



Remarks of
JOHN H. GIBBONS
Assistant to the President
for
Science and Technology

AAAS Policy Colloquium
12 April 1995
Washington, DC

*Melanne Vermeer -
FYI, reflecting our conversation
about the support of science
and technology.
See, especially, the closing quote!
Jack J.*

Good afternoon, and thank you for inviting me to share a few thoughts about the health of the science and technology enterprise in 1995 and our outlook for the year ahead. I look forward each year to the AAAS colloquium as an annual milestone, a chance to draft a report card for the work that we've been doing over the past 12 months to foster innovation, conduct research along the frontier areas of science, protect our environment, and bring the fruits of technology to the American people and to the world.

As I stand here today, though, I can't help but think a year ahead to what next year's keynote speaker will be saying about the 1995 year-in-science. Will that speaker be able to say that 1995 was the year America ceded leadership in science and technology to foreign competitors, or that America retained and bolstered its lead? That the 104th Congress shut the door to a Federal role in supporting critical technology research and development, or that Congress renewed the science and technology partnerships vital to American economic, environmental, health and national security?

These are not idle questions. What has played out over the past 100 days in Congress for those who follow science policy is a clear dichotomy between some in Congress who desire to cut government seemingly at any cost, versus the Administration's commitment to cutting the deficit while boosting overall productivity and investing for the future..

One of the things that will stand out about 1995 is that it is the first year that we have really felt the pain of living with true public fiscal austerity -- the escalating budgets of the spendthrift '80s are over. I think this is where I'm supposed to say, "I feel your pain."

One of the reason we've been insulated from the pain so far, is that this Administration has been carefully, judiciously cutting the deficit for three budget years in a row, racking up more than \$600 billion in deficit reduction. We've been working very hard to try to minimize the pain, or at least balance it out in an equitable fashion.

The President's projection for FY96 implies a \$200 billion deficit. That's about half of what it would have been had he not commenced two years ago his deficit reduction plan. It's important to note that \$200 billion amounts to the interest we pay every single year for the increase in the national debt callously racked up in the heady Reagan-Bush years.

I don't want to say that our work over the past few years has been painless; money is scarce across the Federal spectrum. Yet despite deep cuts in virtually every other domestic discretionary account, research funding actually has risen modestly -- a signal of the Administration's commitment to science and technology as the engine of growth in jobs, the economy, and our quality of life. And basic research received the greatest percentage increase.

So I give high marks to the coordinated process that built this budget, and to our President who supported science as an investment meriting increases -- increases that could only be provided by shifting funds from other Federal activities. In this middle of the fiscal pain, the Administration has held fast to the principle of wise investment in science and technology - not because it's a good thing politically, not because there's PAC money here, not because there's a great and clamoring constituency -- but **because it's important and the President and Vice President believe in it.**

This kind of priority-setting -- difficult as it is -- represents the actions of deliberate and dedicated government, husbanding and making careful, multiple use of the resources for the future for our children and our grandchildren. It reflects the vision of the Clinton Administration -- science and technology in the service of society, an engine of growth for the economy and the creator of knowledge that is the key to a new world condition. It is a vision that draws people into science and brings many of us here today.

Crafting such a vision requires great care. It cannot be done by a Congress motivated solely by the desire to move dollar signs from one side of the ledger to another. It cannot be done in 100 days, or 200 days, for that matter. It cannot be done by simple fiat or decree. It cannot be done by a Congress so weary it can't see straight; so driven that it doesn't even have time to read the material on which it is about to vote.

It must not be done with a meat ax when the precision of a scalpel is necessary.

Yet the spectre of finishing the first session of the 104th Congress with S&T resources slashed by a meat ax is a real one. In their rush to cut government, (Dan Greenberg, I think, recently labeled it "demolition politics") some Members have launched a wholesale attack on anything that isn't nailed to the table -- including R&D, and especially the "D" in R&D. But don't be lulled into thinking that basic research is sacrosanct.

The bad news for R&D reads like a litany of the lost. Congress already has agreed to cut half-a-billion dollars from this year's budget for science and technology in the military supplemental, and they're about to take another half-billion whack in civilian recissions supplemental. Most of the cuts so far have been in technology programs, but science has taken a substantial hit, too -- \$100 million from the Department of Defense programs in computer science, mathematics research, and engineering education at universities; upwards of \$80 million from the National Institutes of Health; and \$45 million from DOE research on materials, climate change, and the human genome.

This is bad enough. I realize these cuts are well-intended, that they spring from a belief that deficit reduction is the only name of the game in town these days. But it's a short-term strategy that will lead to the Nation having eaten its seed corn for the future.

The cuts we've seen already are nothing compared to what they are thinking about doing: The Chairman of the House Budget Committee, Rep. Kasich, recently released an "illustrative list" of cuts for next year's budget, in which the toll for science and technology was a whopping \$2.5 billion. Over the next five years, it's targeting \$13 billion. More than half-a-billion of these "illustrative" figures for FY96 come from NIH -- \$2.5 billion over five years. Agricultural research declines by \$1.3 billion over five years.

And while NSF hasn't appeared on a public hit list yet, Director Neal Lane has been told to expect at least a 20 percent cut. That's more than \$600 million -- nearly all of it from the research bench, since 95 percent of NSF money goes out in grants.

Now, I don't want to raise the false expectation that we in the Administration will be able to completely insulate science and technology from the real fiscal pressures that will drive the next decade of budget policy. The reality is grim for science and technology funding. There will be cuts; R&D will have to take some of them. But the cuts should be judicious and managed, not across-the-board salvos that wreak havoc throughout the research enterprise.

My hope is that wise heads in Congress will intervene, that history will record that they saved the nation from permanently damaging our research and development base by moderating the hasty, ill-informed or ideology-driven decisions -- penny-wise, pound-foolish decisions we have seen in attacks on technology partnerships and environmental protection, and in irresponsible regulatory reform. But my fear is that history will record that extremists in Congress prevailed as prevailing in an atmosphere of budget chaos driven by a fundamental disregard for reinvestment in science and technology.

Now, I'm an optimist by nature, even under these trying circumstances, and I think most Americans share that trait. A lot of our native optimism rests on the belief, based on our nation's history, that breakthroughs in science lead to advances in technology and vice versa -- the two are inextricably linked. Our scientific enterprise still is the envy of the world, and the technologies it spawns lead to a better life and a brighter future. Just the other day, the President released the 1995 Critical Technologies Report from OSTP concluding that the United States -- at least for now -- is the world leader, or equal to the best, in the 27 technology areas it identifies as critical to national and economic security.

But it's hard to be an optimist in the face of the sobering caveats contained in that report. Yes, we are among the leaders in those 27 areas of technology, but our lead is fragile and shrinking. Now, Europe is dead-even or only slightly behind us in 25 of the 27 areas; Japan is tied or just a nose behind in 17 of the 27, and is closing fast on 5 more. If we want to maintain leadership -- or even parity -- we can't afford to stand still.

It's harder still to maintain my optimism in the face of the Congressional response to this situation. The technology investments that have been a hallmark of this Administration are in great peril. They are our first and best defense against further erosion of U.S. leadership in critical technologies, yet they are marked for the wrecking ball -- at least by some members. I hope, however -- and this is the optimist in me coming out again -- that we are making progress in educating some of the new members about the value of these crucially important programs.

According to the World Economic Forum, the U.S. Federal government already under-invests in federal civilian R&D compared to our world competitors. Equally distressing, the U.S. private sector under-invests as a percentage of gross domestic product compared to other nations. Our negative balance of trade in technology products is testament to how poorly we are doing in this area -- the worst among all trading nations. We must correct this investment failure. In doing so, the Administration has addressed this issue by supporting R&D tax credits and industry-led, cost-shared programs to develop technologies that have widespread returns to the public -- better transportation, safer buildings, cleaner air. I'll talk more substantively about those programs in a moment. But I view the new congressional majority's decimation of these programs as a ruthless attack on this nation's future, an attack erroneously labeled corporate welfare.

To offset years of inadequate long-term investment, this Administration has concentrated on building up some rather modestly funded but indispensable activities in which the federal government makes partners of private industry, universities and community colleges, state and local governments, and community organizations to develop technologies that benefit all of us. We've done so for two reasons: (1) For national security, and (2) because much of the generic science and technology critical to economic growth can't attract adequate private investment -- the firm that takes the risk and makes the investment can't capture enough of the benefits.

Furthermore, today's fast-paced, highly competitive economic climate makes well managed federal research investment in growth-enhancing technologies more critical than ever. Faced with short product cycles and intense international competition, many companies are cutting costs to the bone and using available research money on projects with near-term payoffs. The new model of how best to accommodate this changing business environment is to create public/private, cost-shared partnerships for generic R&D -- teaming with other companies, with universities, and with the government.

These programs represent a reasoned and compelling continuation of our successful government-industry partnerships going back, in some case, for more than two hundred years -- in transportation, aerospace, navigation, exploration, national security, agriculture. They represent a 21st-century vision of commitment to the programs and values that made America great. They are the way the Administration is building the National industries of the future. They are programs like:

- o The Advanced Technology Program run by the National Institute of Standards and Technology (NIST) in the Department of Commerce -- industry-led, merit-based, and cost-shared. ATP awards support development of new technologies today that will be the backbone of the tomorrow's manufacturing, construction, and commerce.
- o The Partnership for a Next Generation of Vehicles (also known as Clean Car), designed to tackle an extremely tough technical challenge -- to develop within ten years a production prototype car with three times the efficiency of today's autos and very low emissions, with no sacrifice in cost, comfort, or safety.
- o The Environmental Technology Strategy -- working with industry on cost-effective technologies to clean up pollution from the past, prevent pollution in the future, and help build a U.S. environment industry that is a leader in rapidly growing world markets.
- o Education and training technologies that have multiple public and private benefits: exciting education challenges for our children; lifelong learning opportunities for all Americans, including those who need retraining to handle changing technologies on the job; and a rich potential commercial market for the technologies themselves.
- o The Technology Reinvestment Project (TRP) at the Department of Defense, another cost-shared program designed to propel the commercial development of technologies critical to the military, since low-cost commercial manufacturing practices and economies

of scale from commercial production will make those technologies more affordable for military users.

- o Policy support for and end-use research on the National Information Infrastructure, which will bring the knowledge of the world to a desktop in rural Montana; or tap medical expertise from Paris, France for a patient in Paris, Texas. This program also will assure the Nation's continuing leadership in high-performance computing.

- o Promotion of energy efficiency and renewable energy through our Climate Change Action Plan to improve air quality while simultaneously reducing emissions of greenhouse gases and conserving energy resources..

- o Industry-led CRADAs -- cost-shared, cooperative research and development agreements -- that have grown from a few hundred at the beginning of this Administration to more than 3000 today. CRADAs move important new developments on the laboratory bench into the commercial market, improving health care, transportation, home design, and hundreds of other technologies to improve our quality of life.

Most of these programs are cost-shared, meaning that industry is the senior partner. If they don't invest, there is no deal -- industry is picking the winners and losers, not government. Economists, investors, technologists, and industrialists understand and widely support this activity ... but in their rush to judgement, it sometimes seems that some Members in the new Congress don't want to be confused by the facts.

These innovative partnerships -- which have done much to boost technology investment and innovation in the American economy, and which promise so much more for the future -- may be a matter for the history books alone unless concerned Members of the Senate and House act to restore funds for technology programs. Based on their work and words to date, it's getting harder and harder even for me to retain any kind of optimism.

The question for us today is: Can we moderate these demolition politics soon enough to avoid grievous harm to the science and technology that drive our economic growth and national security? If not, we risk losing more than just figures on a pie chart. We lose jobs, security, and our children's opportunities.

Congressional number crunchers promise that money saved in downsizing the federal government will be reinvested in science and technology -- if there's any left over after paying down the deficit some more and increasing funding for pet projects. If you believe this, I have a bridge to sell you.

One of their preeminent proposals is the creation of a Department of Science.

Veteran attendees at this colloquium will note that this Department of Science proposal is not a new idea. It was first proposed in 1884, and again over 100 times over the past three decades. As Guy Stever once said of Antarctic blizzards, this isn't new snow -- it's the same old snow being blown around again and again.

Let me be very clear about one thing -- **this Administration unequivocally opposes the creation of a Department of Science of the kind now being discussed in Congress.** We are not against change; under the leadership of the Vice President, we have been remaking the very structure of federal agencies -- not just shuffling programs around and renaming them. But we are against change for change's sake -- or for the sake of as-yet-undocumented savings in federal resources.

Congressional supporters of the Department of Science idea argue that it's important to have all the science programs centrally located -- except, of course, for health ... and defense ... and agriculture. They say this, by the way, as though it were a given and without a shred of evidence about its effectiveness. But the genius of U.S. science policy to date has been its recognition that pluralism of support and diversity of performers allows the crucial freedom of enquiry that unleashes the creative spirit of our world-class researchers and their students. The proposal to create a Department of Science flies in the face of this pluralism by instituting a command-and-control model of rigid bureaucracy.

We are all in favor of making science more responsive to the needs of the Nation. But we believe the worst possible thing you can do to policy and associated missions is to divorce them from a science base. To say that food safety will be greater because someone, somewhere in that science agency across town is doing some kind of pesticide research is ludicrous -- Just as in industry, Federal agencies depend on the feedback from research that is inextricably linked to their mission. There is no productive way to unhitch science and policy. Nor should we. The result will be poor science conducted in a vacuum and even poorer policy.

If this is such a good model, why hasn't private industry adopted it? Why not take Bell Labs in New Jersey, an IBM facility in New York, maybe a Silicon Valley research consortium and plunk them all down together in the middle of the Great Plains? That might consolidate some overhead, but would it actually help the bottom line or the future viability for any of the companies involved? Of course not -- their competitive edge demands access to the research that drives productivity, just as the mission agencies require free and easy access to the best science available.

The President's report "Science in the National Interest" says it succinctly:

"Federal support of fundamental science and engineering is characterized by a healthy pluralism. All Federal departments and agencies that depend heavily on scientific and technical knowledge and human resources support fundamental research and education in these areas. This improves their capacity to attain their evolving goals as new challenges emerge."

What we have to keep in mind is that, as we face increasing fiscal austerity, it is particularly important that the nation's science leadership understand the "mosaic" of science support and performance by federal agencies, universities, and industry; to understand how the support by DOD of research and graduate training in engineering and computer science complements the work by NSF, and how together they provide a knowledge base and the human resources for advances in the private sector; to understand how materials research and high-speed computing and networking at the Department of Energy contributes to breakthroughs in biomedical research support by NIH; to understand how the biological research and long-term

ecological monitoring supported by NSF provide further elucidation of natural phenomena crucial to wise environmental policymaking by the EPA; to understand how to mix advanced technologies and research so that both military and civilian services can be provided from the same investment.

What we must understand -- and there are those in Congress who would ignore this at the Nation's peril -- is how federal agencies, together, support our overall science base: and we must especially recognize the increasing interdependency among their efforts. Significant cuts to one program can have substantial effects on other national initiatives. We must be smart and deliberate in any trimming -- mindful of these important connections as we attempt to make our Federal government work better. But this does not mean that all Federal science efforts ought to be merged into a single entity.

On the other hand, if the Congress truly wants a leaner, more efficient Federal S&T system -- not just cosmetic surgery -- it need not look far for a model. Under the President's "Reinventing Government" initiatives, we have already pared more than 100,000 jobs from the Federal bureaucracy. That'll total nearly 150,000 before we're finished.

o NASA alone has plans to cut more positions as it streamlines its operations than the 5000 jobs that supporters of the Department of Science claim their move will eliminate.

o EPA, FDA, and other regulatory agencies have slashed regulatory red tape -- by contrast, regulatory "reform" as passed in the House of Representatives would only, in the words of last Sunday's Washington Post editorial page, "put sand in the gears of the Federal regulatory process."

o And in the next few weeks, I will be briefing the Vice President on new and innovative ways being tested at NSF, NIH and the Department of Energy to use the information superhighway to reduce the mountains of paperwork required of Federally funded researchers and grantees. We want to free up administrative time and costs for professors and their institutions, time that can be reinvested in teaching, research, and scholarship.

This Administration has a mechanism to encourage cooperation where advantageous, consolidation where necessary, and coordination overall. It's the National Science and Technology Council -- the first time in history that the United States has had a comprehensive coordinated Cabinet-level body devoted to reviewing the Federal R&D enterprise. The principal purpose of the NSTC is to establish clear national goals for federal science and technology investments, and to ensure that policies and programs are implemented that contribute to those goals. The NSTC provides a structure through which we can prioritize the many legitimate demands on the public's R&D dollar. It assures a forum where critical national needs cannot be pushed aside by urgent and parochial agency needs. It sensitizes agencies to the advantages of symbiosis over isolated pursuit of objectives.

Isn't this what the promoters of a Department of Science say they want?

There is a good way to go about reform, and there is a bad way. I venture to say that each of you has been trained in the good way -- experiment, observe, and test your observations before implementing innovation across the system.

Is this the process that we've seen at work in the Congress over the past 100 days? It is not. Rather, we have seen dog-tired Members marching lockstep ahead with their eyes fixed only on the end of the 100 Days. Many of the changes wrought by the House were passed without the benefit of a single hearing, or at best with a minimal legislative record. Is this what Jefferson and Madison had in mind?

Now, Speaker Gingrich is fond of referring to Thomas Kuhn's model for revolution in science, a model that stresses cataclysmic change as the driving force when scientific paradigms are replaced with newer, more powerful ideas. The Speaker stresses that the election in November and the ensuing 100 days' activities are just such a Kuhnian shift.

When paradigms shift in the Kuhnian sense, they do so because the weight of accumulated evidence and data become so great that the old paradigm topples beneath them. There is no hard evidence and there are no compelling data to support abandoning our historic commitment to science and technology. Rather, at times this Congress seems to run screaming from anything that looks like research or credible data ... even pushing to eliminate their only bipartisan and bicameral Congressional resource for S&T analysis, the Office of Technology Assessment.

Nowhere is this more clearly illustrated than in the area of environmental protection. Environmental policy in the 104th Congress has been driven by a crazy-quilt of anecdote, anxiety, and homespun homily -- tall tales and outright fabrications of workers having to wear moon suits to pick peaches and whole villages lost to forest fires because of kangaroo rats. Whatever other motivations may obtain, environmental policy in this Congress has not been driven by knowledge, and certainly not by science.

In fact, the Contract with America never once even mentions the word environment.

Still, we've managed to end up with ill-conceived legislation like the House-passed Risk Assessment and Cost-Benefit Act, which makes fundamental changes in the way the Federal government protects public health, safety, and environmental quality. The Senate has a similar bill on its docket. Both chambers may compromise on language that would require agencies to go through a maze of costly, inflexible, and bureaucratic procedures -- creating along the way infinite new opportunities for petitions and litigation -- and new jobs for lawyers.

It's also why we're seeing proposals to eliminate the National Biological Service -- a national inventory of our natural plant and animal resources. Such a move is analogous to book-burnings of yesteryear. Since when is ignorance a promising route to deliverance? The NBS isn't a land-grab, as its detractors claim -- science doesn't get much purer than this.

And it's why the Congress seems bent on gutting research on energy efficiency and sources of renewable energy that will be critical to combating global warming. Next on the chopping block is likely to be global change research itself -- leaders in the new Congress call it "politically motivated." Since when does it require political motivation to want to understand the world in which you live?

And of course, Congress' lack of regard for scientific evidence is likely to put a halt to funding for endangered species research -- the dismantling of the Endangered Species Act is a probable priority item for later this year on the Hill.

Science and technology programs in the 104th Congress are the legislative equivalents of endangered species. In Congress' rush to slash government and lower taxes -- taxes that already are among the lowest in the industrial world, I might add -- we are in danger of losing the very excellence in technology that has made our country the envy of the world.

Surviving with our national R&D portfolio even relatively intact will require aggressive action. We must engage the R&D community, the industrial community, the education community, Congress -- ultimately, we must engage the American people, if they mean to remain their own governors.

Congress must be part of this dialogue. I respect the leaders of the new Congress as hard-working agents of change, and I truly believe they think they are doing what's right for America. I admire their conviction, and their tenacity. But I want to work with the Congress to make sure every Member understands the enormity of the change being proposed, and its impact on the ecosystem we call the Federal R&D enterprise.

We have had periods of similar intellectual foment in our country before -- and survived them. The optimist in me takes heart in this. And the optimist in me is bolstered by the words of Thomas Jefferson, penned in a similar time of national frenzy: (and I quote)

"A little patience, and we shall see the time of witches pass over, their spells dissolve, and the people, recovering their true sight, restore their government to its true principles."

Thank you.

Connecting Classrooms to the Information Superhighway

Although most schools have telephone service, that service rarely extends beyond the principal's office. Eighty-eight percent of the nation's classrooms are without a phone line and, according to a recent Department of Education study, 97 percent are not connected to any computer network. In other words, we do not have even the most rudimentary infrastructure to connect the nation's classrooms to the information superhighway.

A mechanism to help network the classrooms should ideally conform to these principles:

Assist with networking the classrooms, not just the schools. The recent Department of Education survey found that while 35% of schools have an external network connection, only 3% of classrooms are connected. The internal connections are more costly, but only networking the classrooms can bring educational technology to bear on the daily tasks of teaching and learning. Every classroom should have e-mail and access to the emerging information superhighway.

Assist with installation costs. The *initial* cost of networking the classrooms is the greatest obstacle to bringing teachers and students into the Information Age. Giving schools preferential or incremental service rates will only help once the network is in place.

Identify a dedicated source of non-tax revenue that bears a nexus to this use and is not regressive; cap the amount and sunset the program. The mechanism chosen should not unfairly burden a narrow set of ratepayers. One possibility is funds raised through the universal service support mechanism, modified to draw from all telecommunications providers. The total amount of assistance should be capped and the program should terminate after no more than 5 years.

Create no new bureaucracy and no new allocation mechanisms. A fund might be administered by a non-governmental entity such as that which collects and distributes for the current Universal Service Fund. Funds could be passed *directly to states*, perhaps according to the formula in Title I of the Education Act; the states could suballocate as they deem proper to localities or school authorities.

Be technology-neutral. Schools should be free to choose among competing networking technologies and providers, i.e., satellite, cable television, wireless cable, and wireless telephone, in addition to local telephone connections.

Catalyze networking and leverage other investments. In order to keep the cost low and ensure that awards are made only to school authorities committed to using and maintaining the technology, any grants should be awarded on a *matching basis*. Funds should be used only to create the *network* (hookups and network hardware/software); a hard or soft match would provide computers, program software, and teacher training. Creating the networks should create a huge educational technology market and economies of scale that will bring costs down.

The Need for Advanced Technology and Networking in America's Classrooms

Telecommunications technology improves the ability of schools to teach students the basics. Studies find that technology-based instruction is 30 percent more effective than traditional instruction.

Telecommunications technology in the classroom helps prepare students for the world of work -- in which computer literacy is essential. Lack of information literacy already costs business an estimated \$25 to \$30 billion annually in poor product quality, low productivity and accidents; workers without computer skills today earn 15 percent less on average than workers with such skills. As the mismatch between worker skills and job requirements grows, the cost to businesses and to computer-illiterate workers will grow.

The technology increases students' feelings of competence in school and allows teachers to interact more with lower-performing students. Students in schools with computer-based instruction expressed stronger "feelings of success in school" than students in traditional schools. A 1993 survey of studies concluded: "courses for which computer-based networks were used increased student-student and student-teacher interaction [and] increased student-teacher interaction with lower-performing students."

Telecommunications technology allows the family to play a greater force in student learning. New technology can provide tools for parents to communicate with educators more frequently and participate in student work projects on-line.

Telecommunications technology makes teachers more productive. In one case, introduction of wireless phones into classrooms saved three weeks of teacher-time per year. On a national basis, that would translate to over \$47 billion in productivity gains.

Telecommunications technology is not available currently to the vast majority of the nation's students. Ninety percent of the nation's classrooms are without a phone line and 97 percent are not connected to any computer network. In other words, we do not have even the most rudimentary network infrastructure to connect the nation's classrooms to the information superhighway.

While wealthier schools and families are introducing their children to new technology, poorer families may be left behind. Sixty-five percent of households with incomes over \$100,000 have a personal computer at home for their children to use, while only 11 percent of households with incomes under \$20,000 have a computer.

Success Stories

The Christopher Columbus School in Union City, New Jersey was substandard and about to be taken over by the state. Working with Bell Atlantic, the school set up networks with 286 computers integrated into the curriculum. One year later, morale had improved, parents were more involved, and there was great progress in standard test scores:

	<u>% who passed/other urban districts</u>	<u>% who passed/Columbus</u>
Math	51	97
Reading	60	87
Writing	61	87

The Hueneme School District in Oxnard, California, consists of 300 students: 67 percent minority; 41 percent non-English speaking; 42 percent eligible for the reduced or free lunch program. In 1984, technology was integrated into the curriculum, with the results that students' scores on standard state tests have increased from below the 40th percentile to the 92nd percentile, absenteeism has decreased 18 percent, and discipline referrals have dropped 26 percent.

Project TELL studied whether access to computers and telecommunications networks would significantly affect the learning experience of inner-city, New York children. The study primarily focused on those students identified by the schools as high risk for dropping out and found:

- 1) The project had a powerful influence on children's self-esteem and learning capacity.
- 2) Children involved in the Computers in Homes initiative were three times less likely than other children to move to another school.
- 3) Damage, theft, or loss of the equipment was virtually nil.
- 4) Voice messaging services demonstrated that parents welcomed opportunities to become more aware of and involved in their children's education.

EXCERPT FROM SPEECH BY REED E. HUNDT
CHAIRMAN, FEDERAL COMMUNICATIONS COMMISSION
TO THE ANNUAL LEGISLATIVE CONFERENCE
NATIONAL ASSOCIATION OF COUNTIES
WASHINGTON, D.C.

March 5, 1995

The information superhighway is at a crossroads. In one direction lies a society connected by the new audio-video-data technologies; in another direction lies a society further split, this time into information-haves and have-nots.

Every day 45 million of our fellow Americans go to work in an industry in which only 12% of the workplaces have basic phone lines. In this day and age, in which every shipping clerk at Wal-Mart's is hooked up to a computer network and half of all workers use a computer at work, only 4% of the workplaces in that industry are networked. That industry is called education; those workplaces are called classrooms and the workers are schoolchildren and teachers.

We need to network the classrooms to improve education and prepare our kids for the future. I think the schools and libraries can become the backbone of a unified, networked society in the 21st century.

The key feature of the Information Superhighway is going to be networking. Whether the networks eventually turn out to be connected by phone wires or television cables or wireless waves, and whether the workstation looks more like a computer or a television, it will be networks that will weave homes, government, schools, hospital and businesses into a national community.

Our schools are floundering as they plod along with 19th century chalk-and- blackboard technology. The communications revolution can change our faltering educational system forever and for the better. If our kids are to remain competitive when they venture into the world, if they are to be more productive, we need to hook up our schools now.

A long time ago, I taught junior high school. Like all teachers and parents, I discovered that to teach successfully, you have to spark the child's desire and ability to communicate. Modern communications technology can provide that spark. I have seen it happen in classrooms in Harlem, Hawaii, Japan and Russia.

Kids turned off to today's education get excited about tomorrow's -- they love communicating over the computer. They don't think they are learning the 3Rs when they exchange messages with another student, but they are. And at the same time they are learning to use the technology they will need in the workplace.

Teachers can be incredibly more productive on a network. Studies show productivity

increases of as much as 30%. Networked teachers can exchange lesson plans, get tips from their colleagues, or obtain access to the Library of Congress, the National Archives, and the great museums for teaching materials. In rural areas, you can teach subjects through distance learning that the consolidated school district can't provide teachers for.

For students, I am not talking about teaching kids how to use a computer after school. I am talking about computer networks as an integral part of the school day, about teaching the 3Rs on the computer, getting kids enthusiastic about learning again and about preparing them for their futures.

Classroom networks will eventually extend to the home and thereby fulfill what progressive educators say is their biggest unmet need: lengthening the learning day and involving the parents. Homework assignments will be available at home and perhaps parents and kids together will sit in front of the TV or computer trying to figure out how to solve an algebraic equation.

Once we do network our schools, they will become community waystations on the information superhighway. I have already seen this at the Ralph Bunche school in Harlem. Parents who can't afford computers at home come to the school in the afternoon to carry on the lifelong education that they need to remain competitive in the marketplace, or just to browse through museum collections, film libraries, or shopping catalogues.

And not just schools, but libraries can take on this role. I see the schools and libraries as a thousand public hearths attracting community members to the light of the national information network. These community nodes can be the town squares of the future. These points of light, to borrow a phrase, can serve in rural areas, where the cost of networking may be high, just as in inner city areas, where individual citizens may not have the wherewithal to link up.

Our common job, then, is to hook up the libraries and classrooms. Last year, President Clinton and Vice President Gore set a goal of connecting all the nation's schools and libraries to the information superhighway by the year 2000. We can do it.

Is this exclusively a job for government? No, the private sector needs to develop the technology and do the work. But there is an important role for federal, state and local government. Just as the federal government initiated the Internet with small Defense Department funding, it is appropriate for the government to provide seed money to connect the classrooms. And local government needs to demand the money and figure out how best to spend it.

How? There are many ideas. Vice President Gore has suggested using some of the revenues we bring in through our spectrum auctions to fund the federal contribution to networking the schools and libraries. Speaker Gingrich agrees that it is a national priority to give our school children access to the information superhighway. He has suggested that we might provide some form of tax credit to ensure that every kid is connected. There are many ways to skin

this cat -- but now's the time to do it.

I know that many of you are active in distance learning and other educational networking initiatives in your areas. Many of our rural states are way ahead of the urban areas.

Many states are offering some kind of regulatory relief to their local phone companies in return for their hooking up the schools. Other potential network providers -- cable, wireless, satellite, broadcasters -- need to be able to share in whatever subsidy we provide, so that all lanes of the superhighway can compete and so that government does not dictate the network technology.

My charge to you is to help us get this job demanded by the people and then done. I pledge to you that I will do everything I can to get the FCC to promote this moral imperative for our children and our communities. But our means are limited!

You are central to meeting this goal. You can make technology a priority in school and library spending. And you can demand that Congress give you and the FCC the tolls to build the information highway to every classroom and library.

If we don't provide classroom networks to all our kids, if we fail to prepare our kids for the job markets that will be most desirable, if we fail to prepare our country's future workforce for the world that is coming, what will we say? That we forgot? That we couldn't afford it? That we couldn't figure out the hard issues or make the hard decisions that were necessary for our children?

Please join me in a partnership to make this vision of the future of telecommunications, sparked by competition and innovation, a reality for everyone of our citizens -- and especially the children. Thank you.