FELLOWSHIPS HAVE DECLINED IN VALUE AND EVEN DISAPPEARED -- CAREER PATTERNS HAVE TILTED TOO CONSISTENTLY AWAY FROM THE ACADEMY.

LARGE-SCALE INTEGRATED CIRCUITS ARE THE ESSENCE OF AMERICA'S TECHNOLOGICAL ADVANTAGE -- BUT I'M TOLD THAT TODAY WE HAVE ONLY A THOUSAND PEOPLE WHO CAN DESIGN THEM. WHILE THE NEED FOR DOCTORATES IN COMPUTER SCIENCE IS GROWING, WE ARE TURNING OUT FEWER OF THEM THAN WE WERE FIVE YEARS AGO. WHILE AMERICAN AGRICULTURAL GENIUS IS ADMIRED BY NATIONS AROUND THE WORLD, WE HAVE FALLEN SHARPLY BEHIND IN TRAINING YOUNG PEOPLE ABLE TO MEET THE CHALLENGE OF WORLD HUNGER.

NEWTON'S FAMOUS APHORISM ABOUT THE CUMULATIVE NATURE OF SCIENCE IS STILL TRUE: "IF I HAVE SEEN FARTHER, IT IS BY STANDING ON THE SHOULDERS OF GIANTS." THE NEWTONS OF THE YEAR 2000 WILL STAND -- OR FALL -- ON THE YOUNG GIANTS SEARCHING FOR FELLOWSHIPS AND FACULTY JOBS TODAY.

THE SECOND CRITICAL NEED IS TOOLS: INSTRUMENTS, EQUIPMENT, FACILITIES, LABORATORIES, LIBRARIES. ONE UNIVERSITY RESEARCHER WHO RECENTLY TOURED A NUMBER OF PRIVATE-SECTOR LABORATORIES COMMENTED, "THE IVORY TOWERS ARE NOW IN INDUSTRY." UNIVERSITY RESEARCH EQUIPMENT IS TWICE AS OLD AS INDUSTRY'S EQUIPMENT. STUDENTS ARE LEARNING AND TRAINING ON INSTRUMENTS WHICH ARE ALREADY OBSOLETE. AND WHERE WE DO HAVE PEERLESS FACILITIES -- SUCH AS OUR LINEAR ACCELERATORS -- THEY ARE OFTEN OPERATING AT FAR LESS THAN THEIR EFFECTIVE FULL CAPACITIES.

OUR RESEARCH LIBRARIES NEED HELP -- NOT ONLY BECAUSE IT COSTS INCREASINGLY MORE TO ACQUIRE AND CONSERVE AND MICROFILM AND COMPUTERIZE INFORMATION, BUT ALSO BECAUSE THE AMOUNT OF KNOWLEDGE IS GROWING FASTER THAN OUR ABILITY TO STORE IT USEFULLY. OUR LABORATORIES NEED HELP -- NOT ONLY BECAUSE THE COST OF EQUIPMENT IS RISING, BUT ALSO BECAUSE LEAPS IN SCIENCE LEAVE THE INSTRUMENTS WE DO HAVE BEHIND. IN 1960, A NOBEL PRIZE WAS AWARDED FOR THE DEVELOPMENT OF THE BUBBLE CHAMBER; TODAY, THAT TECHNIQUE HAS LARGELY BEEN REPLACED BY DRIFT AND WIRE CHAMBERS CONTROLLED BY COMPUTERS. IT IS TIME TO MAKE OUR EQUIPMENT CATCH UP WITH OUR MINDS.

THIRD, OUR UNIVERSITIES NEED HELP AS THEY MEET NATIONAL NEEDS. I RECALL HOW RESEARCH DONE AT THE UNIVERSITY OF MINNESOTA ON THE EXTRACTION OF TACONITE CREATED A NEW IRON ORE INDUSTRY IN MY STATE. EXAMPLES LIKE THAT MUST BE MULTIPLIED. TO MODERNIZE OUR STEEL INDUSTRY; TO REVITALIZE OUR AUTO INDUSTRY; TO CREATE A SAFE AND CLEAN NEW ENERGY INDUSTRY; TO KEEP OUR MICRO-ELECTRONICS WAY OUT AHEAD OF THE REST OF THE WORLD -- TO DO THAT, AND MORE, UNIVERSITIES AND INDUSTRY MUST COOPERATE AS NEVER BEFORE.

BENEFITS WILL FLOW IN BOTH DIRECTIONS. WE SHOULD NOT FORGET THAT IRVING LANGMUIR WON A NOBEL PRIZE IN CHEMISTRY FOR WORK BEGUN TO IMPROVE LIGHT BULBS. LOUIS PASTEUR'S WORK IN MICROBIOLOGY BEGAN AS A CONSULTING PROJECT FOR THE FRENCH BEER INDUSTRY. AND IF WE NEED AN EXAMPLE OF UNIVERSITY RESEARCH CHANGING THE ECONOMIC FACE OF A REGION FOR THE BETTER, WE NEED LOOK NO FARTHER THAN THE RELATIONSHIP BETWEEN M.I.T. AND THE ROUTE 128 BELT.

UNIVERSITIES CAN ALSO HELP US FOCUS ON THE ROOT CAUSES OF OUR PROBLEMS -- LIKE THE DECLINE IN FOREIGN LANGUAGE STUDIES. OUR ECONOMIC STRENGTH DEPENDS DIRECTLY ON OUR INTERNATIONAL COMPETITIVENESS. BUT TODAY -- WHILE THERE ARE TEN THOUSAND JAPANESE SALESMEN IN THE UNITED STATES WHO SPEAK PERFECT ENGLISH -- VERY FEW OF THE THOUSAND AMERICAN SALESMEN IN TOKYO SPEAK JAPANESE. OUR SECURITY DEPENDS AS MUCH ON OUR UNDERSTANDING AS IT DOES ON OUR MILITARY DEFENSES. BUT TODAY THERE ARE MORE TEACHERS OF ENGLISH IN THE SOVIET UNION THAN THERE ARE STUDENTS OF RUSSIAN IN THE UNITED STATES. AND IF WE UNDERSTAND HOW LANGUAGE AND INTERNATIONAL STUDIES CAN HELP US, PERHAPS WE CAN ALSO GRASP THE CONTRIBUTION OF THE SOCIAL SCIENCES TO OUR SOCIETY, THE HUMANITIES TO OUR HUMANENESS.

AMERICAN GREATNESS

I HAVE EMPHASIZED OUR PROBLEMS -- BUT I ALSO WANT TO UNDERLINE OUR ADVANTAGES. AMERICAN PRODUCTIVITY IS STILL THE HIGHEST IN THE WORLD. AMERICAN SCIENTIFIC AND TECHNOLOGICAL AND AGRICULTURAL STRENGTH ARE STILL THE ENVY OF THE WORLD. OUR MILITARY DEFENSES ARE UNSURPASSED. OUR NATURAL RESOURCES ARE UNEQUALLED. OUR HUMAN RESOURCES ARE THE MOST HIGHLY TRAINED AND BEST PAID ON EARTH. NO EDUCATIONAL SYSTEM IS MORE AMBITIOUS OR MORE INDEPENDENT THAN OURS. NO POLITICAL SYSTEM IS MORE STRONG OR MORE FREE THAN OURS. NO SOCIETY CAN MATCH OUR COMMITMENT TO ECONOMIC AND SOCIAL JUSTICE AT HOME -- AND TO HUMAN RIGHTS AND ARMS CONTROL AND PEACE AROUND THE WORLD.

THESE BLESSINGS WE OWE TO MANY SOURCES -- A BENEVOLENT GOD, A RICH LAND, A BRILLIANT CONSTITUTION, AN OPEN SOCIETY, A RESTLESS SPIRIT, A RELENTLESS PURSUIT OF EXCELLENCE. IN THAT PURSUIT, WE WILL HAVE HIGHER EDUCATION TO THANK -- NOT ONLY FOR WHETTING THE BLADE OF OUR INTELLECT ... BUT ALSO FOR LEAVENING AND KNEADING AND FORMING AND COAXING OUR VALUES.

LAST WEEK, AT THE UNITED NATIONS, I WAS PRIVILEGED TO TAKE PART AT A CEREMONY HONORING A GIFTED AMERICAN POLITICAL SCIENTIST, AND AN INTERNATIONALLY RESPECTED PEACEMAKER -- RALPH BUNCHE. BEFORE I WENT TO THE UN, I HAD A CHANCE TO LOOK THROUGH SOME OF WHAT HE HAD WRITTEN AND SAID OVER THE YEARS, AND I CAME ACROSS ONE PASSAGE THAT SEEMS APPROPRIATE TO RECALL TODAY. IT WAS 1927. RALPH BUNCHE, A BLACK MAN, WAS GRADUATING <u>SUMMA CUM LAUDE</u> FROM THE UNIVERSITY OF CALIFORNIA. HE GAVE THE COMMENCEMENT ADDRESS -- AND THIS IS PART OF WHAT HE SAID:

> HERE THIS MORNING, AFTER FOUR ARDUOUS YEARS OF HIGHER EDUCATION, WE CONFRONT A NEW WORLD. IF THE MISSION OF THIS EDUCATION BE FILLED, ... WE SHALL HAVE BECOME MORE ALTRUISTIC -- AND LESS SELFISH. WE SHALL LOVE MORE -- AND HATE LESS. WE SHALL HAVE BECOME MORE INTERNATIONALLY MINDED -- LESS INSULAR-MINDED. WE SHALL HAVE SUCCEEDED IN SLIPPING INTO THE SKINS OF OTHERS. WE NEED NOT BE LESS INTELLECTUAL -- WE NEED ONLY FEEL MORE. WE SHALL NOT ONLY HAVE DEVELOPED THE INTELLECT -- WE SHALL HAVE EDUCATED THE HEART.

TODAY, LET US REDEDICATE OUR NATION TO THE PURSUIT OF EXCELLENCE. AND LET US ALWAYS ENSURE THAT OUR LEARNING SERVES THE ENDS OF THE EDUCATED HEART.

OFFICE OF THE VICE PRESIDENT'S PRESS SECRETARY

(FOR RELEASE AT 9 AM EDT
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CAMBRIDGE, MASS., SEPT. 25--Following is the text of an address prepared for delivery by Walter F. Mondale to a special convocation at the Massachusetts Institute of Technology in Kresge Auditorium here.

I am honored to speak at one of the finest centers of learning not only in the United States, but throughout the world. Though this is the middle of a hotly-contested political campaign, I have been making a number of serious statements around the country about the direction of our nation's future. And I am especially pleased to make this address today at M.I.T., because this university is an example of everything I want to emphasize.

For over a century, the work done here has expanded humanity's understanding of the universe, and of itself. The Institute has set standards of teaching and research admired by universities everywhere. By increasing the number of women and minorities in science and engineering, you have enriched us all. What's more, a key reason the Boston-area economy is so strong is the growth in high technology industries which owe their existence to this and other great universities here. There is an undeniable link between work done on this campus, and our country's security, its economic vitality, and its long-term social and intellectual well-being.

I'm delighted to speak during Paul Gray's inaugural week. I am sure he will be a gifted and sensitive and trusted university President. And he will also join a long line of M.I.T. leaders, from Jim Killian and Jerry Wiesner, to Guy Stever and Frank Press and so many others, who have shaped this country's commitment to science.

And may I add, as someone who watched the presidential science advisory system abolished in the '70s because they told one President things he didn't want to hear; and as someone who worked with Senator Kennedy to restore that crucial scientific presence in the White House may I say that I hope this nation never again allows that office to be destroyed.

John Gardner once put a list together that included these items: Confucius teaching the feudal lords to govern wisely; Lincoln writing his second inaugural; Mozart composing his first oratorio at the age of eleven; Galileo dropping weights at Pisa; Eli Whitney pioneering the manufacture of interchangeable parts; and Ruth saying to Naomi, "Thy people shall be my people."

What binds the list together is the idea of excellence. And though these images taken collectively suggest that civilization has done a respectable job of exploring the full range of human excellences, Gardner points out that "a particular society at a given moment in history is apt to honor only a portion of the full range."

He goes on to ask some hard questions: Is our society honoring the excellences which are most fruitful for our own continued vitality? To what excellences are we relatively insensitive? And what does that imply for the tone and texture of our lives?

This morning I want to address those questions. I believe that our institutions of higher learning must be counted among our greatest national assets. I believe that the time has arrived for a dramatic renewal of our national commitment to those centers of excellence. And I believe there is scarcely a task America faces that can be met without new respect and increased support for our finest research universities.

What are those tasks? Our workforce is skilled and dedicated, but today, dependence on foreign oil erodes their jobs and earnings. Our industrial capacity has transformed our quality of life, but today, other nations challenge our preeminence. Our defenses, which are strong and growing stronger, protect our freedom, but today, other nations are nevertheless attempting to outstrip us.

I believe there is a growing concern in our country that unless we do something about it, we could loose our advantages. A progressive national policy for the '80s begins with that understanding, and adds to it the tax credits, and liberalized depreciation schedules, and regulatory reform, and targeted development aid, and support for the economic infrastructure, and the rest: all the tools for capital formation and investment and modernization that the country can command.

(MORE)

But if we do only that, we will have ignored the greatest resource we possess: the trained mind. It is our genius for new inventions which has boosted our productivity. It is science and technology which have carried us decades ahead in our defenses. It is our human capital which is the basis of two hundred years of freedom and progress.

And if we are to become more competitive, as we must; if we are to create new sources of energy which are both abundant and safe, as we must; if we are to build new cars which are both efficient and environmentally sound, as we must; if this generation is to scale the peaks of the 80's, we will need not only the money to buy the ropes and pitons and crampons. We will also need the one thing without which they will be useless: the poised, skilled, trained, talented, gifted human mind.

We are blessed to be the kind of society that understands the inherent worth of knowledge: We know that scholarship and research are valuable for their own sake. But they also contribute to our economy, and have raised the standard of living around the world.

Consider the story of American agriculture. About the time that Boston Harbor was being filled with tea, it took one American farmer to feed three Americans for a year. At the time that MIT was founded, one farmer could feed five of us. But today, one farmer feeds 60 people, and by the turn of the century, one farmer will feed 80 of us.

That story, unmatched in human history, is the result of American investment in research and education. In fact, one study suggests that up to one third of the increase in America's total national income in the last half-century has arisen from advances in knowledge, and I think that substantially understates it.

The greatest share of those advances has occurred at our research universities. When the National Science Foundation looked at the 85 most significant advances in four fields: mathematics, chemistry, astronomy, and earth sciences; they found that university-based research was responsible for 70% of them. Call the roll of this century's scientific miracles, and you will also be naming our great universities and faculty scientists. Penicillin, hybrid corn, the maser, the laser, the computer, FM radio, polio vaccine, nuclear fission, nuclear fusion, inertial guidance systems: all were born at universities.

Here at MIT, biochemists in one laboratory are creating strains of bacteria that can convert cellulose to alcohol. At another, high-energy physicists are lifting the curtain on the nature of matter. At another, pioneers in linguistics are building new models of the human mind. From electrical engineering to computer science, from immunology to economics: at a given moment, the work underway at MIT is a snapshop of the boundaries of human knowledge. And what is happening here is also occurring in pockets of excellence all across the country.

Why have universities been so successful? Three reasons quickly come to mind.

First, universities encourage fundamental, basic research, conducted in a climate of academic freedom. Ever since Francis Bacon counseled us 350 years ago to "seek for experiments of light, not for experiments of fruit," the university has upheld the worth of pure knowledge -- pursued as an end in itself, chased wherever it might lead.

For example, we have developed organisms that can combat oil slicks not because we set out with that goal, but because the university permitted decades of pure research in molecular biology.

We have developed drugs to combat infectious diseases not because there was a quick profit to be made, but because, as Lewis Thomas reminds us, for fifty years a great mass of interesting knowledge was stored up by gifted scientists, "none of whom had the faintest idea that penicillin and streptomycin lay somewhere in the decades ahead."

We have developed transistors and solid state circuits not because someone set out to build miniature electronic components: if they had, they would have tried to invent smaller vacuum tubes. Instead, we own our enormous leaps in computers and integrated circuits to pure research on the properties of semiconductors.

Second, the university has been home to so many discoveries because it is also home to so many disciplines. For example, the presence on the same campus of first rate mathematicians, computer scientists, and economists has meant achievements in all three fields that would have been possible in none of them alone.

Third, American campuses prize their unique mix of teaching and research. No one understands that better than the MIT community, where most instructors would be hard pressed to say whether they are teaching or doing research at a given moment. That mix has not only turned students into researchers; it has also turned research into great research. Students are more than apprentices; they are colleagues. Their freshness makes them invaluable critics. You will never catch gifted professors yearning to be free of students and teaching. But you will often hear them remark how a student's question threw open the door to a whole new line of inquiry.

Today, more than half of the basic research conducted in America is pursued at our universities. And more than 70% of that university research is paid for by the federal government. The government's contribution was launched in earnest in the wake of Sputnik, growing in a decade to nearly $2 billion annually.

At the same time, a second revolution in public support for education was underway. Our nation's eyes had opened to poverty, and racial discrimination, and unequal opportunity -- and we rightly saw our schools and colleges as an instrument of social justice. We also understood the power of learning, expressed in this advice from a Chinese philosopher of the third century BC:

> If you are thinking a year ahead, sow seed.
> If you are thinking ten years ahead, plant a tree.
> If you are thinking a hundred years ahead, educate the people.

As a new Senator, I was proud to be part of the effort to aid local schools; to strip away laws that held so many of our young people behind; and to create new laws that protected their civil rights.

As the Chairman of the Subcommittee on Equal Educational Opportunity, I helped write and strengthen landmark programs like Head Start and Title I and Bilingual Education and Education for the Handicapped -- all designed to improve basic skills.

As Vice President, I am pleased to have seen Federal support to elementary and secondary education grow by 66% in the last four years, a $3.1 billion increase which represents the largest rise in such an interval in our history. Today, with children's test scores improving from Boston to Oakland, we are seeing evidence that our commitment has made a difference.

In post-secondary education as well, public support has grown, and in the last four years we have nearly doubled it. That student financial aid, grants and loans and work-study and the rest, each year has enabled millions who could not afford to attend college and vocational school to do so. Today, over half the students in America who are continuing their education beyond high school are receiving significant aid from those programs. The number of minority students in post secondary education has more than tripled. Those programs work, they are fundamental, they are just, and they must be protected.

Yet as support for access has increased steadily, support for excellence has slackened. By the late '60's, the Federal investment in our superb centers of research and instruction hit a plateau and began a long decline reaching to the mid-seventies. But surely our two national goals in higher education, access and excellence, strengthen one another. By broadening the pool from which universities draw, we increase the number of gifted students whose talents can be developed. By helping our centers of excellence keep their sharp edge, everyone benefits.

The time has come to match our commitment to access with a comparable commitment to excellence. The American people understand that our nation will lose its competitive advantage unless we do something to maintain it. Our elected officials understand that a growing constituency for excellence is ready to be mobilized. And our great universities understand that the surest route to new discoveries is to support our major research centers, protect their academic freedom, help them get the equipment and talent and facilities they need and leave them alone to do their job.

(MORE)

And let us not only face the resource problem: let us also confront the regulation and paperwork problem. I believe universities need not more direction from Washington, but more support from Washington. If a research team is first rate, they don't need the paperwork. And if it is a shoddy research project, all the paperwork in the world won't help. Surely government and universities must begin working their way toward a new social contract between them, providing reasonable standards of accountability on the one hand, and scrupulously guaranteeing academic freedom on the other.

I am proud that the long slide in Federal support for basic research has ended. President Carter has increased funding for basic research each year in office. It has risen by $1.6 billion and in the next two years we have budgeted for 3% real growth in basic research funds. For the first time in history, a President has asked for and received over $1 billion for the National Science Foundation.

Last month President Carter outlined a new program to revitalize American industry. $600 million of that effort has been earmarked for research and technological development. More needs to be done, but this significant first step symbolizes the crucial nature of the objective.

In the President's economic message, the commitment to research was made clear; the initial amount was specified; but we deferred the specifics of the program until we could consult with you, and with others at centers of excellence across the country.

If you have ideas for revitalizing our great research universities, and I suspect you do, I invite you to correspond with me. In that same spirit, I invited the presidents of many of our greatest institutions, including Dr. Gray, to begin designing the ways in which that initial $600 should be used in a meeting I hosted at the White House last week. That meeting, and this one, and others will help us assemble a package we will send to the Congress very early in the next year. We want to lay the groundwork for a long-term national commitment to our research centers. And this morning I want to report briefly to you the consensus of our meeting at the White House.

Three problems stand out as most critical. First, people: students, faculty, research and technical staff, support personnel. I have heard it said that if we do not act, we will be in danger of losing an entire generation of researchers in key fields. Of course we need first-rate people going into applied work and the private sector. But if the universities lose their critical mass of researchers, both the campus and industry will be diminished. It is increasingly clear that, as the number of faculty openings has dwindled, as fellowships have declined in value and even disappeared, career patterns have tilted too consistently away from the academy.

Large-scale integrated circuits are the essence of America's technological advantage, but I'm told that today we have only a thousand people who can design them. While the need for doctorates in computer science is growing, we are turning out fewer of them than we were five years ago. While American agricultural genius is admired by nations around the world, we have fallen sharply behind in training young people able to meet the challenge of world hunger.

Newton's famous aphorism about the cumulative nature of science is still true: "If I have seen farther, it is by standing on the shoulders of giants." The Newtons of the year 2000 will stand, or fall, on the young giants searching for fellowships and faculty jobs today.

The second critical need is tools: instruments, equipment, facilities, laboratories, libraries. One university researcher who recently toured a number of private-sector laboratories commented, "The Ivory Towers are now in industry." University research equipment is twice as old as industry's equipment. Students are learning and training on instruments which are already obsolete. And where we do have peerless facilities, such as our linear accelerators, they are often operating at far less than their effective full capacities.

Our research libraries need help, not only because it costs increasingly more to acquire and conserve and microfilm and computerize information, but also because the amount of knowledge is growing faster than our ability to store it usefully. Our laboratories need help, not only because the cost of equipment is rising, but also because leaps in science leave the instruments we do have behind. In 1960, a Nobel Prize was awarded for the development of the bubble chamber; today, that technique has largely been replaced by drift and wire chambers controlled by computers. It is time to make our equipment catch up with our minds.

Third, our universities need help as they meet national needs. I recall how research done at the University of Minnesota on the extraction of taconite created an iron ore industry in my state. Examples like that must be multiplied. To modernize our steel industry; to revitalize our auto industry; to create a safe and clean new energy industry; to keep our micro-electronics way out ahead of the rest of the world, to do that, and more, universities and industry must cooperate as never before.

Benefits will flow in both directions. We should not forget that Irving Langmuir won a Nobel Prize in chemistry for work begun to improve light bulbs. Louis Pasteur's work in microbiology began as a consulting project for the French beer industry. And if we need an example of university research changing the economic face of a region for the better, we need look no farther than the relationship between MIT and the Route 128 belt.

Universities can also help us focus on the root causes of our problems, like the decline in foreign language studies. Our economic strength depends directly on our international competitiveness. But today, while there are ten thousand Japanese salesmen in the United States who speak perfect English, very few of the thousand American salesmen in Tokyo speak Japanese. Our security depends as much on our understanding as it does on our military defenses. But today there are more teachers of English in the Soviet Union than there are students of Russian in the United States. And if we understand how language and international studies can help us, perhaps we can also grasp the contribution of the social sciences to our society, the humanities to our humaneness.

I have emphasized our problems, but I also want to underline our advantages. American productivity is still the highest in the world. American scientific and technological and agricultural strength are still the envy of the world. Our military defenses are unsurpassed. Our natural resources are unequalled. Our human resources are the most highly trained and best paid on earth. No educational system is more ambitious or more independent than ours. No society can match our commitment to economic and social justice at home and to human rights and arms control and peace around the world.

These blessings we owe to many sources; a benevolent God, a rich land, a brilliant Constitution, an open society, a restless spirit, a relentless pursuit of excellence. In that pursuit, we will have higher education to thank, not only for whetting the blade of our intellect, but also for leavening and kneading and forming and coaxing our values.

Last week, at the United Nations, I was privileged to take part at a ceremony honoring a gifted American political scientist, and an internationally respected peacemaker, Ralph Bunche. Before I went to the UN, I had a chance to look through some of what he had written and said over the years, and I came across one passage that seems appropriate to recall today. It was 1927. Ralph Bunche, a black man, was graduating summa cum laude from the University of California. He gave the commencement address -- and this is part of what he said:

> Here this morning, after four arduous years of higher education, we confront a new world. If the mission of this education be filled, ... we shall have become more altruistic -- and less selfish. We shall love more -- and hate less. We shall have become more internationally-minded -- less insular-minded. We shall have succeeded in slipping into the skins of others. We need not be less intellectual -- we need only feel more. We shall not only have developed the intellect -- we shall have educated the heart.

Today, let us rededicate our nation to the pursuit of excellence. And let us always ensure that our learning served the ends of the educated heart.

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