

Ed Tech Trust Fund

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PRESERVATION

December 6, 1995

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SUBJECT: FEDERAL MATCHING GRANTS TO THE STATES FOR
EDUCATION TECHNOLOGY

We recommend that you convene the relevant Principals at an appropriate time to discuss whether the President and Vice-President should consider, as one of the options for new investments for the FY97 Budget, a federal matching fund to support State and local efforts to increase the use of technology in teaching and learning. As summarized below, we believe that such a federal matching fund would help realize the goal set by the President and the Vice President -- technological literacy for all children at the dawn of the 21st century. There is a legislative authority in place that could provide the basis for such a federal matching fund. At an appropriate time, the Principals will therefore need to determine (1) whether such a fund is a viable policy and political option and (b), if the answer is yes, the amount that should be on the table to compete with other priorities as final FY97 Budget decisions are made.

Background. For your information Tab A attached summarizes:

- the education technology vision and four component goals (connections, computers, teacher training and content) established by the President and Vice-President
- their important announcements, events and meetings to date
- the schedule of meetings with a wide range of stakeholders that will lead to their joining in a major announcement and event with the President and Vice-President in mid-January in advance of the State of the Union Address.
- the other federal and non-federal policy proposals and initiatives on which we are now working

Factors in Considering Federal Matching Fund

1. The Extent of Costs. As in every such national challenge, money is an issue -- even if we do everything that we can to craft this in initiative as a grass-roots and largely state-local, private-sector revolution. Given the rapid advances in technology and the potential benefits of increasing competition in a rapidly growing market, however, estimating the total costs for connections, computers, teacher training and interactive content is difficult; and many of the costs are falling (e.g., in connections, on-going telecommunication services, multi-media computing and networking). In addition, schools have been increasing their investment in all four of the key components at an annual rate of over 15% per year for the past several years. K-12 schools now spend 1.3% of their approximately \$300 billion annual budget on these four components; if these trends continue, schools are projected to increase these investments to over 3.5% of their annual budget by the year 2005. The federal government, primarily through Title I, has financed approximately 20-25% of the state-local expenditures on education technology to date; and local districts are likely to continue to use a substantial share of these federal funds to defray some portion of the costs of education technology for the foreseeable future.

2. The Role and Test for any Additional Federal Funding. If these trends continue, most schools in the country will likely achieve the four components sometime between 2005 and 2010. Any additional federal funding should be considered only to extent necessary to catalyze -- in combination with all of the other policy and action proposals and the leadership of the President and Vice-President -- a more rapid transition to realizing this vision by the school year 2000-2001 in all schools. Our recommendation, therefore, focusses on these incremental transition costs and is strictly limited by the extent additional federal funding can be structured to serve as a lever to promote this faster ramp-up. As a result, we do not include the on-going operating costs for any particular component. We have also excluded incremental costs for aspects of components that should be met, at least in the first instance, primarily by private investment. Any new federal funding should be focused where they can be expected to make the most difference.

3. The incremental Transition Costs for the Four Components. This analysis proceeds component by component in order to reach a total sum of the order of magnitude of costs. As noted in section 4 below, however, the existing authorizing statute is much more flexible and permits states and localities to use the federal matching funds on any of the four components as they deem appropriate.

- Computers -- \$8.5 billion for acquiring in grades 4-12 one modern, network-ready computer per 4 students in each classroom at an average cost of \$1,250 per unit and two rapid color printers for every classroom at a cost of \$500 per printer. (This assumes that older computers, with appropriate upgrading, will be passed down to students in grades K-12 or that much less costly interactive learning devices will be developed for use in the early grades. It is also possible that schools may choose in grades 4-12 a different configuration as hardware, connectivity, and networking alternatives develop -- e.g., a "dumber" networked, even portable "terminal" for each student. The total incremental costs for acquiring and installing such alternative configurations is likely to be of the same order of magnitude.)

- Teacher Training -- \$1.5 billion for the initial basic training of all teachers in the use of computers and educational technology. This estimate is based on a one-time cost of \$600 per teacher for the 90% of teachers who are not already technologically literate and fully capable of integrating education technology in the daily learning of their students; this estimate also assumes that the computer and software sellers will also provide an additional \$400 in technical training per teacher as a part of the price of acquiring hardware and software. (This does not include the on-going costs of professional development that school districts already bear. We assume that an increasing proportion of these costs will go toward integrating the use of new education technologies in the regular curriculum and daily learning of teachers and students. We also believe that new teacher technology networks -- both formal and informal -- will provide additional means for all teachers to develop new skills and strategies for integrating education technologies in the daily learning of students and teachers. Our estimate also excludes any on-going costs for technicians, technical coordinators and other support services that may be included in the regular operating budgets of schools as education technology becomes an integral part of each classroom. In other words, we would focus on building a foundation of technical competence, but leave to local districts the job of helping teachers integrate fully and creatively the content of education technology into the curriculum and the daily learning of students.)
- Education Software -- \$2.5 billion for initial acquisition and use. (This is a one-time "kick-start" to assure rapidly growing teacher and student demand for educational software. The education software market may include the purchase of interactive programs on CD ROMS, as well as the initial cost of access to interactive programs and discovery resources provide via networks and servers.)
- Connections -- \$0. In the first instance, we exclude the initial incremental cost for connecting all schools and classrooms to interactive networks. (We also exclude the on-going operating costs for use of such connections to interactive networks because these costs will have to be born in the normal school operating budgets as education technologies become an integral part of teaching and learning.) We exclude the initial incremental connection costs for five reasons:

First, the President and Vice-President have already called on the private sector to bear this cost.

Second, we have already succeeded in demonstrating the viability of this private sector approach to connections through announcing Net-Day in California, as have several other states (North Carolina, Iowa, Vermont, Delaware and West Virginia.) Major private sector companies are prepared to make additional announcements along these same lines. We also plan to orchestrate the announcement of Net-Days in several additional states over the coming months.

Third, the rapid acquisition of Internet-capable computers by schools coupled with ample "kick-start" funding for educational software will provide a sustained and growing demand by schools, teachers and students (and through them to a large proportion of homes) for the on-going services of the many

potential competitors with long-term economic incentive to finance the initial connections.

Fourth, the cost of initial connections is rapidly falling -- for example, fiber optics now cost a fraction of previous cost as demand has grown, and wireless connections provide an economical alternative to connect rural schools (or old schools where some forms of wiring may be made prohibitively expensive due to the age or asbestos problems of some school buildings).

Finally, the President and Vice President have led support for the Snowe-Rockefeller and Universal Service Trust Fund provisions in the Telecommunication Bill in order to provide authority for federal and state regulators to encourage telecommunication companies to connect on an interoperable basis all schools and classrooms.

At this stage, therefore, it is important to keep the pressure on the private sector and the regulators to find the means to finance the costs of initial connections to schools and classrooms. Make no mistake, however, the costs of the initial connections are substantial -- an estimated \$10 billion. In announcing the federal education technology matching grants to the States, we therefore believe that it is prudent to provide for a review at the end of the second year to determine whether our assumptions on this count are being born out or whether alternative regulatory or funding decisions are appropriate.

4. The Structure of the Federal Education Technology Matching Grants. We propose considering an appropriation of \$500 million per year for five years to fund the current authorization for "School Technology Resource Grants" in Title III of the 1994 Reauthorization of ESEA. This is the Title under which we negotiated the very successful Technology Learning Challenge Grants -- which have already spurred consortia of local districts to join with major private sector, university and museum partners to develop and to integrate innovative, interactive education programming and learning into the daily learning of their students. Sections 3131-3135 and 3137 provide the authorization for federal funding for each state to run its own "challenge" to catalyze the rapid ramp-up of education technology so that it is integrated in the curriculum, teaching and learning by teachers and students in all classrooms, and parents are encouraged to become involved in the interactive learning of their children.

- State Qualification and Match. To receive funds, a State must submit an application to the Secretary of Education that (1) includes a "systemic statewide plan that outlines long-term strategies for financing technology education in the State," (2) explains how the private sector, museums and libraries and higher education will be involved in the planning and implementation, and (3) "meets such other criteria as the Secretary may establish in order" to enable the State to provide assistance to local districts with a high number or percentage of "children in poverty and demonstrate the greatest need for technology." The Secretary, therefore, can make this Education Technology Grant Program a variable matching fund by, for example, requiring the States to match the federal funding \$3-to-\$1 for "needy" districts and \$6-to-\$1 for other districts. [Other federal funds could be used to meet this match. This will provide additional assurance that Title I schools are not left out of the education technology revolution. Most states

are already preparing education technology plans as a part of their Goals 2000 initiative, which may but are not required to be used by a State as a part of this application.]

- Local Applications and Formation of Consortia. In qualifying states, local districts are then required to submit an application explaining how they will, in essence, integrate all four components of the President's vision into the daily learning of their students in order to meet challenging content and performance standards. Local districts are encouraged, as in the Technology Learning Challenge, to form consortia with one another and with libraries, museums, higher education, and the private sector to integrate education technology in schools and classrooms so that all students learn to higher skill levels.
- Uses of Funds. Funds received by a local district from the state can then be used to implement all four components of the President's vision. This includes the cost of initial connections and linkages to networks. We do not believe that the Secretary of Education has the authority under this legislation to prohibit the use of funds for this purpose. Nevertheless, we can make the case that the size of our federal funding excludes these initial connection costs, explain the reasons why, and encourage the States to exclude, in the first instance, the costs of such initial connection in their own strategies for using this matching fund to finance education technology. In fact, we could encourage the States -- through working with their own PUCs, the telecommunication companies and other connection competitors, and their own versions of NET-DAY -- to assure a rapid ramp-up in initial connections at the lowest possible up-front cost to the State and to local school districts.
- Evaluation. The Secretary of Education is authorized to develop procedures for state and local evaluations. The Secretary is also required to submit to Congress a summary of the State evaluations in 1998. This is the time when an evaluation of the assumptions going in, the actual experience and results, and any new potentials of the rapidly changing technologies will enable the President and Vice President to make appropriate proposals for modifying the funding and implementation of this matching grant program. This will permit any necessary mid-course corrections to assure that their extraordinary vision will be realized in all schools and classrooms by the 2000-2001 school year.

Conclusion: We believe that the other policy and action initiatives summarized in Tab A attached will contribute much to realizing the education technology goals of the President and the Vice President by the turn of the century. Many may even be more innovative and exciting than this federal matching fund proposal. Moreover, we will be working hard to ensure the maximum level of private, voluntary, and state-local governmental action. We believe that proposing this education technology matching fund is, however, critical to the success of the overall initiative for five reasons:

- it is necessary to achieving the stated goal of ensuring that all children are technologically literate by the dawn of the 21st century.

- it assures credibility for all of the leadership -- and the other policy and action initiatives -- provided by the President and Vice President.
- it demonstrates that the President and Vice-President are serious, smart, and prudent in proposing additional funds and a matching structure that is designed for the sole purpose of catalyzing the more rapid achievement of goals to meet the clear national interest.
- it demonstrates that the President and Vice President can continue to provide the leadership in making key national investments to achieve national goals while balancing the budget.
- by relying on an existing authorization that was designed to implement a key priority of the President and Vice President and was approved by broad bi-partisan majorities in both Houses, it requires the current Republican Congress to choose among three options -- (1) to join the common ground already established by the President and Vice President and the previous Congress in funding the authorized matching fund, (2) to propose and negotiate a better alternative to achieve the same goals, or (3) to demonstrate partisan extremism by objecting to an initiative that is widely supported by the American people and the major private sector players who care about this issue.

TAB A: BACKGROUND INFORMATION

PURPOSE

This Tab will (a) describe the President and Vice President's Vision on Educational Technology previewed to the nation on September 21 at the San Francisco Exploratorium; (b) outline the schedule of important announcements, events, and meetings to date; (c) outline a proposed remaining schedule of meetings with a wide range of stakeholders that will lead to their joining in a major announcement and event with the President and Vice President sometime in January, and; (d) briefly describe a number of possible Private Sector commitments to this vision. We have also attached a brief description of a number of federal actions that are currently being considered to support this initiative.

THE PRESIDENT AND VICE PRESIDENT'S VISION ON EDUCATIONAL TECHNOLOGY

On September 21, the President and Vice President met with a group of information industry CEO's to discuss their goals for education technology and to outline some first steps for connecting California's schools to the information superhighway. At that event, the President stated:

" . . . Over the next several weeks, I will put forward a public-private plan that lays out how we can move our entire nation toward the goal of technological literacy for every young person. Here are its guiding principles:

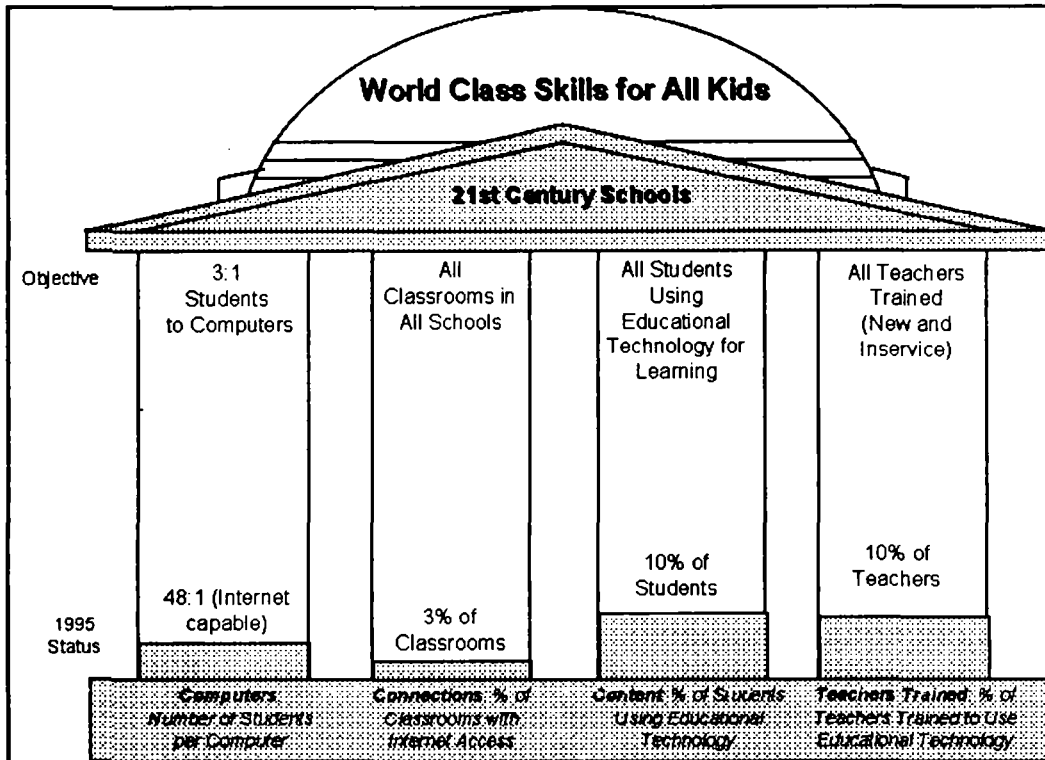
- Modern computers in every classroom and accessible to every student, from kindergarten through 12th grade;
- Networks that connect students to other students, schools to other schools, and both to the home and the world outside;
- Educational software that is worthy of our children and their best aspirations;
- Teachers with the training and the assistance they need to make the most of these new technologies.

Make no mistake: Count on us for leadership. But the goal we have set cannot be achieved by government fiat. It can only be met the way these companies are meeting it: by communities, businesses, governments, teachers, parents, and students joining together. . . a high-tech barn raising. . . . "

The President also challenged the private sector, teachers' organizations, universities, communities, state and local governments to work with him to help develop his vision for a nationwide campaign to meet his four guiding principles (listed above) for achieving technological literacy.

A PICTURE OF THE VISION

In the figure below, we have sketched out a picture of the vision for education technology. The four principles are represented by four columns (complete with specific goals for each principle), supporting the overall goal of creating 21st Century Schools and World Class Skills for All Kids.



IMPORTANT EVENTS TO DATE

- **September 21:** The President and Vice President met with a group of information industry CEO's to discuss their goals for education technology and to announce "NetDay 96," a private-sector initiative to wire over 2000 California K-12 schools on March 9, 1996.
- **October 10:** Working breakfast by the President and Vice President with key CEOs. This meeting allowed the President and Vice President: (1) To consult with the CEOs and gain their input on the President's vision on educational technology; (2) To obtain a commitment from these CEOs to work with the Administration on this initiative.
- **October 10:** 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 -- see Tab B for details), the creation of the American Technology Honor Society (an honor society for students who demonstrate expertise in using technology and who volunteer to help their schools integrate technology into the classroom) 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) with corporate supporters that have pledged support of its efforts. These three initiatives will build off the President's "electronic barn-raising" theme from September 21st -- they are the equivalent of raising 21st century electronic schoolhouses by learning communities around the country. The Technology Learning Challenge provides the content and the collaboration, and the Tech Corps and American Technology Honor Society the technical on-site expertise, to make the vision of 21st century electronic schoolhouses real in communities around the country.
- **October 11:** 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.
- **November 3:** Administration officials held a conference call with over 25 private sector representatives to discuss their efforts to support the President and Vice President's vision and to gain their input in how to roll-out the initiative in January.
- **November 7:** Administration officials hosted a meeting with 10 of the largest education associations to discuss their efforts to support the President and Vice President's vision and to gain their input in how to roll-out the initiative in January.
- **November 10:** Administration officials held a conference call with a number of major educational software publishers to discuss the issue of educational content and their efforts to support the President and Vice President's vision.

- **November 29:** Administration officials met with leaders of leading national Parents organizations to discuss the President and Vice President's vision and ways these organizations can support this vision.
- **December 6:** Administration officials held a meeting with 25 private sector and education "champions" who will take on a leading and visible role in the January rollout.
- **December 7:** Administration officials held a day-long outreach conference with over 100 representatives of private sector and education organizations who are interested in participating in the National Partnership effort and rollout.
- **December 11-22:** Administration officials will be speaking with representatives from some of the leading-edge state efforts in educational technology to discuss how a number of states can join with the President and Vice President as they roll out this initiative.

PROPOSED SCHEDULE FOR 1996

At this time, discussions are underway on the schedule of Educational Technology events for 1996. A possible timeline could include the following:

- **January 8-13:** The President and/or Vice President appear by teleconference to kick off Hawaii's "NetDay" which, like the California effort, will use volunteer efforts to help deploy and use technology in local schools. January 11, one possible date, is also the second anniversary of the Vice President's challenge to connect every school to the Information Superhighway.
- **January 24/25 (?):** State of the Union -- reiteration of the President's challenge.
- **January 30:** President and Vice President release their National Vision Statement, which challenges the nation to meet defined goals and deadlines, while explaining why the effort is fundamentally important to every community and every citizen. A number of private sector and education leaders stand behind the President and the Vice President to show support for the Vision Statement. The National Information Infrastructure Advisory Council will present the President and Vice President with their concrete suggestions for a set of private-led initiatives that will "kickstart" educational technology in communities around the country. This can be combined with other federal and private initiatives that are ready for announcement.
- **February 17 (?):** At the Empowerment Zone conference, the Vice President announces the voluntary, private effort that will connect every K-12 school in an empowerment zone.
- **March 9:** The President, Vice President, and senior Administration officials work with volunteers in schools in California on "NetDay 96" -- the fulfillment of the

President's pledge on September 21, 1995, to connect 20% of California's schools -- and engage in activities that demonstrate the full scope of the President's vision.

- **Mid-March:** The President gives the keynote address at the education conference of the Nation's Governors organized by IBM CEO Lou Gerstner.
- **May:** The President and Vice President appear at a White House "stakeholders" conference at which educators, teachers, parents, students, and businesses assess the progress made by the end of the 1995-96 school year and announce further efforts at meeting the President's goals.

PRIVATE SECTOR ACTIONS

The President and Vice President's overall goal is to develop a national public/private plan to achieve technological literacy for all of our young people by the year 2000. At the center of this plan will be a number of major private-sector commitments in each of the four principles. We are currently working with a number of companies to obtain these commitments. Possible examples could include:

- Several Telecommunication companies are considering connecting all schools and classrooms within whole regions of the country to the information superhighway.
- **IBM** and other computer companies are considering the formation of public-private consortia to incorporate education technology in all schools where they have a major corporate presence.
- **Microsoft** will provide an America On-Line type service for teachers and kids.
- **Time Warner** is about to commit to provide free communication services to schools in their service areas.
- **Training parents in the use and benefits of educational technology.** Apple is already conducting free "training" seminars for parents around the country to teach them how to use technologies and how important those technologies are for children. We will work with other companies to encourage them to do the same and perhaps even combine their efforts to make this happen.
- **Electronic Barnraisings.** We will continue to locate and encourage volunteer efforts to connect the schools in a number of states
- **AT&T** recently announced it will commit \$150 million for a 5 year program offering free dial-up Internet service, browser software and 100 hours of free usage to every school in the U.S. as well as free use of its forthcoming national voice-messaging service for three months.

The federal government will also play an important role in this effort. We are in the process of working with agency staff to put together a list of possible federal actions in each of the four guiding principles that could be announced as part of the roll-out of the public-private plan. Such actions will demonstrate the Administration's commitment to this issue goes beyond rhetoric to actual substantive action. We attach a summary of these possible actions for your review.

POSSIBLE FEDERAL ACTIONS/COMMITMENTS

Principle: "Networks that connect students to other students, schools to other schools, and both to the world outside"

- **Launch the Tech Corps:** On October 10, the President announced the creation of the national Tech Corps (with the full support of its founder, Gary Beach). **Tech Corps** will include company volunteers to assist teachers and students in using information technologies, computers and the Internet.
- **Direct agencies to actively participate in the Tech Corps** to the full extent that their mission and budgetary authorities allow (this will enable the government to participate in Tech Corps at the same level as the private sector). An Executive Order will be issued so directing federal agencies.
- **Coordinate the Announcement of specific regional plans to connect schools** (e.g. California "electronic barnraising").
- **Strong Presidential statement supporting the Snowe-Rockefeller amendment and expansion of Universal Service provisions** in the telecommunications bill. The Snowe-Rockefeller Amendment and the Universal Service Trust Fund provisions in the current Telecom Bill will lower the costs for schools and classrooms to connect to and to use the Information Superhighway. These provisions could cut the costs to schools and classrooms by a significant amount, compared to businesses.
- **Request that FCC set aside a specific piece of spectrum for educational use.** The Administration sent a strong letter to FCC requesting that a specific piece of spectrum be set aside (*the "NII Band"*) which can be used to (i) lower the cost of internal networking for schools with difficult installation problems and (ii) lower the cost of connecting rural schools.

Principle: "Modern computers in every classroom and accessible to every student, from kindergarten through 12th grade"

- **Streamline federal donations of computers** to schools to ensure that federal contributions can be made as easily as private contributions and will be made to intermediaries who can provide essential upgrades that may be needed. An Executive Order so directing federal agencies will be issued.

Principle: "Teachers with the training and the assistance they need to make the most of these new technologies"

- **American Teacher Technology Learning Corps (Teacher TLC):** This will be an honorary association jointly sponsored by the NEA, AFT, National School Boards Association and the International Society of Technology Educators, the relevant Associations of Community Colleges, Colleges and Universities and Tech Corps, with state and local affiliates. This organization will provide national leadership for state and local campaigns to engage the cadre of teachers in schools and colleges who are already expert in education technology to provide the leadership and service in local schools to train their teaching peers in education technology and assist in integrating new education technologies in the daily learning of all teachers and students. A critical mass (at least 10%) of teachers has the expertise and motivation to build this support for training all teachers in local communities and schools all across the country.
- **Endorse Public Broadcasting Spectrum and TeacherNet:** The President (in conjunction with PBS) proposes the use of PBS spectrum by local PBS stations to provide local interactive education programming, and TeacherNet. The President also directs the federal agencies to make their curriculum, educational and other pedagogical research and information available on TeacherNet. Our preliminary discussions with PBS indicate that they and their local stations would welcome the chance to work in cooperation with major private sector partners to create a TeacherNet, with home pages for providing teachers with access to educational curriculum materials and dialogues about student learning and educational technology
- **Tech Corps:** Tech Corps (listed above) also applies under this principle. Perhaps the most valuable, ongoing service that Tech Corps volunteers will provide to schools is advice and technical assistance to teachers on technology-related issues.

Principle: "Educational software that is worthy of our children and their best aspirations"

- **Announce Second Round of the Technology Learning Challenge II and expand to Pre-School:** (a) Expand the TLC to include pre-school. This will provide the second round with a major public relations and policy boost: early childhood includes both pre-schoolers as well as students in the early elementary grades; and interactive learning games, discovery exercises, and simulations enable parents, teachers, and children to play and to learn together. This also provides an easily understood way of showing how interactive educational technologies can be leveraged through use at home, as well in the school or day care center. (b) FY 97 Budget request of \$75 million, up from our request of \$50 million in FY96.
- **American Technology Honor Society:** At the invitation of the President, the Secondary School Principals, which has managed the National Honor Society since 1926, is prepared to manage a National Technology Honor Society to be inaugurated by the President. The new Technology Honor Society will help students bring educational technology into their

schools and recognize students who use their demonstrated technological literacy to serve their schools and student peers.

- **Public Broadcasting Spectrum -- World Wide Classroom and Interactive Learning:** The Public Broadcasting Spectrum action listed above would also contain a initiative to work in cooperation with major private sector partners to create a virtual Worldwide Classroom on the Internet (e.g., to connect students at a distance in research with one another and with experts in a variety of fields), and also an expansion of their charter to make clear that they will use their piece of the spectrum in local communities to provide engaging and interactive educational content to schools, day care centers and homes (e.g., Big Bird and Barney interactive learning games).
- **Bring the Smithsonian to Your School:** Establish a cost-shared program to bring the rich collections of the Smithsonian, the National Park Service, and the National Archives, for example, to the classroom through digital means. **Announce a new policy allowing cost-shared partnerships** with publishers to digitize and distribute federal cultural collections granting them exclusive rights to the digital collections, and the logo of the institutions, for a fixed period [e.g. 1-2 years]
- **Awards for Innovative Use of Technology for Education:** The Smithsonian and Computer World Magazine have hosted a small award program in this general area for the past seven years. It could be greatly expanded if elevated to the stature of the awards were raised (e.g., by being recognized by the President as an annual U.S. Open for Education Technology sponsored by Tech Corps, Teacher TLC, and the American Technology Honorary Society.)
- **Issue an executive order establishing the Interagency Learning Technology Office** designed to (a) focus the currently scattered and duplicative federal research and state-of-the-art demonstration programs for education technology in DoD, NASA, DoEd, NSF and other technology agencies -- working in cooperation with the private sector and educators -- on topics of value to public schools; (b) in cooperation with private developers, conduct an advanced demonstration in each of three areas -- pre-school, K-12, and school-to-work; and (c) work with the private sector and the States to get the results of existing and future research marketed to schools, students, and parents.
- **21st Century Schools -- Department of Defense:** Direct the Department of Defense to transform its Department of Defense Dependant Schools (DoDDS) -- 172 overseas for 82,000 dependent children and 65 State-side for 33,000 dependent children of our families in service -- into cost-effective **models for the Nation's 21st Century Schools.** Demonstrate how computer-based learning can be systematically designed, developed, and integrated in a large K-12 school system that spans the globe in order to significantly improve student achievement and performance across all academic areas and at each grade level. The goal is to have an hour of interactive courseware per day used at every grade level and to promote additional interactive discovery, research and expert tutoring on the education resources available on the internet. The military has already shown that it can dramatically improve the results of adult training of its full-time and national guard forces stationed all around the country and the globe through distance and interactive learning at

a lower cost; and providing a world-class education for dependent children in Defense Department schools is an integral part of Secretary Perry's commitment to a high quality of life and training for military families. As a result, the transformation of the Defense Department Schools is a central part of the DoD mission.

- **Establish federal funding for 50 matching, State Technological Literacy Trust Funds:** The diverse federal actions described in this document will help stimulate major private sector actions to assist in lowering the costs to schools, but there will still be significant start-up and on-going costs. As a result, financing state matching funds -- that encourage each state (and local districts) to reprioritize their own investments in educational technology in partnership with the private sector -- may be influential. This may be particularly important -- as provided in the TLC authorizing legislation -- to making sure that state-local-private consortia are formed within states so that potential "have-not" districts and schools are not left out of the education technology revolution.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET

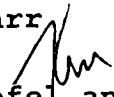
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☐	Take Necessary Action
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FROM: Ken Apfel  and Bob Litan 

DATE: November 14, 1995

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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
		(High)	(Low)		(High)	(Low)	(High) (Low)
Proposal Highlights:							
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)	(0.25 FTEs)	—	technology coordinators per school district (1.5 FTEs)	(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							
connection to school	—	1.9	0.4	—	0.6	0.7	— —
system design/layout	—	1.9	0.4	—	1.8	0.8	— —
connection within school	—	6.1	1.4	—	1.0	2.1	1.0 0.4
subtotal	0.0	9.9	2.3	—	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	16.8 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.