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Folder Title:
Technology/Digital Divide

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Technology Digital Divide

~~Budget '98~~

GS Memos

Fyson Memos

BASE CLOSURE/REUSE

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PRESERVATION

April 7, 1999

MEMORANDUM FOR GENE SPERLING

FROM: TOM KALIL
JONATHAN SCHNUR

RE: HIGH-TECH INVOLVEMENT IN ADDRESSING THE SKILLS GAP

A lot of you have had a hard time finding sufficiently trained workers in the United States to do the work you need done. Last year I agreed to increase the number of H-1B visas as an emergency measure. But over the long run, the answer to this problem of the lack of skilled workers cannot simply be to look beyond our borders -- surely a part of it has to be to better train people within our borders to do this work. Because you have done so well, I would argue that you have larger responsibilities as citizens than those who have not.

-- President Clinton, March 30, 1999

Summary: There are a number of steps that companies can take to help address the shortage of workers with IT skills. I believe that we would have a more productive discussion with them about what they would be willing to commit to if we had some specific ideas. Obviously, the most effective measures depend on:

- * *The skill set/level of education that the job requires.* Some jobs (help desk, PC repair, network installer, Web page design) may not require a college degree. Others (programming, systems analyst) can be done after 3-6 months of intensive training, but a college degree or at least an associates degree is helpful. Still others (e.g. chip designer, software engineer) may require a masters' degree in electrical engineering or computer science.
- * *Whether one is trying to impact the current workforce or the future workforce:* Clearly, one of the reasons for the IT worker shortage is poor K-12 performance in math and science and a lack of interest in pursuing technical careers. This argues for corporate partnerships and involvement in K-12 education. However, this will not solve the short-term problem. Moreover, there are many people that are already in the workforce that can be retrained. (The high-tech industry has been criticized for discriminating against older Americans and only wanting to hire recent college graduates who are willing to work long hours at low pay). Furthermore, we should be able to take steps to upgrade the skills of the U.S. workforce when labor markets are tight and the economy is booming. If not now, when?

Follow-up on Vice President's Life-long Learning Summit

A challenge to the high-tech community to do more on “training America’s workers first” and addressing the skills gap could build on the work of the Vice President’s Life-long Learning Summit. The Vice President has asked corporate, education and non-profit leaders to:

- * Identify actions that companies, universities, labor unions, state and local governments and community organizations should be taking to promote life-long learning;
- * Develop a set of principles for best practices (e.g. portability of skills, ensuring that training programs address the needs of business, ensure that training programs allow adults to deal with the competing demands of work and family); and
- * Design an informational campaign to increase awareness of opportunities for life-long learning and its importance.

Examples of steps that companies could take

1. Train American workers first

- * We could challenge the private sector to identify “best practices” with respect to retaining and retraining U.S. workers before using H1-B visas -- and get more companies to adopt these best practices. Some current and possible examples include:
 - One company, Synopsys, is providing a \$10,000 scholarship for every H1-B worker they bring in.
 - Some companies provide information on the corporate “intranet” about all open jobs and what skills are required to compete for those jobs.
 - Some companies (e.g. NYNEX) provide release time for workers every Friday to participate in training programs.
 - Companies could establish or expand “worker scholarship” programs that take advantage of Section 127. This year, the Administration is proposing an expansion of Section 127 to include graduate education.
 - Companies could get involved in our “regional skills alliances.” DOL is developing the guidelines for this program, but we need to make sure that they will support industry-led activities.
 - Companies could partner with the government to use resources from the Workforce Investment Act to upgrade the skills of the incumbent workforce. Although most programs authorized by the WIA are designed for disadvantaged and dislocated workers, governors can use 10 to 15 percent of the funds for

discretionary activities. These funds could be used to support partnerships in states (e.g. California) with a growing demand for workers with high-tech skills.

2. Partnering with community colleges

Community colleges are one of the educational institutions that adapts most rapidly to changes in the labor market. A number of companies have worked closely with community colleges to help train and retrain American workers for high-tech jobs. They have:

- * Provided the necessary computers, equipment, and software so that students are trained in a realistic, hands-on environment;
- * Created new curricula and skills standards that reduces the gap between what is taught and learned in schools and what is needed by industry; and
- * Provided technical support, instructional support, and access to resources that faculty who are preparing students for careers in IT need to ensure continuing relevance to workplace needs.

Some of these partnerships have been funded in part by the National Science Foundation's Advanced Technological Education (ATE) program. For example:

- The NorthEast Center for Telecommunications Technologies has participation from 5 4-year colleges, 14 community colleges, 14 high schools, IBM, Bell Atlantic, Time Warner, Texas Instruments, the Communication Workers of America, and the International Brotherhood of Electrical Workers.
- The Maricopa Advanced Technology Education Center (MATEC) is being operated by the Maricopa County Community College District, in partnership with ten semiconductor manufacturing/supporting industries, (including Intel, Motorola, and SEMATECH); two Tech Prep consortiums with 13 secondary school districts (60,000 students); Arizona State University, the nation's largest public university; three other Community College Districts (Arizona/Oregon); and Albuquerque Technical-Vocational Institute.

The industry could be challenged to "scale-up" some of these successful partnerships in other community colleges.

Another interesting model is being developed by Fannie Mae. Currently, there is much less financial aid available for part-time students. Fannie Mae is developing a low interest "life-long learning" loan. Companies could get involved by:

- * Committing to hire the graduates of the training programs;
- * Subsidizing the interest rate; and

- * Working with community colleges to develop the curriculum.

3. Reaching out to under-represented groups, including women, minorities, and people with disabilities

Companies are beginning to realize that they need to do more to recruit women, minorities, and people with disabilities to high-tech careers. The CEO of Texas Instruments stated at the most important semiconductor industry event of the year that:

“We must recognize that we're facing a real crisis, not a disconcerting trend. .. Because of the demographics, we need to spend a lot more effort getting Blacks, Hispanics and women into the pipeline of engineering.”

There are a number of steps that companies could take:

- * *Fellowships:* Some companies are contributing to organizations that are attempting to get more women and minorities to pursue careers in engineering through fellowships, such as the Graduate Engineering Minority Consortium, the Society of Hispanic Professional Engineers, and the Society of Women Engineers.
- * *Making minority-serving institutions “centers of excellence”:* Companies could partner with Historically Black Colleges and Universities, Hispanic-Serving Institutions, Tribal Colleges, etc. to make them “centers of excellence” in information technology. This might require support for curriculum development, equipment donations, and faculty recruitment. **NSF has set aside \$6 million to partner with HBCUs on IT issues -- we could seek to leverage this with corporate participation.**
- * *Advanced Placement:* Minority participation in AP courses is much lower than white participation. Siemens is now embarking on an effort to expand this by funding AP programs.
- * *Early college awareness and mentoring:* Hewlett-Packard has supported a \$4 million program to get universities to engage women and minority students in math and science from kindergarten until the time they graduate from college! HP has also encouraged its employees to serve as telementors. By spending about 30-45 minutes per week communicating via e-mail, adult mentors can share their experience and expertise, helping students achieve academic excellence in math and science, improve communication skills, and explore career and educational futures. Companies could work more closely with our GEAR-UP program.

4. Partnering with unions to sponsor joint company-union programs.

This is an idea that President Clinton specifically mentioned at last year's AFL-CIO meeting. As

you know, only certain sectors of high-tech industries have a significant number of union workers, such as local telecommunications companies.

5. Welfare-to-work

Although there may be only a limited number of high-tech jobs that people that are making the transition from welfare-to-work are be able to compete for -- it is still be worth exploring what contribution high-tech companies can make to the welfare-to-work challenge.

6. Improving K-12 math and science education

We could challenge companies to:

- * Help train teachers to teach math and science using technology;
- * Recruit more math and science teachers by providing summer employment and providing scholarships to people who commit to becoming math and science teachers (we have a pilot project to do this in several different Congressional districts, and we also have some funding for Teacher Recruitment Grants).
- * Encourage the development of high-quality Internet content in math and science (Genentech is doing this in high-school biology).

January 16, 1996

Fax 456-2878

To: Gene Sperling

From: Paul A. London *P*

Re: Supporting Data on Four Hi-tech Industries.

This is what I can give you for place holders right now. I will get more from the biotech and semiconductor associations and send it on.

I think it is worthwhile to link these high tech industries to increased efficiency in more prosaic ones like trucking. E.g. US sales of large, Class A trucks in 1994 and 1995 set consecutive records. This was in part because new computer technologies are lowering the cost of trucking so that the business is growing.

Software.

Worldwide sales of U.S. industry in 1994 = \$61 billion up 17.3 percent over 93.

US sales \$32 billion in 94, up 15.2 percent.

US world market share in 94 was 76.8 percent, up from 74.9 in '93. Source: International Data Corp.

Telecom.

Output of communications equip. up 18 percent during Clinton Administration and exports up by 62 percent. Real exports of communications services are up 13 percent during this Administration. Source: Inforum Model.

Will get real numbers.

Biotech.

US leads the world with over 70 percent of gene engineering patents, and dominate production of "world class" drugs.

Asking Biotech Industry Organization for numbers.

Semiconductors.

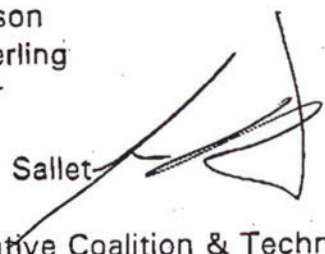
US market share for semiconductors (42 percent) surpasses Japanese share once again. Source: Commerce/TA

Real output of the computer industry up 21 percent during Clinton Administration, real computer exports up 38 percent. Source: Inforum Model.

MEMORANDUM FOR

Laura Tyson
Gene Sperling
Bo Cutter

FROM

Jonathan Sallet 

SUBJECT

Conservative Coalition & Technology

DATE

December 4, 1995

During the debate on the Omnibus Civilian Science Authorization Act, H.R. 2405, earlier this fall, Congressman George Brown introduced a substitute amendment to fund science and technology programs, which was expressly endorsed by Congressman Stenholm as "consistent with the Coalition budget plan and reflect[ing] our shared belief that we can balance the budget while continuing to make essential investments in our Nation's future."

As the attached table demonstrates, the Brown proposal would have provided about \$23 billion for science and technology programs that the President's FY 1996 budget pegged at about \$24.7 billion.

Tomorrow, I will provide you with a table that compares the proposed Brown numbers with the President's budget and comparable appropriations action (H.R. 2405 is an authorization bill).

As budget negotiations continue, it seems to me that the Brown proposal, endorsed as it was by Congressman Stenholm, deserves careful scrutiny.

Given the level of detail involved, I will contact your offices tomorrow to see whether it would be helpful for me to discuss this with any of you personally.

Thanks.

Congress of the United States
House of Representatives
Washington, DC 20515

October 10, 1995

We've Got a Better Idea

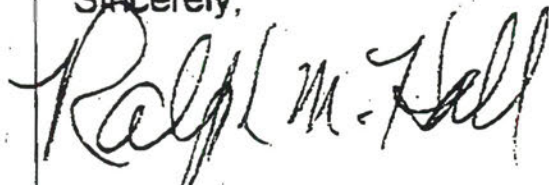
Dear Colleague:

This week, the House will be taking up H.R. 2405, the Omnibus Civilian Science Authorization Act. Regrettably, this bill goes too far in cutting the very programs we need to guarantee a growing economy and bright future for our children.

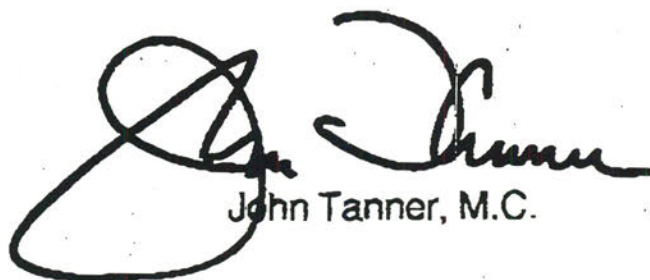
We encourage you to support the Democratic substitute to H.R. 2405, which will be offered by George Brown, the ranking Democrat on the Science Committee. This alternative is consistent with the Coalition budget plan and reflects our shared belief that we can balance the budget while continuing to make essential investments in our Nation's future.

Join us in support of the Democratic substitute to H.R. 2405.

Sincerely,



Ralph Hall, M.C.



John Tanner, M.C.



Charles W. Stenholm, M.C.

SUBSTITUTE TO H.R. 2405

At the end of consideration of the bill H.R. 2405, George Brown will offer an amendment in the nature of a substitute which provides budget authority and policy guidance for all of the agencies included in H.R. 2405.

- o The substitute is intended to provide a healthy level of funding for all essential science and technology programs and provide a balance between basic and applied research including joint Government-industry technology partnerships.
- o The substitute is based on the principle that the goals of deficit reduction must be met and science and technology programs must absorb their fair share of cuts. Yet investments in such programs also contribute to long term economic growth and must be an essential part of any plan for economic growth.
- o In sum, the substitute provides \$22,028 billion. This funding level is \$1,518 billion above the equivalent authorization in H.R. 2405 but \$1,112 billion below the F.Y. 1995 appropriated level and \$1,743 billion below the F.Y. 1996 request.
- o The Brown alternative is based on and consistent with the Conservative Coalition budget offered earlier in the year which set forth a balanced budget without cutting student loans, medicare, or science or providing for a tax cut. The Conservative Coalition budget provided or implied \$23,224 billion for the programs contained in H.R. 2405.
- o The Brown alternative provides the following for the agencies in the bill:

Agency	F.Y. 95	F.Y. 96 Request	H.R. 2405	Alternative
<u>DOE</u>	<u>5208</u>	<u>5477</u>	<u>4251</u>	<u>4795</u>
<u>NSF</u>	<u>3264</u>	<u>3360</u>	<u>3126</u>	<u>3186</u>
<u>NOAA</u>	<u>2028</u>	<u>2094</u>	<u>1725</u>	<u>2016</u>
<u>NASA</u>	<u>12351</u>	<u>12145</u>	<u>11547</u>	<u>11702</u>
<u>Tech Admin</u>	<u>8</u>	<u>14</u>	<u>5</u>	<u>10</u>

<u>NIST</u>	<u>701</u>	<u>1023</u>	<u>338</u>	<u>744</u>
<u>EPA</u>	<u>546</u>	<u>629</u>	<u>490</u>	<u>546</u>
<u>Fire Admin</u>	<u>34</u>	<u>29</u>	<u>28</u>	<u>29</u>
<u>TOTAL</u>	<u>24140</u>	<u>24771</u>	<u>21518</u>	<u>23028</u>

**OFFICE OF THE SECRETARY
OFFICE OF POLICY AND STRATEGIC PLANNING
THE DEPARTMENT OF COMMERCE**

**14th and Constitution Avenue, N.W., Room 5834
Washington, DC 20230
(202) 482-44127
(202) 482-4191**

TO: Gene Spurling, Michael Waldman
FAX: 456-6687 456-7028
FROM: Jonathan Sallet
DATE: 12/4/95
NUMBER OF PAGES INCLUDING COVER: 2
MESSAGE: _____

CLOSE HOLD

MEMORANDUM FOR

Gene Sperling
Michael Waldman

CC:

Jason Goldberg

FROM

Jonathan Sallet

SUBJECT

Technology Outreach

DATE

December 4, 1995

Assuming hypothetically, an announcement supportive of the Importance of technology investments, I suggest that we should immediately brief (in person or by conference call):

1. Congressional Democrats who have been supportive of our pro-growth, pro-technology message (including the members who earlier met with Leon: Senators Lieberman, Bingaman and Glenn and Congressmen George Brown and John Tanner). This is particularly important because the Commerce appropriations bill is expected to be on the floor of the House on Wednesday and on the Senate soon thereafter.
2. Pro-technology private groups, like the Council of Competitiveness, that are supporting the President's R&D agenda,
3. Technology press, especially those reporters at daily papers (like Ed Andrews of the New York Times and Rory O'Conner of the San Jose Mercury-News) who have attended Administration press conferences and/or written recently.

With your approval, I would set these up with the assistance of our technology/budget group. This presupposes, of course, good news and specific budget analysis that shows the continued emphasis on technology.

Thanks.

**OFFICE OF THE SECRETARY
OFFICE OF POLICY AND STRATEGIC PLANNING
THE DEPARTMENT OF COMMERCE**

14th and Constitution Avenue, N.W., Room 5834
Washington, DC 20230
(202) 482-44127
(202) 482-4191

TO: Laura Tyson, Gene Sperling, Bo Collier

FAX: 456-2878

FROM: Jonathan Sallet

DATE: 12/4/95

NUMBER OF PAGES INCLUDING COVER: _____

MESSAGE: _____

December 4, 1995

MEMORANDUM FOR

Laura Tyson
Gene Sperling
Bo Cutler

FROM

Jonathan Sallet

SUBJECT

Advanced Technology Program

OMB tells me that, of all the high priority technology partnerships (ATP, MEP, TRP, ETI, PNGV, HPCC, CRADAs, Mission to Planet Earth, etc.), ATP is the only program eliminated.

Total funding (conf. or avg. House/Senate) for these programs is a 73% of the President's FY 1996 request. If ATP were funded at this level, it would receive \$358M.

Total funding (conf. or avg. House/Senate) for these programs is down (14%) from FY 95 enacted. If ATP were funded at this level, it would receive \$293M.

I hope these facts may be helpful.

MEMORANDUM FOR Don Baer
Kitty Higgins
Gene Sperling
Vicki Radd

FROM Jonathan Sallet

SUBJECT Technology Message

DATE March 1, 1996

On my way out the door, I wanted to make one last suggestion (or, at least one last suggestion as a governmental official).

I urge you to find a way to continue a process, like the budget-message group, to define and implement a broad message of strength, optimism and prosperity. The working group this summer and fall was the best I've seen in terms of coordinating and leveraging the President's message with the operations and programs of the Executive Branch a whole.

That will continue to be a critical goal, not only during the next phase of the budget battle but after its conclusion, when the Administration will want to demonstrate the huge strides made in the past four years. Such efforts at portraying past accomplishments can easily become fragmented and uninteresting, unless they are well coordinated, they fully capture the variety of important efforts that the Administration has successfully undertaken, and unless they are infused with a keen sense of the larger message.

As you would expect, I believe that technology should play a critical role in that larger message: not as technology per se, but as a fundamental means of demonstrating the pathway to a stronger, even more optimistic, and more prosperous America. Just as the President's emphasis on educational technology has demonstrated that people, including children, need and use technology, so too the economic message must emphasize that technology creates new markets for new products and new services -- and new jobs.

The evidence is clear. For example, Secretary Brown will be releasing a study (which will be sent to you prior to release) showing that manufacturing firms that both export and use high-technology increase their employment more rapidly, pay higher wages and are less likely to fail than firms that do not. (Secretary Brown will be releasing that study as part of an address in which he will emphasize America's Advantages in an age of possibility; Advantages that include our people, our tradition of innovation and our competitive spirit. That text will also be supplied to you for your review.)

I have appreciated the opportunity to work on these issues with you in the past. I would be especially appreciative if, in the future, you include Laura Philips from my office in these technology efforts. Laura is a former professor of chemistry at Cornell, and a former business-school student, who worked for Senator Lieberman and for OSTP before coming here. She will work closely with Mark Mandell, who was already been involved with technology efforts run by your offices.

Thanks.

Kalil

EXECUTIVE OFFICE OF THE PRESIDENT

21-Nov-1996 11:20am

TO: sperling_g
FROM: Thomas A. Kalil
CC: robyn_d
SUBJECT: Status of tech issues in the budget

Gene:

Here's where things stand from my point of view, Dorothy may have additional comments. Also, I have not seen all the numbers, and its difficult to tell what is happening to overall R&D funding.

1. R&E tax credit:

This is \$2 billion a year. I realize this is a big ticket item -- but would us to make an explicit choice on this.

Possible option: Fund it for 1 year, work with Congress to make it permanent. It lapses in May of this year.

2. NIST:

Current OMB mark is \$250, rising to \$350 in 2002

Commerce request, \$345, rising to \$750 in 2002

I support the OMB "add back" option, which is \$275, rising to \$500 million in 2002

Dorothy feels strongly about adding \$12 million to MEP - which I support.

Rationale: This is the only part of our R&D budget that is focused specifically on civilian technological leadership and economic growth.

2. Next Generation Internet initiative:

OMB says they have gotten no guidance as to whether NGI should be a 1 year or 5 year initiative.

Cost: \$100 million for 5 years.

Rationale: Investment in Internet technologies has been the highest "ROI" activities of the federal government, ever. Analysts estimate that Inernet technologies have created

\$250 billion in wealth (market capitalization) over the last 18 months.

This is a five year project -- there is not much sense in doing it for 1 year.

3. DARPA

DoD cut the DARPA budget by \$100 million in FY98 over the FY97 request.

Flat-funding DARPA could restore Presidential priorities in high-performance computing, flat panel displays, etc.

4. Government use of technology:

John Doerr - the guy who organized the Silicon Valley CEOs on our behalf -- organized a brainstorming session on how the gov't could use technology to improve the operations of government, delivery of services, etc.

There is a lot you could do for a small amount of money (e.g. \$5 million per Cabinet) - e.g.:

Improve distribution of export information for small businesses (Commerce)

Fund a consortium to develop Internet tools for people with disabilities (Education/Special Ed)

Secure, on-line transactions (e.g. checking your Social Security benefits) -- all agencies

Make all government information available on-line -- all agencies

Create digital library for rural Americans using the research results of USDA's investment in land-grant colleges (USDA)

Dramatically expand the amount of high-quality consumer health information available on the Internet (HHS)

5. Growth in NSF is very important

6. DoE - a lot we could do by re-allocating some funding within DoE. President has talked about a new initiative in sustainable development. Could be very important politically given conference on global warming.

I'm payable if you have any questions -- although I'll be speaking from 11:30 - 12:30 your time.

I may have more comments after I see more details.

EXECUTIVE OFFICE OF THE PRESIDENT

21-Nov-1996 11:32am

TO: Thomas A. Kalil

FROM: Dorothy Robyn
National Economic Council

CC: sperling_g

SUBJECT: RE: Status of tech issues in the budget

Just one other item -- Dual Use Applications Program (DUAP) formerly TRP. Current OMB mark is \$197M, rising 7% a year. I've told them I want \$225M. (Last year's request was \$250; we got \$185M.)

MEMORANDUM FOR JOHN D PODESTA

RON KLAIN

CC:

GENE SPERLING

BRUCE REED

MONICA DIXON

FROM

KAREN TRAMONTANO

SUBJECT

LABOR AGENDA: NEXT STEPS

to: BK/SK
Let's talk. Brief
W/UP on Labor-Mgmt
is - possibly need to
talk about trans-agends
+ part-time.
GS
5/21/99

PURPOSE: The President and Vice-President have asked how we can respond to the current debate within labor and among workers about trade. I believe the only way to respond to the debate is to change it by focusing on the Administration's goals and objectives for workers and their families. Outlined below are short-term strategies to get on the offense on issues that concern working men and women and organized labor. Additionally, I have also outlined next steps in a long-term approach to these issues. Finally, I have noted throughout some of the things that the Administration has been doing to broaden our dialogue and approach to these issues.

BACKGROUND: Since the surge in hot-rolled steel imports we have been on the defensive. We have allowed the industrial unions who are fighting for their survival, their identity and their power within the labor movement to use this issue as the symbol for everything that is wrong with the global economy. Although we have virtually solved the surge crisis, the facts are of no consequence. The issue is about an industrial union base that has lost its power in communities, in the political system and internally within the AFL-CIO. Since workers who are not prepared for the new economy fear that they will lose their jobs and believe the social compact is lost forever, the message the industrial unions are delivering is resonating in a number of communities. Although we like to discuss the economy as global, like politics, the economy is local. If we are going to win the debate we must shift it significantly and speak to working families directly.

TRADE: Whenever we are speaking about trade, I recommend that we wrap ourselves in the principles of lifting labor and environmental standards. As a result of the FAST TRACK campaign that labor unions waged against our administration, most organized workers believe that one of the answers to companies moving overseas is to raise labor and environmental standards. Even though facts show that companies do not move overseas to escape high wages and environmental standards, workers generally believe this proposition. Therefore, I recommend that we continue and the Vice President, in particular talk about our initiatives at the ILO, our child labor initiative and our desire to include labor and environmental standards in our trade policies. The President has a number of significant venues in the near future where he will

discuss these matters, I strongly recommend that the Vice President consider venues where it would be appropriate to speak to these issues.

ORGANIZING: The AFL-CIO has recently figured out that talking about "organizing" is meaningless to workers. Although there are a number of reasons for this result, the most pertinent is that workers believe that organizing benefits unions not them. I know that the Vice President has been very vocal on this issue and he has received a great deal of support and praise. I recommend that he add to his approach a discussion about the benefits of organizing to workers. Specifically, I recommend that he add to his venues several organized work places where he can not only high-light productive labor-management relations but also talk to workers about the benefits of working in an organized setting. Our CEA agrees that there is at least a 10% wage premium for workers who are organized. Additionally, the gender wage-gap is significantly reduced for women who are part of an organized workforce. Finally, organized workers are more likely to have pensions, health-care, family leave and other working family benefits. These benefits also dovetail nicely with the accomplishments of the Clinton-Gore Administration.

EMPLOYER NEUTRALITY: The key issue for workers is whether their employers are neutral when they exercise their right to choose to have a union. In union elections where the employer is neutral, nearly all workers chose to be represented by a union. Where the employer decides to challenge a union's organizing drive, workers generally vote against union representation. There are a number of reasons for this result, but the thread running through all the analysis is that workers generally do not want to do something that the employer does not want. Worker loyalty in the first instance generally runs to the employer. I believe it is useful for the Administration, especially the Vice-President to seek out venues where employers have been neutral. This is another way in which the Vice-President can speak positively about employers, unions and workers. Several unions like CWA, SEIU and UFCW have worked out employer neutrality arrangements that can be easily highlighted.

LABOR-MANAGEMENT TRAINING & COOPERATION: In most cases the by-product of employer neutrality is the development of effective labor-management training programs and labor-management work site cooperation. Over the past ten years, research conducted by the AFL-CIO has shown that union workers favor labor-management cooperation to labor-management confrontation. There are many of examples of effective labor-management cooperation programs in all sectors. Highlighting these programs is an effective way to talk to workers and employers. In fact, the AFL-CIO has developed a national program to highlight and expand these programs throughout the labor movement. Workers also support labor-management-training programs. The AFL-CIO has recently discovered that it has the largest, and perhaps most effective workforce training programs. These programs also are found in all sectors, can be used to demonstrate effective labor-management cooperation and the benefits of organizing. I recommend that the Administration, especially the Vice-President consider venues where these programs can be raised up as programs for the new economy and new workforce. The President has visited several of these sites to announce initiatives that have been well received by the workers and labor unions involved.

 **NEW MARKETS & EMPOWERMENT ZONES:** Both the President and the Vice-President have opportunities to involve labor unions in these initiatives on two fronts. First, the AFL-CIO and International unions have investment initiatives where they invest in communities to build housing and make other critical community investments. I am working with the Treasury and Labor Departments and the AFL-CIO to see if they are interested in being a part of the New Markets Initiative as investors. Additionally, the CEOs who met with the President and Vice President made clear that the shortage of trained workers is critical to continuing to grow our economy. The AFL-CIO and other International Unions could be key to providing workforce training to a much needed workforce as we expand the economy to new markets. This is another opportunity for the President and Vice-President to call upon the labor movement to be part of the Administration's initiatives and potentially to increase their membership as the economy grows.

In the short term, I believe figuring out the opportunities where these five topic areas are discussed and reinforced will help to change the debate, get us on the offense and involve workers, employers and individual unions in all sectors in a more positive and productive dialogue.

ON-GOING AND LONG-TERM STRATEGIES: The question of whether the labor movement grows along side our growing new economy is largely a question for the labor movement. We do, however, have an interest in expanding the number of individuals who share in this economic growth. Because workers who are unionized do receive a greater share of the economic growth, it is in our interest to figure out how to facilitate workers' abilities to increase their share of economic growth. I have asked Gene and Bruce to work with me to run a process to see whether there are policies that we can develop to achieve this end. In addition to our changes in work force training policies, we will look at policies that effect contract and part-time workers. The Labor Department has also researched and produced a paper that analyzes jobs in the new economy that we will consider in this process. Finally, Labor Department is looking at developing a Workers' Bill of Rights for the 21st Century that will also be part of this process.

CEA as you know has agreed to conduct a series of discussions with economists in the labor movement (including all the industrial union economists) about the effects of trade and our industrial policy. After the first session, everyone agreed that trade was not the primary cause for job loss in the industrial sector. But, the labor union economists explained that they defined trade as the culprit because they believe it is the only policy that they can control. Although we did not resolve any issues, we are meeting for a second session on May 26th. Our hope is that we can develop a set of principles upon which we can proceed to develop a thoughtful discussion about our industrial policy.

THE WHITE HOUSE
WASHINGTON
MEMORANDUM

To: Laura D'Andrea Tyson
cc: Dan Tarullo
From: Tom Kalil TAK
Re: Telecommunications issues for 1997
Date: November 14, 1996

Telecommunications Act of 1996

There is no question that the biggest telecommunications issue will be the implementation of the Telecommunications Act of 1996. This act has the potential to lead to more competition, lower prices for consumers, and faster deployment of an advanced broadband infrastructure. The universal service provisions ("Snow-Rockefeller") can be used to provide schools, libraries and rural hospitals with subsidized telecommunications service.

The FCC has a great deal of authority and responsibility to draft regulations that implement the act. As a result, the fights between interest groups that occurred over the legislation have now shifted to the FCC and the courts. For example, GTE, some of the Regional Bell Operating Companies (RBOCs), and a number of state regulators have used the courts to appeal the FCC rules on interconnection. Reed Hundt said that as a result, "the states have complete control over the prices new entrants will pay to share the existing telephone networks during the critical period when competition is supposed to begin in local markets."

Probably the most sensitive and volatile issue is the impact that the bill could have on cable and telephone rates. In 1995, cable rates rose more than 10 percent. Although competition should eventually lead to lower cable rates, the bill will deregulate prices for "expanded basic" cable rates by March 31, 1999, and for some basic services for small cable systems immediately. On the phone side, the RBOCs will argue that lowering access charges (which is what the long distance companies want to do) will lead to higher residential rates. State regulators will try to use price caps and universal service funds to avoid "rate shocks" -- particularly in rural areas.

Generally, the Administration makes its views known to the FCC by filing comments through the Commerce Department's National Telecommunications and Information Administration (NTIA). On major filings, NTIA will coordinate with the

White House and other agencies (e.g. Justice). There have been a few issues (telecommunications access for schools and libraries, kid's TV) where the White House has played a more visible and direct role.

I have attached (a) a summary of the rulemakings that NTIA intends to be most involved in; and (b) a summary of the Telecommunications Act prepared by NTIA.

Other telecommunications issues:

- Spectrum issues will inevitably crop-up, because (a) auctions are a popular "pay for" for Administration initiatives; (b) companies are interested in getting more spectrum to roll-out new wireless services; and (c) law enforcement and public safety agencies are anxious to get spectrum as well.
- Although I am not directly involved in the WTO talks and Intelsat restructuring, these are obviously both critical issues.
- A fight is looming over access charges for Internet service providers. Historically, data communications companies have been exempt from access charges. Local telephone companies are complaining that customers are calling up their Internet service providers for hours at a time, and jamming up their networks. Computer and Internet companies believe that the RBOCs should upgrade their networks to handle data traffic more efficiently.

Please let me know if you need any additional information.

OVERVIEW OF MAJOR PENDING TELECOMMUNICATIONS ISSUES

- On February 8, 1996, President Clinton signed landmark telecommunications reform legislation into law. The overwhelming bipartisan support for this new law demonstrates America's commitment to ensuring that all citizens benefit from the information superhighway now and in the next century.
- The new law, among other things: i) opens up competition between local telephone companies, long distance providers, and cable companies; ii) helps connect all classrooms, libraries, and hospitals to the information superhighway by the end of this decade; iii) gives families control of the programming that comes into their homes through television; and iv) prevents undue concentration in television and radio ownership so that a diversity of voices and viewpoints can continue to flourish in this Nation.
- The Federal Communications Commission (FCC) is now in the process of implementing the new Act. NTIA's plan has been to participate in as many rulemaking proceedings as resources allow, but we have placed a high priority on a number of major rulemakings, including the following:
 - Universal Service: Pursuant to the Act, a panel of Federal and State regulators (the Federal-State Joint Board) recently issued recommendations on new universal service policies. The Board's major recommendations include the following: (1) defining the package of basic telephone services that must be made available and affordable for all Americans; (2) creating a mechanism for providing subsidies to so-called high cost areas, which is based on the use of forward-looking costs and the use of proxy models for determining company costs; and (3) establishing a fund (capped at \$2.25 billion) for providing low cost telecommunications services to schools and libraries. It is expected that the FCC will seek public comment on the Joint Board's recommendations. Additionally, the Board deferred action on a number of contentious issues (such as how to provide universal service funds to so-called "high cost" areas and how large the universal service support fund should be) that will be the subject of public comment. NTIA intends to participate actively in these further proceedings.
 - Interconnection: The Act requires most local telephone companies to interconnect with competing local service providers on reasonable terms. The FCC adopted implementing regulations on August 8, but the rules concerning the pricing of interconnection and unbundled network elements were challenged by local telephone companies and state regulatory commissions before the Eighth Circuit Court of Appeals. In October, the court stayed the effective date of the pricing rules, and the Supreme Court on appeal declined to lift the stay. Private parties continue to negotiate agreements (subject to review and arbitration by State regulatory commission) to implement the Act's interconnection requirements. It is unclear whether further FCC proceedings in this area will be in the offing.

- Access Charges: The Commission will soon commence a rulemaking to reform its prevailing access charge regime, the regulatory mechanism by which long distance carriers compensate local telephone companies for the use of local network facilities to originate and terminate interstate long distance calls. The current system must be reformed to make it more compatible with the competitive local exchange market structure that the 1996 Act is designed to promote.
- BOC Entry into Long Distance: It is anticipated that, beginning late this year or early next year, the Bell Operating Companies will begin petitioning the FCC for permission to offer interLATA (long distance) telecommunications services. NTIA expects to participate actively in those proceedings (in close coordination with the Justice Department).
- Cable Television: The Act deregulates the rates charged by cable television systems in areas where local telephone companies offer comparable programming directly to subscribers. The FCC is determining whether telephone companies must offer programming to a certain percentage of households in a community in order to provide sufficient competitive to justify deregulating cable rates.
- Broadcast Ownership Policies: The FCC has commenced a rulemaking to review a number of its local broadcast ownership policies, which control how many radio or television stations that an individual or firm may own in a single market. In a related matter, the Justice Department recently approved the merger of Westinghouse and Infinity Broadcasting, the nation's two largest radio broadcasters. The Department did, however, require the new firm to sell off one radio station each in Philadelphia and Boston, so that the merged company's share of advertising revenues in either market did not exceed 40 percent. Both the Department of Justice and NTIA will likely monitor the FCC's rulemaking closely to ensure that any changes to the ownership rules do not adversely affect either competition or diversity.

SUMMARY OF TELECOMMUNICATIONS ACT OF 1996

Local Competition

- Under the Act, each telecommunications carrier has a duty to interconnect with other telecommunications carriers. The Act sets forth specific requirements that local exchange carriers (LECs) must fulfill to meet this duty. Certain exceptions from these requirements are allowed for rural LECs and LECs with fewer than 2% of the Nation's subscriber lines.
- Interconnection agreements negotiated between a LEC and other telecommunications carriers must be approved by a State within the Act's deadlines. If a State fails to act, the Federal Communications Commission (FCC) can assume the responsibilities of the State.
- No State or local government may prohibit any entity from providing interstate or intrastate telecommunications services. Limited, nondiscriminatory exceptions to this rule are allowed for certain State and local government activities related to public rights-of-way, consumer protection, and other similar issues.
- The FCC must establish regulations to allow public utility holding companies to offer telecommunications services.

Universal Service

- A Federal-State Joint Board will make recommendations to the FCC regarding changes to the definition and funding of universal service. Each telecommunications carrier that provides interstate and intrastate telecommunications services must contribute, on an equitable and nondiscriminatory basis, to universal service.
- Upon request, all telecommunications carriers must provide universal service to K-12 schools, libraries, and rural and non-profit hospitals at preferential rates.
- The Communications Act is amended so that the FCC's general universal service responsibility includes making communications available to all people of the United States "without discrimination on the basis of race, color, religion, national origin, or sex."
- The Act requires telecommunications equipment and services to be accessible to and usable by individuals with disabilities, to the extent this is readily achievable.

Provisions Concerning Bell Operating Companies (BOCs)

- Upon enactment, a BOC may apply to the FCC for authorization to provide in-region long distance services if it has entered into an approved interconnection agreement and meets the "competitive checklist" and other requirements in the Act. The FCC may approve the authorization if the BOC meets these requirements and the authorization is in the public interest. A BOC must provide such service through a separate affiliate for 3 years after enactment. A BOC may also, upon enactment, provide out-of-region and incidental long distance services, as well as already authorized long distance services.
- A BOC may engage in manufacturing if it is in compliance with the Act's interconnection, nondiscrimination, and cross-subsidy requirements. Such activity must be done through a separate affiliate for 3 years after enactment.
- BOCs are permitted to engage in electronic publishing through a separate affiliate or joint venture, subject to the Act's non-discrimination and cross-subsidy requirements. These requirements sunset in 4 years after enactment.
- BOCs are not permitted to engage in alarm monitoring before 5 years after enactment (except for certain already authorized activities).

Broadcast Services

- The Act encourages the FCC to limit initial eligibility for advanced television (ATV) licenses to existing broadcasters. Licensees that use ATV spectrum for services other than ATV for which a fee or other compensation is received must in turn pay a fee to the FCC based on the market value of the spectrum used for these "pay" services.
- The Act extends radio and TV license terms to 8 years and loosens rules on license renewal, eliminating the need for comparative hearing in most cases.
- The Act eliminates the FCC's national ownership cap for radio stations and modifies local radio ownership limits. The Act increases the national audience reach for TV station ownership to 35% from 25%. The FCC will conduct a rulemaking to determine whether local TV ownership limitations should be modified or eliminated.
- The Act eliminates the FCC's network-cable cross ownership rule and the statutory broadcast station-cable cross ownership restriction, but retains the FCC's regulatory broadcast-cable and broadcast-newspaper ownership bans.

Cable Services

- Regulation of expanded basic cable rates sunsets on March 31, 1999. The Act deems effective competition to exist (and therefore rate regulation to cease) if a local telephone company offers "comparable" video programming in a community. The Act deregulates rates for cable programming services and some basic services offered by small cable systems immediately.

Telephone Company Provision of Video Programming

- The Act gives telephone companies the option of providing programming on a common carrier basis or as a conventional cable operator. If it chooses the former, the telephone company will face less regulation but will also have to comply with FCC regulations requiring "open video systems."
- The Act generally bars, with certain exceptions including most rural areas, acquisitions by telephone companies of more than a 10% interest in cable operators (and vice versa) and joint ventures between telephone companies and cable systems serving the same areas.

Regulatory Reform

- The Act requires the FCC to forbear from regulating telecommunications carriers or services if it determines that regulation is not necessary to ensure reasonable rates, protect consumers, or otherwise promote the public interest.
- The Act removes current restrictions on foreign officers and directors serving on the board of broadcast and other radio licensees or their holding companies. (The Act, however, retains the overall equity and voting control limits on such foreign ownership as set forth in 47 U.S.C. 310(b).)

Obscenity and Violence

- The Act makes illegal the transmission by computer of obscene or indecent communications to minors. Certain "good faith" defenses are provided for on-line services and users.
- To address violence on television, the Act requires TV manufacturers, within 2 years of enactment, to include blocking technology (the "V-chip") in all TV sets. The Act encourages the broadcast and cable industries to create a voluntary rating system within one year. If they do not create a rating system, the FCC would establish an Advisory Committee to recommend a rating system. Use of ratings would be voluntary, but any rating must be sent electronically.

Miscellaneous Provisions

- The President must prescribe procedures by which Federal agencies may facilitate appropriate access to Federal property for the siting of wireless services. State and local governments must act within a reasonable time period on siting requests for wireless services.
- A Telecommunications Development Fund under the auspices of the FCC is established for the purpose of promoting access to capital for small businesses and promoting delivery of telecommunications services to underserved rural and urban areas. The fund is financed through the interest on spectrum auction deposits.
- The Act establishes in the District of Columbia the National Education Technology Funding Corporation, a nonprofit corporation which has authority to receive assistance from Federal agencies for the purpose of stimulating investment in education technology infrastructure through public-private ventures.

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**U.S. Department of Education
Office of the Deputy Secretary
600 Independence Avenue, S.W.
Washington, D.C. 20202**

DATE : 3-26-96

TO: Gene Sperling

ORGANIZATION: _____

PHONE : _____ FAX : 456-2878

FROM : Jonathan Hyatt

PHONE : _____ FAX : _____

Total Pages (including cover): 3

MESSAGE :



UNITED STATES DEPARTMENT OF EDUCATION
OFFICE OF THE DEPUTY SECRETARY

MEMORANDUM FOR GENE SPERLING

Through: Linda Roberts *LR*
From: Jonathan Hoyt *JH*
Re: Costs for Some Important Technology Challenges
Date: March 26, 1996

Last week, you asked for some general estimates you could use to stimulate further discussions with Viacom and Sumner Redstone about a technology challenge. We've used Boston and the entire U.S. for these estimates, and focused in on teacher training, because it is probably the biggest outstanding need and has marvelous publicity potential. We've also suggested two other ideas that might have an equally large impact.

The Challenge

While technology has made its way into almost every walk of life, the profession of teaching remains unchanged. About half of all teachers do not use technology at all to help them in the classroom, and only about ten percent could be considered capable users. Yet, the potential benefits to teachers are very great.

- Technology can break down the isolation of teachers by allowing them to communicate with one another, share ideas, and access the resources of the Internet for their lessons.
- It can also free teachers from being the only source of information in the classroom; when teachers and students use technology, teachers spend more time one-on-one with their students, their job satisfaction increases, and scores go up.
- Technology can streamline the paperwork required of every teacher: attendance reports, student grades and files, and administrative information can all be automated with significant cost and time savings.

School districts routinely underinvest in teacher training. It is among the first budget items to be cut when cuts have to be made. All too often, they invest in one-shot seminars and superficial treatment of topics, which have little impact on classroom performance. Yet a significant challenge from the private sector could spur educators to action.

Costs of Some Specific Teacher Training Challenges

Train every teacher in the U.S.: \$6.4 billion

Train every middle school teacher in the U.S.: \$1.6 billion

Train every middle school science teacher in the U.S.: \$400 million

Train every teacher in the Boston Public Schools: \$6.6 million

Cost Assumptions

- Training costs \$2,200 per teacher, on average. This brings 80 percent of teachers to the "adaptation" level and 20 percent to a higher level. "Adaptation" means that a teacher has received 45+ hours of training, has had at least 3 months of experience, is able to apply technology in a variety of situations, and can perform basic troubleshooting. Some (like Mike Smith) argue that much of this cost could be absorbed by the district — so that if Viacom provided half, the district could provide the rest.
- There are 737,000 middle school teachers in the U.S. (grades 7, 8, 9). About a quarter of them teach science.
- Boston Public Schools enrollment is 60,000; there are approximately 3,000 teachers.

Other Ideas for Redstone and Viacom

Teacher professional development is costly, but outright contributions are not the only way Viacom could contribute.

- Building on its clout as one of the nation's largest cable providers, Viacom could deliver training directly to teachers. Cable systems have been used successfully in Hawaii and some local communities to deliver courses that help teachers develop new skills. Viacom might develop this programming, distribute it through local cable systems, and promote it to teachers in its service areas.
- One of the nation's great untapped resources is the ingenuity of talented teachers. Redstone might develop a micro-grant program, offering grants of \$500 to \$2,000 to individual teachers nationwide to use technology in their classrooms and develop technology-based curricula. Even a small amount like \$20 million, distributed in this fashion, could have a powerful psychological effect on teachers and generate enormous goodwill. Teachers rarely get the chance to develop and carry out their own ideas in the top-down structure of school districts, yet they have the best ideas.



**EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET**

Old Executive Office Building
Room 246
Washington, D.C. 20503

Phone: 202/395-3120
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Date: 11/20/95

To: Gene Sperling

Fax Number: 62878

Number of pages (including cover sheet): 9

From: Robert E. Litan
Associate Director for General Government and Finance

Comments:

Cost Comparison of Education Technology Initiative attached.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET

Route Slip

TO: The Educational
Technology Group:

Ken Apfel
Bob Litan
Lori McHugh
Julia Moffett
Chris Devall
Bill Curry
Gene Sperling *2FL/wr*
Paul Dimond
Greg Simon/J. Kolenberger
Henry Kelly/J. Swisshelm
Mike Schmidt
Linda Roberts/J Hoyt
Tom Kalil
Kate Carr

___ Take Necessary Action
___ Approval or Signature
___ Comment
___ Prepare Reply
___ Discuss with me
___ For Your Information
___ See Remarks Below

FROM: Ken Apfel *KA* and Bob Litan *BL*

DATE: November 14, 1995

REMARKS:

Attached for your review is a comparison of the Department of Education's (ED) proposal for carrying out the President's Educational Technology Initiative and the McKinsey, Milken, and RAND studies of the cost of integrating technology into the schools nationwide. The analysis reveals that each of their cost estimates vary greatly because each incorporates different target dates, unit costs and assumptions regarding how the schools and the private sector will respond to various incentives. The differences between these studies make a comparison difficult, if not impossible.

Given that the ED and McKinsey estimates of the cost of achieving a similar goal are so varied, OMB recommends that each meet prior to the Commerce Department's release of the KickStart report, which includes McKinsey's estimates of the costs and benefits of connecting public K-12 schools to the NII.

We hope that these materials will help the group in defining the appropriate scope for the President's Educational Technology Initiative.

Comparison of the Educational Technology Cost Estimates

In September 1995 President Clinton announced a new initiative to integrate technology and education by the year 2000. The plan consists of four components: (1) computers in every classroom; (2) connecting these computers to the National Information Infrastructure (NII); (3) technology centered teacher training; and (4) educational software development. In developing its vision for integrating technology and education, the White House staff have examined several studies of the cost of integrating technology into the schools and the extent to which technology has already been integrated into the schools. The Education Department (ED) has also examined the cost issue. This paper compares the major cost studies and ED's proposal in an effort to identify why they differ so greatly. The answer lies in different target dates, non-comparable unit costs and different assumptions about the behavior of the schools and the private sector.

Summary

- McKinsey and Company, Inc. This report estimates that the total cost of integrating technology into the schools is \$47 billion to achieve a student-to-computer ratio of 5:1 by the year 2005. This estimate is based on: (1) an estimate of the cost of integrating technology into an average school; (2) adjustments for major variations in cost around this average; (3) the existing infrastructure; and (4) multiplying the incremental costs per school by the total number of schools, accounting for population growth. McKinsey also estimates a less ambitious proposal (providing a computer lab in each school), but because this proposal is not comparable to the President's Initiative it is not included in this comparison.
- Milken Institute for Job and Capital Formation. This report estimates that the total cost of integrating technology into the schools is \$31.5 billion. The report does not include information on either the student-to-computer ratio once the technology is integrated into the schools or the length of time it would take to fully integrate technology into the schools. This estimate is based on responses to a survey of the 50 State Chief School Officers who were asked how much their State has already spent on educational technology and how much more would be needed to achieve their current goals. Since the report does not include a description of what this educational technology money would buy, there is no basis for comparing the resulting technology configuration across the States to the other studies.
- RAND. This report estimates that the total cost of integrating technology into the schools "might" be \$103.5 billion to achieve a student-to-computer ratio of 2:1 over three years. However, when the authors were questioned about this figure they stated that they would rather not defend this "rough" estimate of the total cost. They insisted that the primary purpose of the report is to provide an estimate of the magnitude of the cost of operating/maintaining technology in the schools by highlighting how much 8 schools that have already integrated technology into their curriculums are spending on

educational technology annually on a per student basis. The five schools with an average student-to-computer ratio of 2:1 have spent about \$450 annually per student, whereas the three schools with an average student-to-computer ratio of 9:1 have recently spent about \$180 on educational technology annually per student. The report estimates that within a given year, if \$450 were spent on every K-12 student the total cost of operating/maintaining the technology in schools nationwide would be \$20 billion, whereas if \$180 were spent on every student it would cost \$7.5 billion.

- Department of Education (ED). ED estimates that it will cost \$10 billion to achieve a student-to-computer ratio of 4:1 by the year 2000. This estimate is based on ED's estimate of the cost of the hardware and teacher training components of the President's Educational Technology Initiative. Since ED believes that the private sector will pick up the cost of the other two components of the President's Initiative, including connectivity and software costs, the agency does not include these costs in its estimate of the total cost of integrating technology into the schools.

MILKEN

The Milken report estimates that the total cost of integrating technology into the schools is \$31.5 billion. This estimate is based on a survey of 50 State Chief School Officers who were asked how much their State has already spent on educational technology and how much more would be needed to achieve their current goals. Since only 29 States responded to the survey regarding spending to date and only 35 States responded to the survey regarding future needs, Milken estimates that the States have spent \$5.4 billion to date and that \$31.5 billion more is required for all the States to meet their technology goals.

Although the report provides an estimate of the total cost of integrating technology into the schools, it does not provide a break down of costs in terms of how much the States have allocated to each component (connectivity, software, hardware, and teacher training) to date or would allocate to each component if they were provided with the additional funds needed to achieve their current goals. In addition, the report does not include a description of what the outcome would be once the technology were incorporated into the schools. Also, the report does not include information on the length of time it would take to fully integrate technology into the schools.

Since the report does not include either a breakdown of the total cost or a description of what the educational technology would buy, it is impossible to compare this study's estimate of the total cost of integrating technology into the schools with the other study's estimates.

RAND

The RAND report states that the total cost of integrating technology into the schools "might" be \$103.5 billion over three years based on spending about \$2.3 million on every 1,000 students (there were 45 million enrolled K-12 students during the 1994-95 school year). However, when the authors were questioned about this figure they stated that they would

rather not defend this rough estimate. The primary purpose of the report, according to the authors, is to provide an estimate of the magnitude of the cost of operating/maintaining technology in the schools based on how much 8 schools that have already integrated technology into their curriculums are spending on educational technology annually on a per student basis. Notably, each of the eight schools have either a part- or full-time technology coordinator that helps with the design, layout and maintenance of the computers.

Since the primary purpose of this report is to provide an estimate of the total cost of operating/maintaining technology in the schools, rather than to provide a estimate of the total cost of integrating technology into the schools, this study's cost estimates are not comparable to the other study's cost estimates.

ED AND MCKINSEY Estimates

Since the ED proposal and McKinsey report are the only two which provide a breakdown of the total cost of achieving a student-to-computer ratio of between 4-5:1 by integrating technology into the schools within the next 4-10 years (See attached Table), their estimates are the only two that can be compared closely.

The total cost of integrating technology into the schools is \$10 billion according to ED and \$47 billion according to McKinsey, a \$37 billion difference.

Connectivity and Software

Nearly half of the \$37 billion difference between these two total cost estimates is explained by the fact that ED does not incorporate into its estimate the cost of two of the four components of the President's Initiative, connectivity and software. McKinsey, on the other hand, incorporates into its estimate \$10 billion for connectivity and \$6.6 billion for software.

ED assumes that the private sector will pick up these connectivity and software costs. The assumption is that if the computers are in every classroom and teachers are trained, there will be an enormous increase in the demand for connectivity and educational software. ED assumes, therefore, that it will be in the private sectors best interest to pick up the initial connectivity and educational software development costs. ED may not disagree with the costs per se, but questions whether the Federal government needs to worry about incorporating these costs into an estimate of the total cost.

Local school district and telecommunication carriers investments in connectivity will total billions of dollars over the next four years. Both the House and Senate telecommunication bills expand the Universal Service Fund, which currently assists certain residential users in obtaining telephone service, and would use these funds to reduce the monthly service rates (as well as installation rates) linked to supporting computer use within the schools. These funds (a total of \$2-3 billion) would flow directly to the states and would not require a match. In addition, AT&T recently made a commitment to donate \$150 million over the next five years in discounted line charges and other assistance to help schools set up and utilize various forms

of information technology. What is not clear is whether all rural and low-income school districts will be able to make or attract these connectivity investments.

Hardware and Teacher Training

The rest of the difference between these two total cost estimates is explained by a \$15.5 billion difference in the amount each devotes to hardware and a \$5.1 billion difference in the amount each devotes to teacher training. In each instance, the difference is largely due to (1) differences in the quality and quantity of goods and services provided and (2) other expenses that are not accounted for in the ED estimate, but that are accounted for in the McKinsey estimate.

The ED and McKinsey cost estimates are discussed more fully below.

Hardware

The total cost of the hardware is \$8.5 billion according to ED and \$24 billion according to McKinsey, a \$15.5 billion difference. The ED and McKinsey estimates incorporate the cost of multimedia-capable computers (equipped with Internet/World Wide Web access and video-on-demand for distance learning) and printers. The McKinsey estimate also incorporates the cost of other computer peripherals (e.g., furniture, scanners and security devices) and retrofitting (expenses related to the construction and wiring that needs to be undertaken to integrate the computers/printers into the classrooms, such as, electrical, heating, ventilation, air conditioning and asbestos removal expenses), which ED's estimate does not.

- The cost of the computers is \$7.5 billion according to ED and \$13.6 billion according to McKinsey. The \$6.1 billion difference between these two cost estimates is largely due to differences in the quality and quantity of goods provided. ED assumes a lower average cost per computer: \$1,250 versus \$1,700 because the agency incorporates less sophisticated multimedia-capable computers into its estimate. ED does not include any information on the differences in the quality of the multimedia-capable computers incorporated into its estimate. In addition, ED excludes purchasing new computers for students in grades K-3 because the agency assumes that less sophisticated computers already available in schools will be redirected to use in K-3 classrooms. ED believes that these less sophisticated computers will meet the needs of students in grades K-3, since it is unlikely that they will be able to take advantage of multimedia-capable computers that are connected to the NII.
- The cost of the printers and other computer peripherals (e.g., furniture, scanners and security devices) is \$1 billion according to ED and \$6 billion according to McKinsey. The \$5 billion difference between these two cost estimates is largely due to differences in the quality and quantity of goods provided and other expenses incorporated into one estimate and not the other. ED only incorporates the cost of printers into its estimate. ED believes that furniture costs are not allowable under Title III, the provisions that support integrating technology into the schools, of the Elementary and Secondary

Education Act. McKinsey incorporates into its estimate the cost of printers that are more expensive, as well as the cost of furniture, scanners and security devices. There is not sufficient detail in either report to judge which printer and peripheral configuration may be more appropriate to incorporate into an estimate of the total cost of hardware.

- The cost of the retrofitting (expenses related to the construction and wiring that needs to be undertaken to integrate the computers/printers into the classrooms, such as, electrical, heating, ventilation, air conditioning and asbestos removal expenses) is not incorporated into the ED estimate, whereas \$4.4 billion in retrofitting costs are incorporated into the McKinsey estimate. ED believes that retrofitting costs are not allowable under Title III. McKinsey estimates the average cost of retrofitting old and new schools and scales the cost up to a national level by multiplying the incremental costs per school by the total number of schools. Given that McKinsey estimates the retrofitting costs on a per school basis, these are the best estimates available but they are based on the technology that McKinsey envisions integrating into the schools which differs somewhat from the technology ED envisions integrating into the schools.

Teacher Training

The total cost of teacher training is \$1.5 billion according to ED and \$6.6 billion according to McKinsey, a \$5.1 billion difference.

- The cost of teacher training is \$1.5 billion according to ED and \$3.1 billion according to McKinsey. The \$1.6 billion difference between these two estimates is largely due to the number of hours of teacher training that each incorporates into its estimate. ED estimates that it will cost \$1,000 to train each teacher, but assumes that as a result of the new computer and software purchases, the private sector will kick-in about \$400 of the cost of training each teacher. McKinsey estimates that it will cost \$1,255 to train each teacher and does not assume that the private sector will kick-in any of the cost. ED does not indicate how many hours of training each teacher would need, but McKinsey assumes that 80% of the teachers would need at least 45 hours of training and that 20% would need at least 80 hours of training. Therefore, it appears that the difference between these two estimates of the total cost of training each teacher are due to differences in the number of hours of training each incorporates into its estimate. There is not enough detail in either report to judge how many hours of training each teacher would need, though research shows that the amount that teachers learn during computer training sessions varies greatly depending on the number of hours of training.

In addition, ED assumes that the percentage of teachers that would not need any training is 10%, whereas McKinsey assumes that it is 5%. The difference between each of these two estimates of the percentage of teachers that would not need training is because McKinsey assumes that teachers need to attain a higher level of proficiency.

• The cost of substitute teachers needed to cover during the times when teachers are out being trained is not incorporated into the ED estimate, whereas \$2.5 billion for substitute teaching expenses is incorporated into the McKinsey estimate. ED does not include substitute teaching expenses in its estimate because the agency assumes that teachers could be trained on their own time, either in the summer or in the evenings. McKinsey incorporates \$2.5 billion for substitute teaching expenses into its estimate because although some teachers may be enthusiastic about being trained on their own time, others may not be. Whether substitute teaching expenses need to be incorporated into the estimate is debatable given that some teachers are likely to willingly do this on their own time, whereas others may not be willing to do this.

• The cost of technology coordinators within each school district is not incorporated into the ED estimate, whereas \$1 billion for 1.5 technology coordinators in each school district is incorporated into the McKinsey estimate. ED does not explain why the agency excludes technology coordinator expenses from its estimate. McKinsey incorporates \$1 billion into its estimate because most schools that have integrated technology into their curriculum have either a part- or full-time technology coordinator. Given that most schools that have integrated technology into their curriculum have technology coordinators that help with the design, layout, and maintenance of the computers, it seems appropriate to incorporate the cost of technology coordinators into an estimate of the total cost of teacher training.

Comparison of Educational Technology Cost Estimates (billions of dollars)

Total Cost of Integrating Technology into the Schools					Annual Operation/Maintenance Costs of Technology in the Schools			
	Dept. of ED	McKinsey		Milken	McKinsey		RAND	
Proposal Highlights:		(High)	(Low)		(High)	(Low)	(High)	(Low)
student-to-computer ratio	4:1	5:1	lab in each school equipped with 25 computers (ratio 21:1)	-	5:1	lab in each school equipped with 25 computers (ratio 21:1)	2:1	9:1
other major proposal characteristic	-	technology coordinators per school district (1.5 FTEs)	technology coordinators per school district (0.25 FTEs)	-	technology coordinators per school district (1.5 FTEs)	technology coordinators per school district (0.25 FTEs)	each school equipped with technology coordinator	
Year initiated and completed:	1997-2000	1996-2005	1996-2000	-	2005	2000	1996	
Hardware	8.5	24.0	5.6	-	2.0	2.4	10.6	3.0
average cost per computer	\$1,250	\$1,700	\$1,700	-	\$1,700	\$1,700	\$1,500	\$1,500
Connectivity	-	1.9	0.4	-	0.6	0.7	-	-
connection to school	-	1.9	0.4	-	0.6	0.7	-	-
system design/layout	-	6.1	1.4	-	1.8	0.8	-	-
connection within school	-	9.9	2.3	-	1.0	2.1	1.0	0.4
subtotal	0.8			-	3.4	3.6	1.0	0.4
Teacher training	1.5	6.6	1.5	-	5.7	4.3	6.2	3.2
Software	0.0	6.6	1.5	-	2.9	3.6	2.2	0.9
Comparison of Total Cost Estimates excluding Connectivity & Software	10.0	30.6	7.2	-	7.7	6.7	10.8	6.2
Total Cost:	10.0	47.0	11.0	31.5	14.0	14.0	20.0	7.5

Background Information for Cost Estimates

Dept. of Education (ED):

Estimates: calculated based on the funding necessary to (1) support a student-to-computer ratio of 4:1 for grades 4-12 and (2) provide basic teacher training.

McKinsey & Company, Inc.:

(a consulting firm contracted by the KickStart Steering Committee of the presidentially-appointed National Information Infrastructure (NII) Advisory Council (Department of Commerce) to analyze the costs and benefits of connecting public K-12 schools to the NII). Authored "Connecting Schools to the NII," draft dated September 1995. Estimates: (1) calculated the cost of each of the six components (hardware, connections to schools, system design/layout, connections within schools, teacher training, and software) for an average school; (2) made adjustments for major variations in costs around the average (for example, the higher cost of installing computers and local area networks in older schools requiring retrofitting and asbestos removal); (3) mapped the existing infrastructure of each cost component for a high and low estimate; and (4) scaled the costs up to a national level by multiplying the incremental costs per school by the total number of schools, accounting for population growth.

Milken Institute for Job and Capital Formation:

(a component of the Milken Family Foundation). Authored "Expanding Classroom, Shrinking World," dated March 1995. Estimate: based on a survey of the 50 State Chief School Officers who were asked how much the States have already spent on educational technology and how much more would be needed to achieve their current goals. 29 States reported having spent \$5.4 billion to date and 35 States reported that they would need \$31.5 billion more to achieve their goals.

RAND:

(a nonprofit public policy and research institution). Authored "Toward a Federal Strategy to Foster the Use of Educational Technology," draft dated September 1995. Estimates: calculated based on the annual education technology expenditures of eight schools that have integrated technology into their curriculum and the percentage of their educational technology budgets spent on each component (hardware, connectivity, teacher training, and software) in recent years. The annual operation/maintenance estimates for the country were calculated by multiplying the 1994-95 Average Daily Attendance (ADA) estimate by the higher average cost per student (\$450) and lower average cost per student (\$180) for a high and low estimate.

April 29, 1996

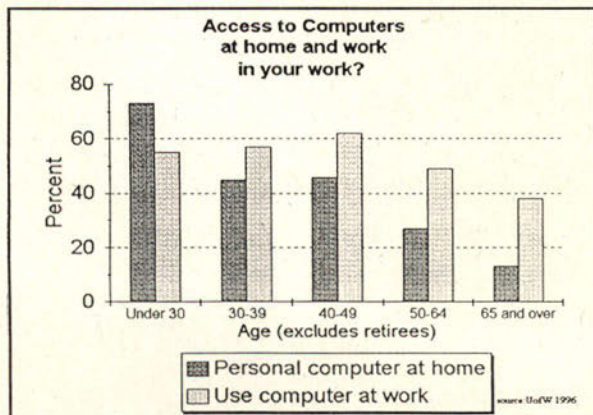
MEMORANDUM FOR LAURA TYSON, GENE SPERLING AND PAUL DIMOND

FROM HENRY KELLY *HK*

SUBJECT: Technology and Adult Education

The computer and communication technologies that are a focus of Administration efforts to improve K-12 education are perhaps even better suited to serve the diverse learning needs of employed Americans. The President's leadership in education technology, and his participation in several key events, have galvanized an extraordinary amount of attention and investment around the country. Netday96 got 20,000 volunteers helping to wire California classrooms, and Technology Learning Challenge Grants stimulated the formation of 500 consortia of schools, businesses, and universities. The President and the Vice-President succeeded in their fight for amendments to the landmark Telecommunications Act that allow schools to get more affordable access to telecommunication networks -- in addition to the benefits that will result from increased competition. In the State of the Union and subsequent addresses, the President challenged the Congress, states and localities, and the private sector to develop and implement plans that will assure that every school and classroom is connected to learning resources and the information superhighway, that classrooms are equipped with modern computers and engaging content, and that teachers are well trained to use the new technology. The President's *Technology Literacy Challenge* launched a national mission to assure that every child will be technologically literate and equipped with the basic communication, math, science, and analysis skills needed to survive in the 21st century. With a little creativity we should be able to find a way to achieve the same kind of excitement about using technology to make education, at work and at home, easier and more convenient for American workers.

Technology can change on-the-job learning more rapidly than K-12 education in part because nearly 60% of employed workers under age 50 already use a computer at work and nearly half have computers at home and usage continues to grow. A large number of office machines are already connected to the Internet. Since technology can often successfully mimic traditional apprentice-based, informal learning, it also offers a style of learning that is



comfortable for people who have not enjoyed formal education or been successful there. Technology based tests can also provide a way to evaluate performance that can provide more relevant information, in much less time, for both employees and employers. For example, simulations that operate on standard computers can be used to measure success in performing practical tasks such as operating a piece of equipment or working with a team to solve a problem.

Unlike K-12 systems which require a broad basis of community consensus and public spending decisions to change approaches to

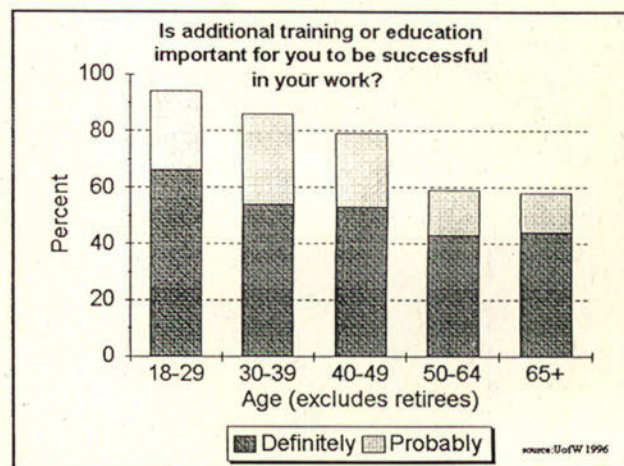
education, the institutions capable of serving the new training needs in homes and in businesses can adjust quickly. Indeed the business of providing net-based instruction to companies is already growing rapidly although use is very uneven and there is enormous confusion about quality and standards. Many large employers -- including DoD -- are convinced that technology can greatly reduce training costs and make it more accessible. The benefits should be particularly great for small businesses that can not manage traditional formal training, but few of these firms make much use of learning technology today.

Anything the Administration can do to accelerate the introduction of practical, inexpensive training methods that are easily accessible is likely to be warmly received. Indeed, this is one of the few areas in labor policy where we can expect strong endorsements from business, labor, and educators. Clearly, improved training methods won't eliminate the apprehension associated with the rapid transformation underway in the American workplace. It would, however, be recognized as a clear, practical step to enabling workers to acquire new skills rapidly and obtain more rewarding work.

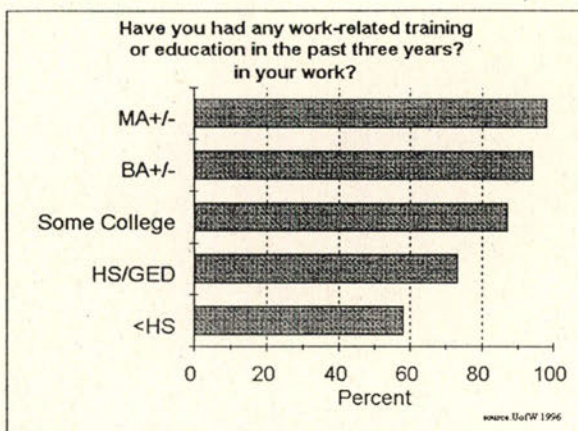
The Department of Labor has already demonstrated the level of interest that can be generated. A comparatively modest DoL investment created an on-line employment service called "America's Job Bank" which is now one of the most visited sites on the web -- winning the PC Magazine "Top 100 Web Sites" award and a listing as one of the top 5% of all web sites by the Lycos group in Carnegie Mellon.

Demand

The need for lifelong learning is widely recognized by both employers and employees. Over half of Americans between 18 and 49 think that additional education or training is "definitely important" for success in their work and an additional 25 percent think that additional training is "probably important"¹. It is striking that more than half of the employed older workers, including those over 65, think that further education is probably important. The desire for more education is nearly independent of income or employment level.



¹ Dillman, Don A, James A. Christenson, Pricilla Salant, Paul D. Warner, *What the Public Wants from Higher Education*, Social & Economic Sciences Research Center, TR #95-52. This publication is the source of the graphs cited as: "UofW"



Worker interest is strongly supported by employers. Slightly more than a third of all Americans were asked by their employers to get more work-related training or education last year and nearly half the workers aged 40-49 were encouraged to do so.

Americans are clearly not just talking about lifelong learning, they're acting on their convictions. In 1995, over 80% indicate that they've received some kind of job-related training during the past three years. The ability of Americans to receive the education they want is,

however, linked to income. The more education a person has, the more likely that he or she will receive further education. Over 90% of employees with BAs have participated in some kind of adult training in the last three years and over half participated in the previous year. Only 60% of employees lacking a high-school degree, however, participated in a training program during the past three years.

While investment in formal training is comparatively easy to document, most training has always been informal -- received from other employees, reading manuals, or observation. The need for informal "learning by doing" has probably increased as products and job descriptions change more rapidly and more work involves knowledge and mind-power rather than repetition and muscle-power.

Investment in training is probably several times higher than the approximately \$50 billion invested in formal business training, but data is virtually nonexistent. Small businesses rely almost entirely on informal training.

The computers and communication systems now used throughout American businesses provide an unprecedented opportunity to expand the scope of both formal and informal education. Its potential is particularly great for informal learning methods. Technology should make it possible to marry the on-the-job learning -- with which most employers and most employees, are comfortable -- with the need to learn an unprecedented range of sophisticated new skills. Computers can simulate the operation of actual equipment or office experiences -- including simulations which require groups working together. A well designed system also offers practical problems and directs a student to specialized help or remediation when, and only when, the student clearly recognizes how it is needed and useful.

Devices ranging from Xerox machines to CAD software, to medical equipment often incorporate "embedded learning" systems. This means that the devices can teach an operator how to use them. The "just-in-time-learning" possible from these systems can be greatly expanded if other instructional material is provided through office computers and networks. In many cases an employee isn't expected to know all the sophisticated options of a new piece of

AGT's hyperlinked just-in-time learning modules provide a meaningful learning environment and are also utilized as job-aids. Through ATG's just-in-time learning modules, companies can tool their employees with the skills they need by providing them with training where and when they need it.

AGT advertisement. The firm's clients include Dupont, Pepsi, AT& T, General Instrument, and IBM

billing software or a new machine tool. But he or she is expected to be able to figure out how to use these options quickly when the need arises. DoD has made major and effective use of both embedded and "just-in-time-learning" for some time and is convinced of its effectiveness and its enthusiasm and use of this approach has grown over the years as the cost of training technology has declined.

The extent to which informal, "just-in-time-learning" can substitute for more formal curricula is not completely understood. Whether or not the training is delivered over new technology, firms may still need to provide employees with time and resources needed to ensure that they can keep pace with major changes in their work environment. This is particularly true when the worker discovers a need to upgrade or refresh basic skills in mathematics, writing, or engineering.

Challenges:

The expense and time commitment of work-related training places great strains on many families. Less than 20% of Americans feel barred by a lack of qualifications. The barriers are cost, time, and inconvenience. Cost was the greatest barrier cited by younger Americans but a lack of time was listed by about 60% of people aged 30-50. Driving across town after work can be a major barrier to a parent, particularly a single parent.

About 75% of the firms providing support for training said that they did so because their employees needed specific skills to

do their jobs. About half also cited the need to keep up "with changes in technology or production methods and to retain valuable employees". While informal training can closely track the immediate requirements of the firm, the benefits of an investment made in basic skills have benefits for the employees, and society as a whole, that may not be completely captured by the

The worldwide information technology (IT) training and education market will increase at a compound annual growth rate (CAGR) of 12.7 percent, from \$14.9 billion in 1995 to \$27 billion in 2000 according to a new report from International Data Corporation (IDC). This research reveals the U.S. market continues to show strong growth - nearly every training supplier surveyed reported positive growth, and some companies even reported more than 200 percent growth.

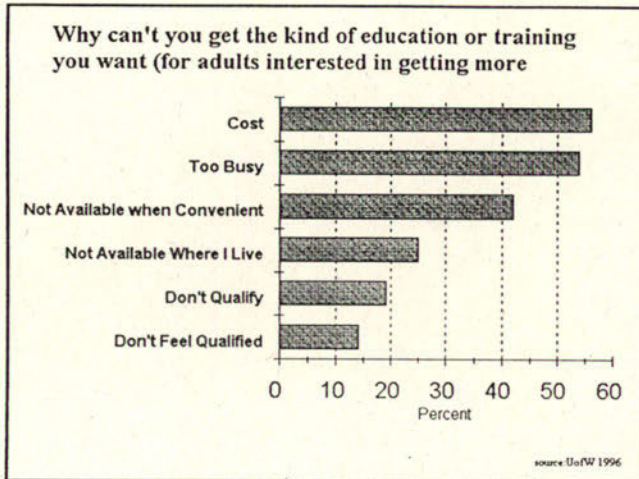
"The shift in spending on training provided by internal staff to training provided by external suppliers is one of the market drivers of growth for the U.S. IT training and education market," said Ellen Julian, IDC's senior analyst for IT Training and Education Services research. Other factors include the increasing investment in business-application training and the growing focus on continuous learning, professional development, and employee skill certification.

This research indicates that although the market is growing at a solid pace, training suppliers face a number of inhibitors to growing their businesses successfully. These inhibitors include maintaining instructor qualifications and quality, keeping equipment current, staying price competitive, and keeping ahead of technology.

"Face-to-face, instructor-led training still reigns as the most sought-after form of course delivery," said Julian. "But with the presence of distance learning programs, custom-made courseware, and multimedia tools in corporate education, the future form of learning delivery remains a big question."

International Data Corporation, Framingham,
Massachusetts 1995 Survey data

company making the investment. Only 10% of the firms interviewed admit to such concerns, however.

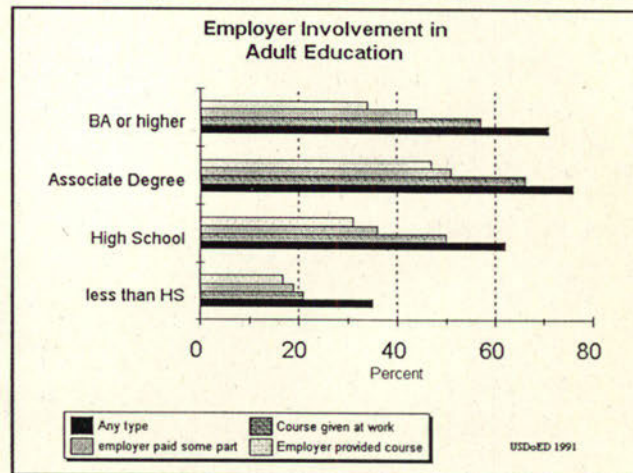


Larger firms are more likely than smaller ones to accept the cost of training. About 70 percent of establishments with fewer than 50 employees provided formal training in 1993, while nearly all larger firms provided training.

The vast majority of all training was focused on specific job skills. Over a quarter of the training was in sales and customer relations, management skills, and computer skills. About a third of all firms provide orientation training and training in safety and related topics. Only 3 percent of all

establishments offered courses in basic reading, writing, arithmetic and English language skills. About 20% of large establishments offered such training.

Training investments are strongly correlated with other benefits such as employee assistance programs, pension plans, employee wellness programs and profit sharing. Unionized firms and firms with employing modern management practices also tend to provide more training opportunities. The Bureau of Labor Statistics finds that "Establishments that employ a number of workpractices such as just-in-time inventories, worker teams, total quality management, quality circles, peer review of employee performance, pay for knowledge, employee involvement in technology and purchase decisions, and job rotation are more likely to provide formal training than are similar establishments that do not employ as many of these practices."²



The Role of Technology

Computers and advanced communication systems provide a unique opportunity to escape some of the most fundamental limitations of the nation's adult education system.

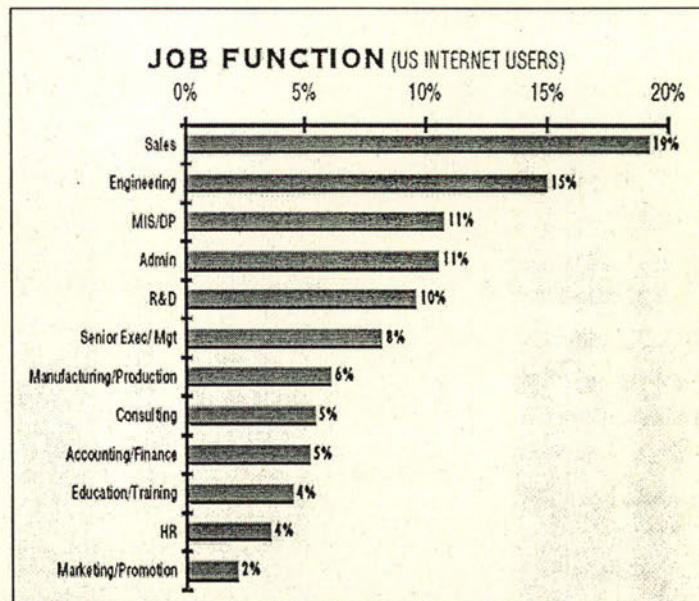
- information technology can adapt educational services to the complex market represented by adult learners. Adults come to the education system with many

² Michael Horrigan, *Employer Provided Training Frequently Asked Questions*, Bureau of Labor Statistics, August 17, 1995. <http://stats.bls.gov/eptfaq.htm>

different kinds of formal education and job experience. A computer-based training system can tailor the learning experience to the specific needs of each individual. It can, for example, be designed to provide remedial instruction in specific areas of mathematics or other subjects.

- information technology makes it possible to offer training in a wide variety of settings. Computers and communication systems are widely in job-sites and a growing number of families have home computers. This means that learning can take place in a time or place that can be combined with the busy work and home schedules of today's employees. About 45% of all Americans below the age of 50 have a computer at home and nearly 60% use a computer at work. About 23 million adults use a home computer everyday.³ This means that about half of the potential market for training consists of people who already have access to some form of advanced information technology and possess the basic skills needed to use it. The availability of computers at home and at work is strongly correlated to education but a third of all people with less than a high school education reported that they use a computer at work (as did 46% of people having only a high-school or GED degree).

- Coupled with local area networks operating in many businesses, the Internet makes it comparatively easy for individuals to receive a wide range of training on their office equipment and at home. A Nielson study published last October showed that 24 million people in US and Canada had used Internet during



the past 3 months (11% of the adult population), 18 million had used the world Wide Web, and a majority had used the net at work. Two-thirds of the respondents reported using the net at work, 44% at home, and 8% in school. Many firms are beginning to use Internet software to provide an easy, and inexpensive, method for internal communications ("intranets") making it even easier to merge proprietary training and training that may be available over the net. About 30% of all firms now use the world wide web, and 40% report that they plan to do so in 1996. Larger firms are much more likely to have access to the web.⁴ At present, Internet users are dominated by professionals, but the growth of the net in both businesses and homes

³ CACM July 1994, vol 37, no. 7 p. 9, "newstracks" a "Times Mirror" study of 4000 US households

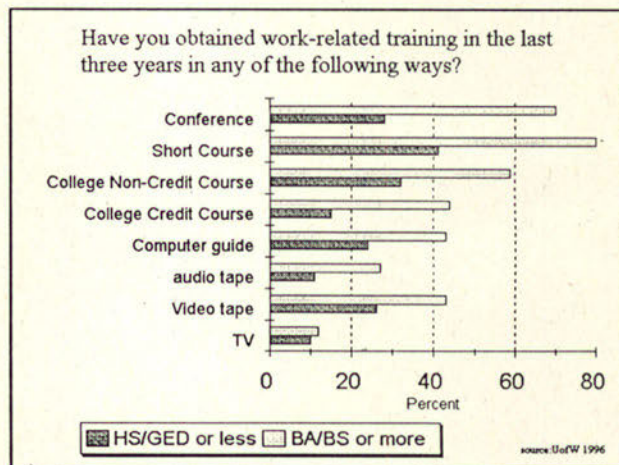
⁴ International Data Corporation's fifth annual Global IT Survey.

has been phenomenal. Net access is likely to be as commonplace as the telephone within the decade.

- information technology provides a learning environment that many adults find more attractive than formal school settings -- settings in which many did not do well originally. Computers are infinitely patient and anonymous; the student can approach an instructor for personal at his or her option. People who failed to get a high-school degree are more than twice as likely to prefer to be taught on a videotape as people with more formal education.
- the new technology ensures that the instruction will be up-to-date and makes it possible for a firm to combine a training program aimed at a specific task with generic program for filling in background skills as needed.
- the new technology can also greatly reduce the cost of instruction. It is clearly less expensive than sending employees to off-site training.
- technology is particularly attractive for helping workers with disabilities learn to function productively in the modern workplace.

The Department of Defense provides direct evidence that these benefits are real. DoD has made effective use of technology based training over the past decade and is rapidly expanding its investment. Their studies confirm that computer-based instruction leads to better performance proven in actual combat situations like the Persian Gulf War, that the troops like it, and that it reduces the variation in outcome. Studies conducted over the past decade indicate that computer-based training is 40% more effective than standard courses and multi-media instruction 70% more effective.⁵

Technology not only saved time and cost in training equipment operators and repair skills, it proved effective in teaching "soft skills" such as leadership and team performance. Much of the cost saving resulted from the fact that tasks could be learned in 30% less time. Savings were very large when simulations could substitute for operating expensive, and sometimes dangerous, equipment. Federal Express to Massachusetts Mutual Life Insurance Company, McDonnell aircraft and many large private firms are also making major investments in instructional technology.



⁵ Effectiveness is measured as the difference between test scores of two groups of students divided by the standard deviation in test scores. The standard deviation of test scores of the technology-trained group is almost always smaller than the standard deviation of the control group indicating that the technology both improved average outcomes and narrowed the gap between the best and worst performers. These conclusions are based on meta-studies conducted by Dexter Fletcher and others in the Institute for Defense Analysis.

The need to reduce costs and make training more convenient are driving innovation throughout the nation's training businesses. A surprising number of people have already made use of instructional programs that do not involve conventional blackboard and text instruction methods.

The market for computer-based training is growing rapidly, but traditional education and training statistics can't follow this growth. Major gaps and problems clearly exist. Bound by tradition, many universities and colleges have not been willing to adapt to this new demand. Even colleges with an investment in "distance learning" technologies based on closed TV systems have not grasped the radically new opportunities offered by the Internet. Major new quasi-academic institutions with names like "Mind Expansion University", "Magellan University", and Galaxy University, are emerging to fill the gap. Clearly many problems remain in defining quality, standards, and accreditation. Large gaps remain in the offerings.

Where Do We Go From Here?

There is no doubt that technology-based training is expanding and will eventually play a major role in incumbent training. The administration is nowhere visible in a process which appears to be widely endorsed by labor and business groups.

...despite the many proven benefits to company performance, most companies are not doing a good job training their employees. ...Successful companies should set a goal of spending from 3-5 percent of payroll on employee training and education [up from an average of 1.4 percent].⁶

Jerry J. Jasinowski, The Manufacturing Institute. April 1996.

While most of the recommendations of the White House Conference on Small Business focused on ways to remove regulations and unions, one of the 60 recommendations endorsed by the National Conference in 1995 provides a basis for establishing local partnerships with small businesses with an emphasis on on-the-job training.⁷ The National Association of Manufacturing has set a voluntary goal of doubling corporate spending on training and is

planning a project to link CEOs with good training programs with those who "recognize the need to do so." While both business and labor groups are calling for increased spending on training, virtually none of these groups have recognized that technology can achieve major gains in learning without increasing costs. The Council on Competitiveness has launched a study of technology in training but it is still in a very preliminary stage.

The federal government has some unique options for participating in a voluntary partnership in training. Unlike K-12 education where federal investment is small, DoD and civilian agencies represents a major part of the adult training market. Federal training needs can best be served if a vigorous, competitive market is operating to provide both basic skills and specialized training. DoD recently compared business requirements for training to its own

⁶ Jerry J. Jasinowski, White Paper: *Improving the Economic Condition of the American Worker*. The Manufacturing Institute. April 1996.

⁷ *Foundation for a New Century: Report of the White House Conference on Small Business Commission*, September 1995.

inventory of instructional material and found that it already has 2718 software programs that appear to match both civilian and military requirements. The most important legacy of this investment may be the know-how of the firms which have developed these products under DoD contract.

A successful administration effort in education technology for American workers should focus on stimulating a large, voluntary effort which will both have a real effect on the accessibility of learning for employed Americans and have major symbolic value. And it should get significant support from unions and large businesses and enthusiastic participation by small businesses.

Several kinds of challenges could be considered:

- a) finding a way to stimulate development of low-cost basic skills training in a form easily available for employees with access to computers or the net. Virtually all firms share an interest in developing a market for high-quality, low-cost products in this area.
- b) finding a way for firms to offer job-specific training that can link to the basic skill packages as required.
- c) finding a way for individual firms or groups of firms to establish standards for instructional materials. This might involve skills standards or standards defined by individual sectors or industries. De-facto standards could be established by industry acceptance of certification tests that could be administered through the technology.
- d) finding a way to ensure that the broadest possible range of workers can benefit from the programs. Workers in small businesses may enjoy the greatest benefits, but they and their businesses must understand the opportunities.

There's clearly an opportunity here for the administration to: (i) catalyze the development of a vibrant industry in technology-based training, (ii) provide a practical, inexpensive source of training for many Americans in the very near future, and (iii) meet clear business and union objectives in increased investment in training at a lower cost. Given the potential for broad-based political support and -- given the resources available to many of the private groups involved -- this should require little or no additional federal investment. What we lack, at present, is a process for bringing the groups together.

I'd suggest that the ETR be charged with holding a series of discussions with interested organizations in the near future and forge some specific options. The groups consulted would include:

- unions and professional societies
- large businesses and business organizations such as the Competitiveness Council
- small business associations
- community colleges and universities
- training firms and non-traditional training providers
- software publishers
- federal and possibly state agencies with large training requirement.

DATE: November 21, 1995
TO: Gene Sperling
FROM: Paul Dimond, Mike Schmidt
RE: Educational Technology: the TLC and the FY 96 Budget Negotiations

The Department of Education has put together the following one-and-a-half pager on our desired FY96 request for the Technology Learning Challenge (\$50 million) and an explanation of why this level is critical. Please take a look at this ASAP -- we wanted to make sure that this information is somehow integrated into the FY 96 budget negotiation process that is currently underway. Thanks.

Challenge Grants for Technology in Education FY 1996

Rationale for Presidential Support

1.) Challenge Grants deliver on the President's commitment to stimulate partnerships between business and education that will bring the Information Superhighway to our schools by the year 2000. These grants have brought about new corporate partnerships that the President can stand with. Challenge Grants make the rhetoric become reality.

2.) The 1995 round of competition generated grass roots support in every community and region of the country. The 530 applicants included close to 2,700 school districts. The final 19 grant awards included 153 school districts in 23 states with 120 business partners.

3.) The 1995 Challenge grants provided the basis for a major media event on October 10, 1995, with national coverage in Washington and extensive local coverage in the 19 Challenge Grant communities across the country. A second round of the competition in 1996 could provide national press in January, when the competition is announced, and in October, 1996 when as many as 40 new grants could be announced.

Recommendation:

In final 1996 budget negotiations, the President should request \$50 million for the Challenge Grants.

Time Frame and Scope of the 1996 Challenge Grant Competition

SCHEDULE: The new competition could be announced in January at or around the State of the Union address.

At least 2,000 pre-applications would be received in March 1996 (submitted by 2,000 school districts in as many communities across the country).

By the end of April, 200 of these applicants would be asked to submit full proposals by mid-June 1996. These applications would be reviewed during July and August of 1996, leading to negotiations in September 1996, and a major announcement in early October of 1996.

NUMBER OF AWARDS: Any budget scenario requires at least \$15 million of 1996 money to continue the current 19 grants.

1.) If the President secures \$50 million for K-12 Challenge Grants, \$35 million would be available for approximately 40 new grants. This would be twice the number of 1995, and together with the 1995 awards it would establish approximately 60 communities that would be prime sites for visits and media coverage in the fall of 1996. These 60 grants would include approximately 400 school districts in almost every state, along with several hundred business firms as partners. These awards would make it clear that the President and this Administration is

very serious about bringing new technologies into our schools.

FY 1995 New Awards

\$9.5 million was awarded to 19 Challenge Grant winners. These funds will support the first six months of each project (Oct. 1 to March 31).

FY 1996 Continuations

A minimum of \$15 million is needed to continue the FY '95 Challenge Grants for another nine months (April 1 to December 3, 1996). These projects will then move onto full 12 month funding with FY 1997 funds.

FY 1996 New Awards

An appropriation of \$25 million would allow \$10 million for a second round of Challenge Grants for 20 new grants to be awarded during the fall of 1996. Funds would support the first six months of these projects - as in 1995. An appropriation of \$50 million would allow \$35 million for approximately 40 new grants.

House Impact

The House mark of \$25 million for Challenge Grants would be sufficient to support both the continuation costs of \$15 million and the new award costs of \$10 million.

Senate Impact

The Senate mark of \$25 million sets aside \$10 million for Regional Technology Consortium grants. If this happens, we would be able to meet the Challenge Grant continuation costs of \$15 million, but we would be forced to terminate the second round of the Challenge Grant competition for FY 1996.

ED/TECH -- POSSIBLE EVENTS

02/15/96

E X E C U T I V E O F F I C E O F T H E P R E S I D E N T

15-Feb-1996 04:07pm

TO: (See Below)

FROM: Paul R. Dimond
National Economic Council

SUBJECT: Ed Tech - Possible Events

Team,

Please print this memo and put it before Laura (in her book) and Gene (in his reading material).

"puts the future on your fingertips" -- great sound bite for the TLC event today. Why didn't I think of that instead of learning levers three years ago? Probably, just as well: you all have made sure this become much more now than it ever could have been then Thanks!

Dimond

Distribution:

TO: Laura D. Tyson
TO: Gene B. Sperling

CC: Thomas A. Kalil
CC: Jason S. Goldberg
CC: Paul A. Deegan
CC: David J. Lane

February 15, 1996

MEMORANDUM FOR LAURA TYSON
 GENE SPERLING

FROM: PAUL DIMOND
 MIKE SCHMIDT

SUBJECT: **EDUCATION TECHNOLOGY INITIATIVE --
EVENTS AND ANNOUNCEMENTS**

CC: TOM KALIL
 JASON GOLDBERG

A. Events/Announcements That Have Already Taken Place

- **September 21: Announcement of NetDay 96 In California.** On September 21, the President and the Vice President met with a group of high-tech California CEOs who supported the four pillars for educational technology and pledged to connect 20% of California's K-12 schools to the information superhighway by the end of this school year. The bulk of the work will take place on "NetDay 96" on March 9 (described below).
- **October 8: Letter to America's Parents.** On October 8, a letter appeared in USA Today from the President and the Vice President to America's parents on potential of education technology to help all children make a successful crossing to the 21st Century.
- **October 10: Working breakfast with key CEOs.** On October 10, the President and the Vice President met with 14 key information-industry CEOs, Keith Geiger (NEA) and Al Shanker (AFT). At this meeting, they consulted with this group to gain their input on the importance of educational technology and obtained their strong commitment to work with the Administration on this initiative.
- **October 10: Announcement of the First Round Technology Learning Challenge Winners and the Creation of the U.S. Tech Corps and the American Technology Honor Society.** The President and Vice President announced the 19 winners of the Technology Learning Challenge grant competition (community-based consortia of schools, businesses, software developers, community organizations, and telecommunication companies who will create interactive curriculum/content for teachers and students) and the creation of the Technology Corps (a non-profit organization that places private sector volunteers with technological expertise in schools to assist in the integration of technology into the classroom) and the American Technology Honor Society (a school-based organization through which

students with technological expertise can help expand their school's use of technology, and which will recognize and reward students who use their technological expertise to serve their schools).

- **December 7: Outreach Session with Private Sector and Education Representatives.** On December 7, staff from the NEC, DPC, OMB, OSTP, OVP, and the Departments of Commerce and Education met with over 100 representatives from the private sector and the educational community to consult with them on the four goals and the overall educational technology initiative. These groups are excited about this initiative and are willing to offer their active support.
- **February 8: The President Signs the Telecommunications Act of 1996.** The President and Vice President have made connecting every classroom in America to the Information Superhighway by the year 2000 a national goal. To deliver on that goal, the President recently signed into law the Telecommunications Act of 1996 which ensures that schools, libraries, hospitals and clinics have access to advanced telecommunications services, and calls for them to be connected to the information superhighway by the year 2000. It will help connect every school child in every classroom in America to the information superhighway -- opening up worlds of knowledge and opportunities in rural and low-income areas.
- **National Information Infrastructure Advisory Council (NIIAC).** The 36-member NIIAC, co-chaired by Delano Lewis, President and CEO of National Public Radio, and Ed McCracken, CEO of Silicon Graphics and made up of distinguished private and public sector leaders, presented their conclusions to the President and Vice President on February 13, 1996. In their "Kickstart Initiative", they issued a call to action to community leaders at all levels to "connect schools, libraries, and community centers to the Superhighway" by the year 2000. Their report provides case studies of schools that are benefiting from the introduction of technology, and also provides a handbook for local community leaders. Although the work of the NIIAC is finished, its members are committed to reaching the goal of connecting all schools to the information superhighway by the year 2000, and are funding follow-on work by the non-profit Benton Foundation.
- **February 13, 1996: Union City Visit and Announcement of Technology Literacy Challenge.** In Union City NJ, the President and Vice President announced their proposal for a \$2 billion, 5-year Technology Literacy Challenge, which would challenge states and local communities to put together their own plan to meet the President's four pillars.

B. Future Events/Announcements Based on Four Pillars. [Please note that a decision also needs to be made on two sure-fire network news pictures/stories: POTUS/VPOTUS launching CyberEd, the TLC 18-wheeler; and POTUS demonstrating in the Oval Office how he is now on-line with his interactive computer connected to the information superhighway.]

1. Teacher Development: With leaders of the nation's teachers, education, and parents' associations, the President will be able to announce a series of actions aimed at ensuring that all teachers, new and existing, are given the opportunity to get the development they need to use technology in the classroom by the dawn of the next century. Possible actions include:

- A new voluntary initiative, "**21st Century Teachers**" sponsored by the NEA, AFT, PTA, ISTE, School Boards, Chief State School Officers and Secondary School Principals that would create a corps of teachers who use technology and support the President's Educational Technology Initiative, and empower them to train their colleagues. [This same announcement could also include a component for **future teachers**, including (1) chapters of 21st Century Teachers at colleges for students who may interested in using technology in schools; (2) implementation of a set of accreditation standards for the nation's colleges of education that will assure that prospective teachers learn to use technology and integrate it into the daily curriculum before they enter the classroom; and (3) implementation of licensing standards by State Boards for that assure that new teachers can integrate information technology into the daily curriculum before they are licensed to teach.]
- The President could also announce/highlight the AT&T "**Teachers and Technology Summit**" which will take place sometime in May or June in conjunction with the Department of Education. [Secretary Riley will be the keynoter, unless the President or Vice President wishes to made an address.]

Keith Geiger (NEA) and Doug Ross have proposed that we hold an event in Michigan to make these announcements. Whenever we are ready to make such an announcement, they will have the Michigan Education Association and other key stakeholder groups in Michigan ready to commit publicly that they will implement the 21st Century Teachers in local communities all across the State. They can arrange a rally with however many thousands of teachers, student and parents are wanted, in addition to a visit with teachers and students in classroom where information technology has transformed how teachers teach and students learn.

2. Connections: We also have several announcements/activities on the connections pillar:

- At the Empowerment Conference on February 22, the Vice President (or the President) will announce a plan to **connect all K-12 schools in the nation's Empowerment Zones**. This event will focus on equity, emphasizing how every student can go as far and as fast as his or her imagination (and improved learning) will take them on the information superhighway -- so long we make sure that there aren't information "have nots." This provides an excellent opportunity to follow-up on the announcement of the Technology Literacy Challenge.

- On March 9, 1996, the President and the Vice President will participate in **California's NetDay 96**. This initiative, which has already received a considerable amount of state and national media attention, will connect 20% of California's K-12 schools to the information superhighway and challenge America to connect all classrooms by the year 2000. [We also need to determine whether TechCorp, or others, are prepared to announce additional NetDays for other places. In view of the Universal Service provisions of the Telecom Bill, we should also investigate the extent to which major telecommunication companies may be pressing PUC's and the FCC to implement these provisions and to participate fully in the TLC.]

3. Content: On the content pillar, there are a number of activities and announcements that we can package together in a number of ways.

- Many of these announcements could be linked by a **White House Software Expo/Conference** later in the spring that does two things: (a) brings together software developers, internet suppliers, and new information computers and terminals from all across the country to endorse the President's Educational Technology Initiative (including the Innovation Challenge component of TLC) and considers ways to actively support it; (b) provides an eye-popping display of state-of-the-art technologies that are being used for learning.
- **PBS Supports the Educational Technology Initiative:** The nation's public broadcasting stations are ready to release a new charter in which they pledge to continue to provide essential educational resources for all citizens using 21st century technology. The message will be: "We will be the resource that all citizens, including students, parents, and teachers routinely seek out whether they are seated before a television or a computer screen, in a classroom, a library, a community center, at work or at home." PBS stations have a long tradition of serving community educational needs. Many are operated by state universities and colleges. Their products are widely used and trusted in the nation's schools. A statement has been adopted by most public stations [checking status of approval]. They are ready to release their statement at any time.
- **Education Software Olympics:** The White House could announce its sponsorship of a back-to-school olympics at the beginning of the 1996/97 school year designed to highlight the power, excitement, and fun of state-of-the-art software. It would consist of a series of events, each sponsored by a different university/business team. Each event would require a different set of skills (mathematics, science, music, history) and each would highlight a different approach to learning. The software and communication systems used in the contests would provide an early look at the kinds of software university/business teams are developing for nationwide application in schools. Kids in different grade levels would participate in the contests -- many working at their own schools with observers watching their progress

over the net. Universities and a number of key software developers would team with Colleges and Universities to develop the contest tools. Conversations with a number of companies and universities are underway.

- **Announce a New Policy Allowing Cost-Shared Partnerships Between the Federal Government and the Private Sector to Digitize and Distribute Federal Cultural Collections.** The Smithsonian, National Archives, and Park Service hold priceless collections in American cultural history, natural science, and other areas. Only about 1% of the collections are on view and these only to Washington visitors. Easy access to text images, recordings, videos, 3-D representations, and simulations would be an enormously resource that could be used directly by students or as raw materials for instructional packages. The cost of making these materials available over the net far exceeds the federal resources available. The new policy would launch a partnership with the private sector to provide funding for these purposes. The policy would consider such things as giving donors exclusive rights to the digital collections, and the logo of the institutions, for a fixed period [e.g. 1-2 years].

Other Announcements/Events

There are two additional announcements/events that involve more than one pillar:

- **Governors-Gerstner Education Reform:** On March 19, the President will speak at the Governors Education Goals And Technology Conference sponsored by Lou Gerstner of IBM. At this conference, the President can reiterate the four pillars, highlight outstanding state efforts in this area, ask for the support of Governors and business in getting the P.U.C.s to cooperate in implementing the Universal Service provisions of the Telecom Bill and, possibly, even announce new NetDay initiatives. We will also be working closing with Marcia Hale and business leaders to assess the extent to which Governors may be willing to respond affirmatively to the Technology Literacy Challenge proposal. The Department of Education's National Educational Technology Plan will also be ready to be released at this time.
- **DOD Schools:** The President has asked Secretary of Defense Perry to ensure that all DoD schools achieve the national education technology goals. High quality personnel are the foundation of our warfighting capability and DoD recognizes that such people will insist that their children be provided with the best possible education. DoD is prepared to tell the President how they plan to fulfill this commitment by ensuring that DoD schools are exemplary users of education technology. DoD is committed to working in partnership with the nation's public school systems and businesses to understand how best to meet the four pillars. DoD expects to make a major contribution by purchasing high-quality educational software. DoD can bring some unique expertise because of a long history of purchasing software for military training that demonstrably increases learning

performance while reducing costs. [This announcement could be included in the Software Expo; DoD has some of the most eye-popping interactive education programs available.]

THE WHITE HOUSE

WASHINGTON

September 13, 1995

MEMORANDUM FOR MEMBERS OF CONGRESS

FROM: DR. LAURA D'ANDREA TYSON
National Economic Adviser

DR. JACK GIBBONS
Science and Technology Adviser

SUBJECT: Investing in Science and Technology

For the past 50 years, Americans have demonstrated an unwavering, bipartisan commitment to U.S. leadership in science and technology. From basic research to product development, public and private investments in science and technology have generated new knowledge, spawned new industries, created new jobs, ensured sustained economic and national security, and increased living standards for the American people. Research and technology by both government and private industry has led to the invention of the computer, lasers, satellites, microwave ovens, and medical devices and drugs that have changed the way we work, live, and play. Indeed, since World War II, innovation has been responsible for at least a quarter -- and possibly as much as half -- of the Nation's economic growth.

According to the American Association for the Advancement of Science (AAAS), Congressional Majority action would slow federal R&D spending on civilian technology by a third over the next seven years. Moreover, as the AAAS also reports House Appropriations action to date would slash funding for key technology programs. When it was released last week, the AAAS interim report (*Interim Report on Appropriations R&D, FY 1996*) attracted substantial comment from Americans who fear that the de-funding of science & technology threatens our nation's future. That is why we have included for your information a collection of news articles that reported on the AAAS report:

- "Sacrificing the Future to Balance the Budget," *San Francisco Chronicle* editorial, September 1, 1995.
- "Budget Cuts Seen by Science Group as Very Harmful for U.S. Research," article by Malcolm W. Browne, *The New York Times*, August 29, 1995.
- "25 Nobelists Join to Save Institution," article by Malcolm W. Brown, *The New York Times*, September 12, 1995.

Reduction in technology investments could not come at worse time. Japan currently invests 35 percent more than the United States on a per capita basis in civilian technology; and Germany invests 30 percent more. Japan plans to double the country's R&D spending by 2000. Meanwhile, premier U.S. high tech firms continue to reduce long-term R&D investments, instead focusing on short-term product commercialization.

Some in the Congress believe that if the government cuts back on R&D, the private sector will fill the gap. But independent analysis shows that over the past 30 years a decrease in federally funding of R&D on average has been followed by a decrease in industry support of R&D. And, in a world of relentless foreign competition, American businesses cannot be expected to devote sufficient resources to long-term, high-risk R&D whose benefits are difficult for any one firm to capture. Instead, American business and the government must work together to leverage their resources and ensure adequate investment in the technologies that will fuel and sustain economic growth and job creation.

That is why President Clinton's balanced-budget maintains investments in science and technology, including industry-led technology programs that are working to ensure America's technological leadership. It is these investments coupled with a balanced-budget that will help to ensure future economic growth and prosperity for the American people. We hope that in the current debate over how to balance the budget, you will carefully consider the relationship of public and private investments in research and development to the nation's future.

Attachments

11TH STORY of Level 1 printed in FULL format.

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SEPTEMBER 1, 1995, FRIDAY, FINAL EDITION

SECTION: EDITORIAL; Pg. A22; EDITORIALS

LENGTH: 470 words

HEADLINE: Sacrificing the Future To Balance the Budget

BODY:

IN ITS ideological antipathy to government and its single-minded pursuit of a balanced budget within seven years, Congress is about to sacrifice many of the programs that have helped to make America the most productive nation on Earth. The clear and present danger in next month's final round of congressional budget deliberations is that the nation will be put on two contradictory trajectories: a fast-track route to a balanced federal budget and a slightly slower track to national bankruptcy in the technological, scientific and quality-of-life measures by which American wealth is best assessed.

Nowhere in the current scramble over the budget are those trends clearer than in the appropriations to date on federal research and development -- the building blocks of tomorrow's national strength. One stunning pair of statistics says it all: While appropriations for military R&D at the Department of Defense is scheduled to increase by 4.2 percent to \$ 36.8 billion (or \$ 1.6 billion more than the Pentagon requested), funds for nonmilitary R&D are slated for the steepest across-the-board cuts since World War II: a reduction of a full 33 percent by 2002, when the budget presumably will be balanced.

As Richard Nicholson, head of the American Association for the Advancement of Science, whose members include most of the nation's scientists, said in an interview with The Chronicle: "The reason for balancing the budget is so that we don't screw our children and our children's children. If, in the process of doing that, we reduce the level of scientific research, we may be making their future much worse than anything done by debt."

According to a detailed budget analysis by AAAS, the nearly 8 percent cut in overall nonmilitary R&D between this year and next masks devastating reductions -- from a third to virtual elimination -- for scores of worthy programs in such diverse areas as alternative energies, global warming, species preservation, building of new telescopes and development of new materials for electronics. The only major R&D category to escape unscathed is health sciences, which will receive a moderate increase.

Among significant programs going under the knife in fiscal 1996: NASA's global warming monitoring (down 22 percent), mass transit (down 36 percent), water quality (29 percent), hazardous waste disposal (24 percent), toxic substances (30 percent), nuclear nonproliferation (26 percent), new materials research (100 percent).

President Clinton's promise to veto at least eight of the 11 appropriations

...lls may result in a so-called budget train wreck on October 1. We think that's clearly preferable to letting Congress put the nation on a certain course to scientific and technological bankruptcy in the next decade.

LANGUAGE: ENGLISH

LOAD-DATE: September 1, 1995

Budget Cuts Seen By Science Group As Very Harmful For U.S. Research

By MALCOLM W. BROWNE

FEDERAL financing of nonmilitary scientific research in the United States will decline by one-third within seven years, the American Association for the Advancement of Science says in a report to be released today. It warns that "the long-term effects of dismantling a coherent scientific enterprise could be very harmful."

The study projects financing trends through the year 2002, based on the budget resolution passed by Congress on June 29 and on subsequent actions by the House and Senate in drafting appropriations bills for the fiscal year 1996. Deep projected reductions in the support of research and development, in some cases 100 percent, represent "the most significant across-the-board funding cuts to the research-and-development enterprise in the post-World War II era," the authors of the report wrote.

The A.A.A.S., a professional society with more than 140,000 individual members, is the largest scientific federation in the world and tracks the financing of American science every year. Dr. Albert H. Teich, who directs the association's division of science and policy programs, said in an interview that "what we're trying to do is call people's attention to the implications of present trends."

The current drive in Congress toward deficit reduction and a balanced budget by 2002 is strongly supported by new members of Congress whose election platforms called for sweeping cutbacks in Government spending.

The budget cuts will affect science unevenly. Money appropriated for the National Science Foundation may decline only a few percent in 1996, and the National Institutes of Health may actually get an increase of more than 6 percent. But some major programs of NASA, the United States Geological Survey and the National Institute of Standards and Technology face extinction, and the overall trend in Federal support of science alarms many scientists.

Scientific groups are worried that the era of generous treatment from Congress may be waning. "For many years," Dr. Teich said, "we had a protective umbrella of

members of Congress who understood science, were sympathetic toward it and were associated with it. But now we have an awful lot of new people in Congress who don't have any connection with science. It's up to the scientific community to try to reach them."

Many scientists and research administrators acknowledge that Federal belt-tightening has made cuts in research support inevitable. But they believe that Congress has been moving too hastily and without adequate consultation with experts.

An important factor in the trend, besides the need to cut Federal spending across the board, has been the conclusion of the cold war, which, Dr. Teich said, had "provided a geo-

When the cold war was under way, science had friends in Government.

political situation in which political-military power was strongly associated with a nation's scientific and technological prowess." With a decline in the perceived need to maintain that prowess, he said, science has lost political support.

Among the fields in which the association expects the sharpest reductions are research on environmental issues, fusion-energy development, atmospheric and geological problems, unmanned space programs and research assistance to industry. For 1996, research funds for Federal agencies, other than the Defense Department, have been reduced in Congressional appropriations bills by more than 5 percent. The National Institutes of Health was the only major Federal agency granted a budget increase, of 6.2 percent, but it was included in a bill that President Clinton might veto for other reasons.

Some Federal departments and the research they support may not survive the next few years. The Commerce Department has been made a target for elimination by many Congressmen, leading to uncertainty about the future of two of its major research agencies, the National Oceanic and Atmospheric Administration and the National Institute of Standards and Technology.

NOAA investigates changes in global climate, like the possible greenhouse warming of the planet caused by gaseous emissions of human industry and the so-called ozone hole, a thinning of the atmosphere's protective ozone layer believed to have been caused by the release of chlorofluorocarbon compounds. NOAA faces a probable reduction in 1996 of 14.1 percent in money for its operations, research and facilities, the science association says.

At the National Institute of Standards and Technology (formerly the National Bureau of Standards), Congress has already eliminated the Advanced Technology Program, a \$466.5 million undertaking to assist private industry in the development of technology.

In a recent speech, Dr. Arati Prabhakar, the institute's director, said

that "if the current Congress has its way, it will turn the clock back years and put technological innovation on the shelf."

Republican leaders in Congress, however, have argued that Federal subsidies for research conducted by private industry are unnecessary, and that industry should pay for its own research.

The biggest expected dollar reduction in 1996 Federal support for science is the \$716.5 million that the House has voted to pare from NASA's \$9.5 billion budget. A major share of that reduction would come from Mission to Planet Earth, a system for using satellites to track changes in the earth's ecosystems.

Another research casualty of the 1996 budget will be the Interior Department's Bureau of Mines, for which Congress has provided no money at all. The bureau, which this year is spending \$102 million, studies mine safety and supervises the helium-conservation program under which some of this irreplaceable gas separated from the natural gas with which it is mixed, is stored in underground caverns.

Faced with so-called rescission or cuts in money previously appropriated by Congress for the present year, as well as the further cuts expected for 1996, many Federal research groups have begun dismissing scientists and other employees.

For example, the United States Geological Survey, founded in 1879 as part of the Interior Department, has been forced to truncate one of its three main programs, its geology program, which was created to explore and map the nation's geological resources.

"We have reached the point," said Donovan B. Kelly, spokesman for the agency, "at which there is no longer enough money after fixed expenses are paid to support field research in geology. We therefore have to make deep cuts. Nationwide, about 500 employees of the program will be separated by mid-October, and another 200 will be downgraded or transferred to other jobs. It's really hard doing this, when you know the names and faces of the people leaving — people who were highly trained to do

Anticipating cuts, some Federal agencies are already dismissing workers.

special jobs on behalf of the nation and who are now being cast off."

Mr. Kelly said he hoped the geological survey's international earth-

Cuts In Nondefense Research and Development

Projected reductions in funds for selected nondefense programs from the fiscal year 1995 to the fiscal year 2002 based on the budget resolution passed by Congress on June 29, 1995. All figures are in millions of dollars.

AGENCY/PROGRAM	1995	2002	Percentage change
National Institutes of Health	\$10,840	\$8,467	-21.9 %
National Aeronautics and Space Administration	9,875	6,331	-35.9
Department of Energy	3,969	2,086	-47.4
National Science Foundation	2,544	2,084	-18.1
U.S. Department of Agriculture	1,540	995	-35.4
Commerce	1,284	642	-50.0
Interior	686	381	-44.4
Environmental Protection Agency	619	446	-27.9
TOTAL BUDGET CUTS			
	1995	\$34,164	
	2002*	\$22,939	
	Total Percentage Change		-32.9%

*In millions of 1995 dollars, adjusted for inflation.

Source: American Association for the Advancement of Science

quake network would be preserved. The network links seismographic instruments operated by about 120 countries with the survey's network, giving participating nations timely information about all earthquakes and greatly broadening the data base on which seismological research depends.

High-energy physics research suffered a devastating blow last year when Congress, charging mismanagement, cut off funds for the \$10 billion superconducting supercollider, a proton accelerator that would have made the United States the world's leader in the field until well into the next century. Leadership is now expected to pass to Europe after the turn of the century, as a consortium of nations completes the Large Hadron Collider near Geneva. Many American physicists hope to find work there.

Another branch of physics, which holds out the hope of developing hydrogen fusion as a cheap, nonpolluting, renewable source of energy, is expected to suffer a serious reduction of financing in 1996. House action calls for a reduction of 36.4 percent in

the budget for magnetic confinement fusion, whose main beneficiary is the experimental Tokamak reactor at the Princeton Plasma Physics Laboratory in New Jersey.

Dr. Ronald C. Davidson, director of the laboratory, said in an interview that if only \$229 million of the requested \$366 million budget for the laboratory was granted, as Congressional appropriations committees have done, it would be impossible to build a new-generation experimental reactor; the Tokamak Physics Experiment.

Another major fusion experiment, in which microscopic pellets filled with hydrogen isotopes are bombarded by intense lasers, is in progress at the Lawrence Livermore National Laboratory in California, which is operated by the University of California for the Department of Energy. But this, too, faces an uncertain future.

Many of Livermore's projects, including the development of nuclear weapons, are directed and paid for by the Defense Department, which provides the laboratory with a traditionally reliable financing pipeline.

Defense Department research is not included in the overall research cuts that Congress has been making, and the House Appropriations Committee has set a 4.2 percent increase in military research and development for 1996, bringing financing to \$36.7 billion.

Officials of the A.A.A.S. said the association's gloomy new report was not a prediction, merely a projection.

"Between now and 2002 a lot of things could happen," Dr. Teich said. "We could get another President and a different Congress, or we could have a war, or a recession. Lots of things could change. But what worries scientists is the Congressional resolution enacted in June, which is a broad statement of where Congress wants us to be in 2002. It's not a vision that bodes well for the health of American science."

25 Nobelists Join to Save Institute

By MALCOLM W. BROWNE

WITH the National Institute of Standards and Technology facing possible extinction at the hands of a budget-cutting Congress, 25 American winners of the Nobel Prize in Physics and the presidents of 18 scientific societies joined yesterday in an 11th-hour plea to save the institute.

Representatives of the group said they knew of no instance in which so many prominent American physicists had shown such unity.

The National Institute of Standards and Technology, or NIST, is a research subsidiary of the Department of Commerce, which would be dismantled under bills pending in both the House and Senate. Congress is expected to take final action on those bills in the next few weeks. Both versions would sell off the institute's laboratories to some private enterprise, if one could be found within 18 months; otherwise, its property would be sold for whatever price it might command.

President Clinton may veto any bill that completely closes the Department of Commerce, but under another bill, the 1996 appropriation for scientific and technical research at the institute would be reduced by about \$48 million from the Administration's request to \$263 million. A reduction this large would drastically hamstring research programs, supporters of the institute say.

The House Commerce appropriations bill would specifically eliminate the Advanced Technology Program, a major operation of the institute that was supported by the President but denounced by many House Republicans as "corporate welfare." Beyond that, the institute is implicitly threatened by the potential demise of the Department of Commerce.

The institute, which until 1989 was called the National Bureau of Standards, operates laboratories near Gaithersburg, Md., as well as time-keeping laboratories at Boulder, Colo. Since the agency was founded in 1901, it has not only refined the units of measurement on which scientific research is based, but has made many important discoveries.

At a Washington news conference sponsored yesterday by the American Physical Society, Dr. Norman F. Ramsey, winner of a Nobel Prize in Physics in 1989, presented an open letter signed by himself and 24 other American Nobel laureates in support

of the standards institute.

"As recipients of the Nobel Prize in Physics," they said, "we are writing to emphasize the essential role to the nation of the NIST laboratories and urge that Federal funding of these facilities be maintained in the process of downsizing or reorganizing the Department of Commerce."

The letter called the institute's contributions in measuring time, power and materials, as well as its measuring expertise in health and medicine, vital to the nation. "It is unthinkable that a modern nation could expect to remain competitive without these services," it said. The physicists urged Congress to "make every possible effort to preserve this national treasure."

The presidents and directors of American scientific societies representing more than one million experts in engineering and the mathe-

Budget cutters see fat where scientists see a national treasure.

matical, physical and medical sciences submitted an open letter of their own. Among the signers were Richard D'Eustachio, president of the American Dental Association; Dr. Richard Herman, chairman of the Joint Policy Board for Mathematics; Dr. Cathleen S. Morawetz, president of the American Mathematical Society; Dr. Kumar Patel, president of the American Physical Society, and Geri Marullo, executive director of the American Nurses Association.

"We recognize that your effort to balance the budget is forcing tough choices regarding the Department of Commerce," the letter said. "However, the laboratories operated by NIST and funded by the Department of Commerce are a vital scientific resource for the nation and should be preserved in the process of downsizing the Federal Government."

While the keeping of standards of measurement once involved the storage of platinum bars marked with scratches defining units of length, measurement today must be accurate even at subatomic distances, and improvements in accuracy are constantly sought.

The development of ultra-accurate atomic clocks at the institute of

standards, for example, was vital to redefining the length of the meter as the distance that light travels in a vacuum during one 299,792,458th of a second. Arcane though such measurements may seem, they are the bases of many practical applications, including the satellites supporting the new Global Positioning System (G.P.S.), by which anyone on earth with a receiver costing a few hundred dollars can navigate with uncanny accuracy.

To improve the accuracy of its atomic clocks still further required chilling components to within a few trillionths of a degree above absolute zero, and reaching such low temperatures in itself has produced significant discoveries. Last July, Dr. Eric A. Cornell of the institute, in a joint project with Dr. Carl E. Wieman of the University of Colorado, exploited ultra-low temperatures to create a new atomic state called a Bose-Einstein condensate. This condensate is likely to help answer some profound scientific questions, and the standards institute played a crucial role in discovering it.

The institute has pioneered techniques for making solid-state electronics, secure computer codes, fireproofing and new materials, and it maintains vast stores of special-purpose standards used by American scientists and technical specialists for comparison purposes.

"NIST is a resource the nation can't afford to lose," Dr. Ramsey said.

Dr. J. Robert Schrieffer, a winner of the Nobel Prize in Physics, said: "Some Congressmen have suggested that the Commerce Department and NIST could be broken up and parceled out among other agencies. But we have already seen how this kind of division has reduced basic research at AT&T Bell Laboratories and other industrial laboratories that have broken up their research arms."

Nobel laureates who joined in the plea, besides Dr. Ramsey and Dr. Schrieffer, were Philip W. Anderson, Hans A. Bethe, Nicolaas Bloembergen, James W. Cronin, Hans Dehmelt, Jerome I. Friedman, Val L. Fitch, Sheldon Lee Glashow, Ivar Giaever, Russell A. Hulse, Henry W. Kendall, Leon M. Lederman, Arno A. Penzias, Edward M. Purcell, Burton Richter, Arthur W. Schawlow, Clifford G. Shull, Joseph H. Taylor, Charles H. Townes, Steven Weinberg, Kenneth G. Wilson, Robert R. Wilson and C. N. Yang.

THE WHITE HOUSE
WASHINGTON

April 30, 1996

MEMORANDUM TO DENI FRAND

FROM: GENE SPERLING
TOM KALIL

SUBJECT: Options for Mr. Redstone's involvement in the President's Educational Technology Initiative

As you know, ensuring that all of our children have access to educational technology is one of the President's top priorities. He believes that educational technology, used correctly, can help improve student performance, reduce drop-out rates and absenteeism, and help prepare our children for the workplace of the 21st century. Although technology is not the answer to all of the problems associated with our educational system, we think it can make a real difference. Already, teachers are using this new technology to increase parental involvement, exchange lesson plans, keep up with the latest developments in their field, and tailor the curriculum the needs of individual students. Students are using the technology to access digital libraries, take "virtual field trips" Mayan ruins or the bottom of the ocean, collaborate with their peers from all over the world on science projects, and publish their school newspaper on the Internet.

Clearly, the President's Educational Technology Initiative will not be a success without creativity and resources from the private sector. The White House is delighted that Mr. Redstone is interested in playing a leadership role. We would welcome the opportunity to work with him in any way that he feels is appropriate.

At your request, we have developed a list of possible private-sector led initiatives that Mr. Redstone might want to consider. The cost projections are based on the best data we have available, but should be viewed as rough estimates.

As we developed this list, we tried to describe potential initiatives that would:

1. **Significantly advance America's progress towards meeting the President's challenge** in one or more of the 4 "pillars" (computers, networks, teacher training, educational software and applications.)

2. **Capture the public imagination because of its scope and vision.** Our sense from talking to you is that Mr. Redstone was interested in a major project that would rise above the run-of-the-mill corporate philanthropy in educational technology.
3. **Leverage resources** from the private sector and other stakeholders. This "leverage" could be done in a number of ways.
 - I Mr. Redstone could define a large project, underwrite 10-20 percent of it, and help raise the rest.
 - I He could help finance the deployment of educational technology in a particular city, and challenge other business leaders to launch similar initiatives in their communities.
 - I He could help underwrite the capital costs associated with an educational technology initiative if the state and local school district was willing to commit to paying the operational costs.
 - I Some projects by their very nature are highly leveraged. Some companies have gotten many students, teachers, and programmers involved in developing educational content by offering a small amount of prize money.
4. **Promote partnerships** between the business community, teachers, parents, and the community. One of the exciting things about NetDay, for example, was that 20,000 people volunteered to help install wire in California schools. Some parents were so appalled by the condition of their children's schools that we painted the walls, replaced the broken windows, and fixed the lighting. Many of the "human" connections that were made are lasting well beyond March 9th.

Attached are descriptions of some potential projects. Some of the projects (e.g. addressing all 4 pillars in a major U.S. city) require hundreds of millions of dollars. We are not suggesting that Mr. Redstone underwrite a project of this magnitude by himself, but he could serve as the "champion" that helps galvanize other members of the business community.

Occasionally, relatively small amounts of money (e.g. \$100,000) can be incredibly helpful. This is because the Department of Education, because of budget cuts, lacks discretionary funds to pay for conferences and other activities.

Many of the companies that we are working with have established foundations to support educational technology. For a variety of legal reasons, it is often easier for us to work more closely with foundations.

Please let us know if you need any additional information. We look forward to working with you on this important project.

PROJECT:

MAKE 1-10 CITIES MODELS FOR THE NATION IN TECHNOLOGY LITERACY FOR EVERY STUDENT:

Mobilize the resources needed for 1-10 cities so that every student in that school district -- or middle school -- has a teacher who can teach using technology, is in a classroom with one computer per five students, with exciting learning tools and a school wired to the outside world.

Description/rationale:

- I Develop and fund a comprehensive strategy that addresses all four pillars in one or more major American city.
- I Currently the vision of an America with every child technologically literate and every school modernized could spur growth and opportunity on massive scale: but it is still just a "vision." If the American people could see even one major city actually living up to that ideal -- and see a responsive business community getting better prepared students entering the workforce -- it might inspire the entire country to accelerate the pace of making every child technologically literate.
- I Even if Mr. Redstone could lead a mobilization in only 1-5 cities, it would inspire similar efforts around the nation -- once people see what is possible -- and perhaps more national legislation.
- I This would help address the "equity" issue -- the concern that this technology will result in polarization between information "haves" and "have nots." By showing a single city where the all students are technologically literate -- it would show that equity is possible, and inspire efforts by many groups who had never realized the importance of educational technology to the advancement of poor and disadvantaged students.
- I Cost for initial deployment (assuming either the "partial classroom" or "full classroom" models developed by McKinsey) is \$610 - \$965 per student. The on-going operations and maintenance cost is \$155-275 per student per year. The deployment costs would probably be spread over some period of time (e.g. 5 years).
- I The "full classroom" includes 1 computer per 5 students, a local area network that connects all of the computers within the school, a high-speed connection (1.5 megabits/second) to the outside world, hardware equipment such as file servers, printers, and scanners, software and online service subscription services, and teacher training. The "partial classroom" model is similar to the "full classroom", except that only 50 percent of the schools would have computers.

Leverage

- I Organize the business community in a given city (e.g. Los Angeles) to raise the money or provide the equipment and technical assistance. An organization called Smart Valley led by John Young is playing this role in Silicon Valley.
- I Get a commitment from the state or local government to pay for recurring costs.
- I Challenge other business leaders to play a similar role in their community.

Costs for illustrative major U.S. cities

Students (x \$610-\$965)		
Atlanta	63K	\$38 - \$61 million
Boston	58K	
Cleveland	76K	
Los Angeles	660K	\$403 - \$637 million
New York	950K	
Philadelphia:	209K	\$127 - \$202 million

TEACHER TECHNOLOGY TRAINING: BACKGROUND

Significantly expand training opportunities for teachers so that they feel comfortable using this technology in the classroom. Goal is to move teachers as far as possible along the following "skill stages":

- **Entry:** No experience, struggling to cope
- **Adoption:** Successful use at a basic level
- **Adaption:** Discovery of potential in a variety of applications. Adaptation means that a teacher has received 45 hours plus of training, has at least 3 months of experience, is able to apply technology in a variety of situation, and can perform basic trouble shooting.
- **Appropriation:** Mastery over the technology.
- **Invention:** Develops new learning skills using technology.

PROJECT

I TRAIN ALL NEW TEACHERS ENTERING THE WORKFORCE

Sets a universal, bold national goal for the nation at low expense.

While this would only impact 4% of teachers, it would set a standard that 100% of all new teachers should be able to teach using technology.

Description/Rationale:

- I The national goal is to have every teacher able to effectively use technology in the classroom. Currently, most efforts are "demonstration projects" that only reach a handful of teachers. Training every teacher would be too expensive. Every new teacher could be a way to reach a universal standard at a reasonable price.
- I This is roughly 4 percent of the total number of 2.5 million teachers, or 100,000. Assuming a cost of \$1,000 – \$2,000 per teacher, this would cost \$100 – \$200 million. \$2,000 pays for 2 weeks of intensive training with additional follow-up during the course of the school year.

PROJECT:

TRAIN EVERY MIDDLE SCHOOL TEACHER:

Description/Rationale:

- I In a world of scarce resources, one could argue that the most important level for young people is middle school. At this point, they can still become technologically literate before they fall behind, but are beginning to get serious about school. Therefore, a possible goal is to train every middle school teacher -- or every 7th grade teacher -- which would have one-third the costs.
- I There are 737,000 teachers in the United States between in 7th, 8th and 9th grade, and roughly 244,000 7th grade teachers.
- I The cost for middle school on the model of \$2,000 per teacher would be \$1.5 billion or about \$500 million for all seventh graders.

PROJECT:

TRAIN EVERY PRINCIPAL.

Description/Rationale:

- I This is important because the move towards site-based management makes principals key decision-makers in whether a school adopts educational technology. There are 84,000 public schools, so the cost would be \$84 million - \$168 million. Training all of the principals in California and giving them laptops would cost \$36-\$48 million.

PROJECT:

NATIONWIDE "50 STATE" TEACHER TRAINING CENTERS:

Work together to get at least one university in every state to be the location for teacher training centers as part of a national mission to meet this pillar of the President's educational technology initiative.

Description/Rationale:

- I This provides a ready-made concept for partnership. An organization started by Mr. Redstone, could work with universities to ensure that every summer there was at least one location in each state where teacher training could take place.
- I This could be the vehicle for any of the teacher training goals. University-based National Teacher Training Centers in every state could ensure that every teacher could have access to training opportunities.

OTHER TEACHER IDEAS

- I Finance a "raffle" for all teachers that sign up to be "21st Century Teachers"; those teachers that are already technologically literate that agree to improve their skills and to train another 5 teachers during the course of the school year. Assuming 100,000 teachers signed up, and you wanted every teacher to have a 1 in 20 chance of getting a laptop, this would cost \$10 million.
- I Train 10 percent of all new teachers, and give them a lap-top. In exchange, ask that they commit to train another 5 teachers during the course of the school year. Cost is \$30-\$40 million.
- I Develop a high-quality video aimed at principals and mail to every principal in the country.

PROJECT:

HELP SPONSOR AN "INTERNET SCHOOLHOUSE" TO EXPAND INTERNET-ACCESSIBLE COURSEWARE AND EDUCATIONAL RESOURCES IN DIFFERENT SUBJECTS.

Description/Rationale:

- I Although there is a large and rapidly growing amount of educational material on the Internet, it is often poorly organized, of uneven quality, and offers spotty coverage of subject materials.
- I Recently, there have been some efforts made to build partnerships between professional societies, professors, software developers, and high-school teachers to expand the availability of high-quality, peer-reviewed instructional material on the Internet in particular subjects.
- I Some companies have sponsored efforts by museums to go on-line, or are making scientific instruments (supercomputers, radio telescopes) available for on-line use.
- I The National Science Foundation, for example, is funding the creation of a Virtual Department of Geography. Over the next three years, more than 30 geography professors from around the country will develop interactive course modules covering the entire discipline. Because the professors are willing to donate their time, the cost of this project is only \$300,000.
- I Experts believe that there is also a need to develop software "building blocks" that can be used for educational applications. These would include an intelligent period table of elements for chemistry, bilingual dictionaries for foreign language training, and 2-D and 3-D graphing tools for geometry and calculus. Widespread availability of these building blocks can dramatically reduce the time and cost required to develop educational applications.
- I The Administration would also like to see "virtual office hours" sponsored by leading professional societies. This would allow professionals to take turns answering student questions, and in the process, build up useful databases of frequently asked questions.
- I We believe that this is a very highly leveraged activity because (a) the distribution cost of making networked courseware to students is essentially zero; and (b) there is a tremendous opportunity to recruit volunteers such as professors.

Cost:

- I Very credible projects could be started for as little as \$1-2 million per subject area.

PROJECT:

FUND UNIVERSITY-BASED "CENTERS OF EXCELLENCE" THAT WOULD CONDUCT R&D IN EDUCATIONAL TECHNOLOGY.

Description/Rationale:

- I We are still at the beginning stages of understanding how technology can be used to make life-long learning more productive. More research is need in areas such as:
 - Authoring tools [Reduce time and expertise required to develop multimedia applications];
 - Evaluation and assessment (what works);
 - Intelligent tutors for individualized instruction (program can tell what kind of mistakes a student is making);
 - Development of standards for reusable software "objects".
- I This is also a "high leverage" activity. For example, the NSF-funded National Center for Supercomputing Applications developed Mosaic, the first graphical browser for the World Wide Web. Graduates from this program left to start Netscape, which now has a market capitalization of over \$4 billion!

Cost

- I A high-impact program could be started with 5 centers, at a cost of \$500,000 to \$2 million per year over 5 years (\$2.5 to \$10 million). This could leverage efforts by the National Science Foundation to establish Centers for Collaborative Research on Learning Technologies.