

Tech
cm Fred Adams

PHOTOCOPY
PRESERVATION

NATIONAL TECHNOLOGY HONOR SOCIETY: TIMELINE AND IMPACT

Impact

NASSP estimates that the number of students who will join the National Technology Honor Society is higher than the number who are currently members of the National Honor Society (NHS), due to the rising popularity and emphasis on technology. The NHS has one million high school student members in 12,000 high schools and 6,000 junior high schools. The Honor Society has chapters in 60% of the secondary schools in the U.S. Therefore, the NTHS is expected to have chapters in at least **60% of secondary schools** (over 12,000) and to have at least **one million students** participating. Pending approval by the NASSP board, we expect that the NTHS will be made available to all schools by the Fall of 1996.

National Technology Honor Society Description

Purpose. The purpose of the NTHS is to (1) provide an organization through which students can help bring computing and communications knowledge and technology into their schools and (2) recognize and reward students who use their technological expertise to serve their schools.

Function. Members will (1) assist teachers, school administrators, and adult volunteers with integration and use of technology in schools; (2) train teachers, school administrators, classmates, and parents in the use of technology in the schools; (3) participate in mentoring programs with middle/elementary schools; (4) serve as computer system administrators for a class or teacher; and (5) perform other functions which serve the goal of increasing/improving the use of technology in education.

National Sponsor. National Association of Secondary School Principals will manage and guide the NTHS, which will be modeled on the National Honor Society (founded in 1926). NASSP will perform the following functions for the NTHS: create and maintain an organizational structure to support the NTHS on a national level; determine and publish guidelines for local chapters; and publicize the NTHS organization in schools. NASSP will also set NTHS membership selection criteria and define a reward structure.

Criteria for Membership. 1. Scholarship: Academic performance in technology courses; initiative and creativity. 2. Service: Participation in support group activities (e.g., participation in service to the Tech Corps or assistance to teachers and parents). Students will be given credit for membership in other technical societies which are not necessarily associated with classroom activities but fulfill the scholarship or service criteria.

Potential Faculty Sponsors. Computer science, engineering, tech prep, science, physics, and math teachers; media center managers; other faculty with computing expertise and interest.

Parental Involvement. NTHS can work with the PTA to educate parents on the use computers and the Internet in the schools.

Endorsement. The President's Advisor for Science and Technology, John H. Gibbons, has written NASSP in support of the NTHS concept.



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

DATE : _____

TO: Mike Schmidt

ORGANIZATION: _____

PHONE : 456-5567 FAX : 456-7028

FROM : Linda Roberts

PHONE : 205-0167 FAX : _____

Total Pages (including cover): 3

MESSAGE :

Joie emailed this as well.

★ Version 2.

* See last P on foundation.

The Formation of TeacherNET --- A Web Site on the Internet For and By Teachers

Why is TeacherNET Necessary?

While the Internet has an abundance of information, finding exactly the right resource is often difficult. To encourage teachers to use technology in general, and the Internet in particular, there should be help for them. With so few teachers currently using the Internet in their classrooms, and the potential for exponential growth of classroom networking, there will be a tremendous need for help for teachers as they begin to use the Information Superhighway. There could be a place on the Internet where teachers could go to get help in locating educational resources. TeacherNET would be that place.

How might TeacherNET Work?

Teachers in need of curricular materials, primary sources, or other resources could ask in plain English. TeacherNET would respond. When teachers send in a request (E.g., "I'm a biology teacher in a rural area and I'd like some information on the circulatory system. By the way, are there other biology teachers I could talk to about methods of teaching circulation?") TeacherNET would send out an automatic response - a question form that narrows the query to such things as grade level, Internet accessibility level, and types of materials needed, for example. Based on the teacher's needs, TeacherNET would use current search engines to locate the needed resources from non-commercial sources.¹ Along with providing the resources, TeacherNET would send instructions on how to conduct such a search.²

TeacherNET could also provide evaluation and guidance. Whatever group or networks that form the networks would be provide the screening. At the teacher's request, the information and resources could be screened for relevance and value. With the proliferation of information on the Internet, it is almost as difficult to discern what is truly important from what is merely peripherally connected to a topic.

For searches about popular topics, lists can be retained (and upgraded periodically) for quick retrieval when the next teacher requests it.

In addition, in response to the teacher's request for colleagues, TeacherNET would locate listservs, newsgroups, or other discussion forums that address the teacher's needs. If none exists, TeacherNET could search for willing participants for a new list that TeacherNET would sponsor or organize.

¹ NASA currently runs a project called ILIAD, which allows teachers to ask a question via email. ILIAD runs the search and returns 25 email responses.

² AskERIC, funded by the Department of Education, responds to requests for research materials with a list of citations and instructions for future searches.

TeacherNET can help teachers get their students using the Internet as well by helping them locate curricular projects that address the topic the class is studying. If none exists, TeacherNET could search for willing participants for a new project that TeacherNET would sponsor or organize.

How will TeacherNET be created?

We believe that this effort can be created by a combination of private sector and professional teacher organizations, with some assistance from state and other existing networks. The private sector (e.g. Microsoft, Prodigy, America OnLine, Netscape, At&T) etc. know how to build the tools and resources that will enable teachers to navigate and collaborate on the Net. The growing number of state networks, such as TENET, and SENDIT, and the various groups that are already on line and building resources for teachers have to be part of TeacherNET. . Like the Internet itself, TeacherNET will be a network of networks. The challenge will be in building the interfaces and links to these resources, and creating a workable point of entry that will get teachers going. The Federal government will help convene the players and provide support through existing projects as appropriate. We see the teacher organizations such as the NEA, NSTA, etc. directly involved as well.

A number of foundations are already working on similar projects. One strategy would be to pull them in and combine efforts. Additionally, several other foundations have indicated strong interest in supporting teachers use of technology and the development of a network for teachers.



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September 21, 1995

TO: DIMOND, SCHMIDT, KALIL, SALLET

FROM: KELLY

Subject: Research and Development for Technology and Learning

The unique role the federal government can play in R&D for learning technology shouldn't get lost as we put together our plan during the next few weeks. Lou Finch, Ed Fitzsimmons, Sharon Robinson, Tom Carroll and a group of people from the technology agencies have given this issue a lot of thought. We at least owe them a hearing.

Having spent a lot of time looking at how the federal government spends \$72 billion in R&D, I'd be hard put to find research topics that (i) have a higher probability of payoff, or (ii) can more clearly be justified as a recipient of public research funding than the projects this group recommends. The amount we're spending in the area is absurdly small and what is available is not well spent. At a minimum, proposals for funding education technology should be vastly higher standard than the standard set for the \$72 billion we're already spending. Very few school or training institutions do any research -- the major exception is DoD which invests heavily in R&D for training.

The Finch/Robinson group argues *against* investing resources trying to develop hardware products where private spending is already high and *for* research which simply won't get done in the absence of public funding -- such as high-risk demonstration projects, and programs to help school systems develop assessment tools that can measure the effectiveness of new learning strategies and help competitive markets for new educational products operate effectively. The demonstrations they recommend would be based on partnerships between the research agencies, businesses, and the schools or business training sites agreeing to be participants (see attachment A).

They also argue against starting a new bureaucracy or attempting to start a large new technology program in an individual agency. Several agencies are already conducting research relevant to the identified mission. These agency programs can be tied together efficiently under the office Tom Carroll has already established. This office exists and it's got good staff in place. The office is apparently creating a bureaucratic turf problem within ED but that should be a minor problem. New money would be great to have, but much could be accomplished simply by forcing agencies such as NASA and DOE to spend their funds more wisely.

These issues are We're suffering because we're combining too many decisions. I'd disentangle them as follows:

Question #1: Should R&D programs be a part of a Presidential announcement?

Answer: It should be on the short list only if it makes an attractive part of the message. Since the point of the initiative is to help communities think about how learning can and should occur in the future, I'd argue that a federal commitment

in long-term, high-risk research is an appropriate part of the message. I understand the opposing viewpoint.

Question #2: Should we have an interagency R&D Plan and an interagency team to guide it?

Answer: If the research isn't part of the message, I'd argue strongly that we should simply go ahead and execute the program. It isn't reasonable to expect that industry will support the R&D needed to capture the potential of the technology -- particularly since so many of the benefits are hard to capture in markets. Advanced demonstrations conducted in specific markets -- such as pre-school -- would be exciting and visible. They would be warmly supported by businesses interested in an opportunity to stretch the state of the art.

The easiest way to execute the plan would be to put additional funds for research in the Department of Education and require that an interagency team manage it [as OMB specified in their budget guidance last year]. This would obviate the need to hire a technology management team in education and would ensure that research in other agencies was connection to the education goals. As you know both the ATP program in Commerce and the TRP program in ARPA were seriously considering making learning technology a priority but current political realities mean that it is extremely unlikely that we could get funding in these agencies.

Question #3: Where should the interagency team report?

Answer: The team needs to report to the White House if it is to have enough clout to get NASA, ARPA, DoE, and other agencies to take the management task seriously and focus their educational technology money on administration priorities (many agencies use education funds for what amounts to agency promotional activities). The ETR was a perfect reporting site when it existed. Should it report to the DPC?

Question #4: Should hardware research be a part of the mission?

Answer: No! It is almost always a mistake to have the federal government try to decide what a consumer product should look like. This is not a theoretical statement. Early in the administration, Lance Glasser, director of the Electronic Systems Technology Office in ARPA, thought that he would work with electronics manufacturers to develop a small, portable, hand-held computer/communication device. In repeated meetings, the manufacturers gave a resoundingly negative review of the proposal. The businesses said that they had an enormous incentive to develop such products on their own and that anything the government did to comment on their priorities would be distinctly unhelpful. Government procurement would be a dandy way to direct product development but nothing else.

Glasser is a clever fellow and worked with the manufacturers to create an Electronics Manufacturing Initiative in which businesses develop a clear set of priorities for federal research sponsorship -- focusing on long-term component research not products. This consortia plays a key role in guiding priorities in the nearly \$1 billion the feds spend on electronics manufacturing (mostly in ARPA and DoE). Kalil has tracked this.

School or pre-school technology is likely to be very similar to the kinds of portable devices, set-top boxes, and other gadgets that will be sold in vast numbers to businesses, DoD, and homes.

Question #5: What should we be doing in developing hardware

Federal intervention should focus on trying to establish inter-operability standards so that real competition can occur among hardware products and so that school systems don't get trapped in a specialized, dead-end market while business and home products move in some other direction. This is a serious need since a lot of firms working on receivers have an incentive to be first in the market with a product designed to be a proprietary bottleneck.

School procurement policies that specify ambitious performance and price characteristics could also be extremely valuable.

Attachment A:
R&D Priorities developed by the interagency group chaired by Lou Finch and Sharon Robinson

1. DEMONSTRATIONS OF INNOVATIVE TECHNOLOGY AND NETWORKING APPLICATIONS

1.1 *Education and training for disadvantaged youth and youth with disabilities*

Demonstrations of new approaches for young people with disabilities, academic or economic disadvantages, or limited English language proficiency to improve their access to education and training and the effectiveness of the education and training they receive.

1.2 *Promotion of effective school-to-work transitions* Demonstrations of new approaches that ease the transition of students from school to the workplace and that decrease the time it takes for them to fully participate as effective members of the work force.

1.3 *Models and road maps for technology use to ensure that learners and instructors are capable of using educational technology* Demonstrations of (a) new approaches that increase the efficiency and effectiveness with which technology is transferred to instructional institutions, (b) procedures that help prepare learners and instructors use instructional technology effectively, or (c) changes within institutions that help ensure effective use of instructional technology.

1.4 *Professional development of teachers and instructors* Demonstrations of programs of instruction that increase the ability of teachers and instructors to prepare and provide effective instruction.

1.5 *Manufacturing education and training* Demonstrations of new approaches that increase the efficiency and effectiveness with which students can be prepared to enter the manufacturing work force and the efficiency and effectiveness with which they can maintain their skills or acquire new skills to continue participating in the manufacturing sector.

1.6 *Linkages among all levels of education, the private sector, and local communities* Demonstrations of new approaches that integrate all public and private instructional resources available within local communities, increase their accessibility to all members of the community, focus them on providing local solutions to local problems, and increase the viability of the communities.

1.7 *Systemic education reform, institutional change, and overcoming barriers to the use of technologies for advanced modes of education and training* Demonstrations of new approaches that enhance the cost-effectiveness of instructional institutions, help integrate and encourage effective use of technology in their activities, and help them devise new organizational forms that enhance their productivity.

2. NEW MODELS FOR EVALUATING LEARNING AND LEARNING PRODUCTIVITY

2.1 *Learning productivity* Research, development, and assessment of models and measures that establish relationships between the effective accomplishment of instructional objectives and useful descriptions and measures of the productivity of schools and other instructional programs and institutions. This category relates the effectiveness of instruction to definitions of the productivity of schools and training institutions.

2.2 *Impact of learning productivity on institutional viability* Research, development, and assessment to determine how improvements in the effectiveness of education, such as school restructuring and the effectiveness of training, affect the viability, productivity, or well-being of the institutions (e.g., organizations, businesses, communities, countries) that provide them. This category includes school and organizational structuring and restructuring.

2.3 *New assessment tools* Research, development, and assessment to design, implement, and use technology-based capabilities, such as those found in computer-based instruction, interactive videodisk instruction, and instructional simulation, to assess learning progress, simultaneous learner assessment and instruction, instruction based on simulation, learner self-assessment tools, learning tailored to individual needs, and standards-based learning.

3. DEVELOPMENT OF HIGH-QUALITY, AFFORDABLE LEARNING TOOLS AND ENVIRONMENTS

3.1 *Materials development* Research, development, and assessment to determine how best to design and implement tools for producing or "authoring" technology-based instructional materials, reusing and modifying existing technology-based materials when they conform with national standards, developing "just-in-time, just-enough" instruction, developing instruction embedded in operational equipment, developing interactive multimedia instruction, and constructing simulated environments for instruction. This element also includes development of technical standards for the production of all technology-based materials.

3.2 *Personalized teaching and learning capabilities* Research, development, and assessment of technology-based capabilities that learners need to manage their instructional progress in school and lifelong learning settings. These capabilities range from technology-based learner's advisors through instructional management capabilities, to intelligent technology-based tutors.

3.3 *Collaborative problem solving* Research, development, and assessment to design and implement learning environments that focus on collaborative efforts among students or

workers and stimulate teamwork to solve problems posed in a learning environment. This category includes uses of technology to facilitate collaborative learning.

3.4 *Access to shared or distributed resources and expertise* Research, development, and assessment to guide learners to sources of information they need and to make these sources of information accessible to all learners. These sources include digital libraries, human subject matter experts, and mentors.

3.5 *Integration of technology-based instruction* Research, development, and assessment to help ensure that teachers and instructors can successfully incorporate technology into their existing instruction, that technology-based learning tools meet both local and national standards, and that today's instructional institutions and workplaces realize the benefits of new instructional technology as quickly as possible.

4. RESEARCH ON LEARNING AND COGNITIVE PROCESSES

4.1 *New learning paradigms* Research and development to improve our understanding of how people learn and of the mechanisms and processes through which instruction can and does affect learning. This category includes basic research on cognition, learning, and memory and on how they are affected by instruction.

4.2 *Effecting change in teaching and training* Research and development on ways to effect change in our current institutions for teaching, training, and lifelong learning. This category includes efforts to determine (a) the roles that teachers, students, and lifelong learners should play to increase the effectiveness of learning and (b) ways to incorporate these roles in instructional institutions and workplaces.

4.3 *Curriculum structuring and restructuring* Research and development on the design of a standards-based curriculum and programs of instruction. This category of research and development includes efforts to design and structure a curriculum so that it takes advantage of technology-based capabilities for administrative management, information handling, and the tailoring of instruction to each individual's needs, interests, abilities, and learning style.

4.4 *Special needs* Research and development to identify the unique instructional challenges faced by learners in special populations, to assess their ability to respond to these challenges, and to exploit the capabilities offered by technology-based instruction. These populations include learners who must overcome disabilities, academic or economic disadvantages, limited English language proficiency, or other difficulties to take advantage of instructional opportunities and participate fully in the work force.

4.5 *Cognitive task analysis* Research and development to determine the cognitive processes that underlie the skill and knowledge requirements needed to accomplish real-world tasks. This activity includes research to better understand the evolving content

needs of growth-oriented knowledge industries and the cognitive tasks that individuals must possess to meet these needs.

FEDERAL ACTIONS TASK LIST

PROPOSED ACTION	PRODUCT NEEDED	PERSON RESPONSIBLE	DUE DATE
<u>Connections</u>			
Direct Federal agencies to turn over a portion of the spectrum for free use. This will create a free "pipeline" analogous to the free interactive "bulletin board" created by the Internet.	Memo in plain english describing this action, including catchy title Draft Executive Order/Directive Contact names and numbers of key agency officials who must sign off on this	Sallet, Kalil <i>Y is this in 1st - 6th Jan 1995 - Fund Agency</i>	Drafts by Monday, September 18
Announce that the President will not sign a Telecom bill that does not include a provision (as in Snowe-Rockerfeller amendment) which enables federal and state regulators to work with all common carriers to ensure that their information highways are plugged into schools and classrooms	Draft Presidential Statement ☒ Background memo on proposal, including political analysis of impact of statement on Telecom Bill	Kohlenberger, Kalil	Drafts by Monday, September 18
Announce that the FCC will enter into a series of contracts with cable companies to connect schools and classrooms to their information superhighways as a part of settling suits	Draft Presidential Statement ☒ Background memo on proposal Contact with outside officials ?	Kohlenberger, Kalil	Drafts by Monday, September 18

PROPOSED ACTION	PRODUCT NEEDED	PERSON RESPONSIBLE	DUE DATE
Direct Secretaries Cisneros, Brown, and Riley to work with the Private Sector and state and local partners to spur the formation of "electric villages" made up of schools, homes, businesses, and community centers in Empowerment Zones and Enterprise Communities and in other neighborhoods served by public and assisted housing projects	Draft Executive Order/Directive Background memo on proposal Contact HUD, Commerce, Ed to vet with them	Dimond (HUD), Sallet (Commerce) and Smith (DoEd) 	Drafts by Monday, September 18
<u>Computers</u>			
Direct DoD to enter into the most cost effective arrangements to procure the most affordable interactive, electronic tools for use by DoDs schools.	Draft Executive Order X Background memo, including assessment of the impact of such an announcement on the Defense Appropriations Bill	Dimond, Schmidt	Drafts by Monday, September 18
Direct DoD and other federal agencies to donate excess state-of-the-art computers and other technology to schools and to donate older equipment to foundations that will upgrade and make available to schools	Draft Executive Order  X Background memo, including numbers of computers currently donated, reasonable estimate of where we can be in a year. X GSA has initiatives on this?	Donenfeld	Drafts by Monday, September 18

PROPOSED ACTION	PRODUCT NEEDED	PERSON RESPONSIBLE	DUE DATE
<u>Training</u>			
Announce the Formation of Teachernet so that there will be a web site on the Internet where teachers will be able to exchange information on creating and using technology in their curriculum.	Draft Presidential announcement Background memo, including who will do an estimate of how much to know ITC	Sallet ideas -- Lytel?	Drafts by Monday, September 18
Direct that the Eisenhower Professional Development funds and planned Regional Technology Centers be focussed on enabling teachers to effectively use computers and other interactive learning tools and materials with their students.	Draft Presidential announcement Background memo, including specific actions that can be taken in these two programs to accomplish this goal.	Smith, Stevenson ?	Drafts by Monday, September 18
<u>Content</u>			
Announce the 19 winning consortia in the first round of the Technology Learning Challenge	Produce briefing materials for the September 21 event		
Announce the second round of the TLC grants competition, but with major foundation players	Contact potential foundation partners Timing -- Sept 21 or at later Roll-Out event?	Smith, Roberts	

PROPOSED ACTION	PRODUCT NEEDED	PERSON RESPONSIBLE	DUE DATE
With existing funds from HHS and DoEd, extend the TLC grants competition to the development of interactive educational content for use by pre-schoolers and early elementary children at home, in Head Start, and other day care centers and schools	Is this the same as the Head Start "big idea" listed in the Tasking Chart? Yes	Smith, Edleman	Draft, Wednesday, September 20
Direct DoD to develop new (or purchase off the shelf) interactive learning programs and games for DoDs schools; and direct DoD to enter into licensing agreements to make available to interested buyers in American homes and schools any educational programs and games developed for DoDs schools	Draft Presidential Directive Background memo, including political analysis of impact of this announcement on DoD Appropriations. Neel		Drafts by Monday, September 18
Establish and direct an Interagency Technology Learning Office to (a) make sure that existing educational programming from all federal agencies is made available to schools and (b) to use existing federal funds to develop demonstrations of 21st century interactive learning programs in partnership with the private sector.	X Draft Presidential Directive Background Memo on ITLO, including suggested persons to head the new office (Heyman?)	Fitzsimmons	Drafts by Monday, September 18

PROPOSED ACTION	PRODUCT NEEDED	PERSON RESPONSIBLE	DUE DATE
Direct the federal sources of technical and historical information (Smithsonian, Park Service, NOAA, NASA, Library of Congress) to join with other state, local, and private museums and archives to make this content available (a) on the World-Wide Web and (b) to partners who will use this content to build interactive curriculum for use by students in schools and homes	Draft Presidential Directive (Action plan on how this will be accomplished. <i>img here</i>	Kelly, Fitzsimmons	Drafts by Monday, September 18

Possible Federal Actions and Private Commitments by Barrier

Connections

Federal

- ① • Direct federal agencies to turn over a portion of the spectrum for free use. This will create a free "pipeline" analogous to the free interactive "bulletin board" created by the Internet. **This will require the approval of the federal agencies that do not use a portion of the spectrum that they now have reserved.** NII - band
- ② • Announce that the President will not sign a Telecom bill that does not include a provision (as in the Snow-Rockefeller amendment) which enables federal and state regulators to work with all common carriers to ensure that their information superhighway are plugged into schools and classrooms at affordable prices. [Alternative: determine whether the FCC can respond to a request from a common carrier to provide such service at a more affordable price to schools.] **This will require a careful political judgment on the immediate impact of such a statement on the legislative prospects for any reasonable Telecom bill.** school on-and off Ramps
- ③ • Announce that the FCC will enter into a series of contracts with cable companies to connect schools and classrooms to their information superhighways (and to the Internet) as a part of settling suits. Cable with a Conscience
- ④ • Direct Secretaries Cisneros, Brown, and Riley to work with the private sector and state and local partners to spur the formation of "electronic villages" made up of schools, homes, businesses and community centers in Empowerment Zones and Enterprise Communities and in other neighborhoods served by public and assisted housing projects. Electronic Village

Private

- Announce "Electronic Barnraisings" in which firms commit their qualified employees to connect schools and classrooms to the information highway at no cost. (Tab E describes one example for California).
- Announce the formation of Tech Corps, a volunteer association of firms, associations, and federal employees who will work to connect classrooms (and provide on-going assistance to teachers and students in using electronic education tools to interact on the information superhighways).
- Announce the commitments from major telecommunication, broadcast, and cable companies to provide schools and classrooms with low-cost connectivity and interoperable connections to the Internet at affordable prices.

Computers (and other electronic education tools)

Federal

- ⑤ • Direct HHS (with technical advice from DoEd and PBS) to put out for bid immediately the development of effective and affordable portable electronic learning kits and interactive set-top boxes that will enable pre-schoolers and children in early elementary grades to play interactive learning games; provide in the FY 98-2000 Budgets sufficient funds to pay for one interactive learning kit for each new Head Start participant. Interactive Sesame Street

- ⑥ Direct DoD to enter into the most cost effective arrangements to procure the most affordable interactive, electronic education tools for use by DoD's schools for students in early elementary grades, middle school, and high school. **This may require a careful assessment of the impact of such an announcement on the Defense Appropriations bill.**
- ⑦ Direct DoD and other federal agencies to donate excess state-of-the-art computers to schools and to donate older computers to foundations that will upgrade and make available to schools.

The National Educational Technology Testbed

Recycle Computers

Private

- Challenge the private sector to make affordable and fully interactive, multi-media computers, other interactive set-top boxes, and portable electronic learning game kits for use by pre-school children, by students in the early elementary grades, middle schools and high schools, and by teachers, parents and mentors.

Competence (of teachers in using electronic learning tools and resources)

Federal

- ⑧ Announce the formation of Teachernet so that there will be a web site on the Internet where teachers will be able to exchange information on creating and using technology curriculum, interactive student learning, and enabling students to meet or exceed world-class learning skills
- ⑨ Direct that Eisenhower Professional Development funds and planned Regional Technology Centers be focussed on enabling teachers to effectively use computers, other electronic learning tools, and materials and interactive learning games and curriculum available on the information superhighways with their students.

Teacher Exchange, TeacherNet

Teachers as Technology Experts

Private

- Announce Tech Corps
- Announce that States (and colleges and universities) will require technological literacy in the training and certification of all new teachers and that the National Board for Professional Teaching Standards will require demonstration of how experienced teachers use education technology tools to enable their students to become technologically literate and to meet or exceed world-class skills through interactive learning by doing.

Content

Federal

- ⑩ Announce the 19 winning consortia in the first round of the Technology Learning Challenge grants competition. (Tab E includes a description of the very major extent to which leading firms have joined with local schools and universities to commit to developing and deploying meaningful and engaging interactive learning content that will help students actively learn by doing and to meet or exceed world-class skills. A very small amount of federal seed capital is spurring a very large commitment of energy, resources, and innovation from the non-federal partners).
- ⑪ Announce the Second Round of the TLC grants competition, but with major

Meeting the Challenge

~~Recycle~~ 11

MISSING

foundation partners.

- With existing funds from HHS and DoEd, extend the TLC grants competition to the development of electronic learning games and interactive educational programming -- a new generation of fully interactive Big Birds and Barney's -- for use by pre-schoolers and early elementary children at home, in Head Start and other day care centers, and in elementary schools. (This could include commitments (a) to put the interactive learning games in the hands of every Head Start child by the end of 1997 and (b) to make the interactive educational programming available for play on interactive TVs at home by the same date.)
- Direct DoD to develop new (or to purchase off-the shelf, as DoD determines is most cost effective) interactive learning programs and games for DoD schools; and direct DoD to enter into licensing agreements to make available to interested buyers in American homes and schools any education programs and games developed for DoD schools
- Establish and direct an Interagency Technology Learning Office (a) to make sure that existing educational programming from all federal agencies is made available to schools and (b) to use existing funds to develop demonstrations of 21st century electronic learning programs in partnership with the private sector.
- Direct the federal sources of technical and historical information (e.g., the Smithsonian, the Park Service, NOAA, NASA, and the Library of Congress) to join with other state, local and private museums and archives to make this content available (a) on the world-wide web and (b) to partners who will use this content to build interactive curriculum for use by students in schools and homes.

Raising the Stakes

Defense Spin-Offs
Ed tech transfer

Reinventing

National Virtual Museums
+ Libraries
+ Parks

Private

- Announce the commitment of major foundations (including Annenberg) to partner in funding the Technology Learning Challenge grant competition
- Announce the formation of a National Technology Honorary Society for students
- Tout the commitment of major entertainment, software, telecommunication and game companies to respond fully to the expanded TLC grant competition by developing interactive learning programs and games.
- Announce the commitment of states and various curriculum associations to adopt or to endorse electronic learning games and educational programs that meet the standards for world-class learning they choose to set.
- a commitment from major private assessment organizations, universities, and consortia of firms to develop performance-based, interactive assessments.

CAETI.

**BUILDING THE INFORMATION SKYWAY:
CONNECTING THE CLASSROOM**

Summary: A number of companies such as Apple have proposed setting aside some of the spectrum for unlicensed use. As opposed to "auctioning" the spectrum for specific uses and for specific providers, this "NII Band" would be freely available to anyone. This allocation would be uniquely suited to the needs of schools, libraries, and community networks. The Administration could support this initiative by filing comments before the FCC and identifying the portions of the spectrum that could be used for these purposes.

Background: The FCC is currently considering how and whether to respond to a proposal made by Apple and supported by other leading high tech companies such as Microsoft. The "NII Band" proposal would set aside 300 MHz of spectrum in the 5 GHz range. This proposal has a number of benefits:

1. Schools (or any other user, for that matter) would not have to pay connect charges.
2. The cost of "wiring the school" could be avoided. The spectrum can be used for both local-area networks and long-distance (up to 10 miles) links. This is particularly important for remote, rural schools and for schools with asbestos problems.
3. The market for new, low-cost wireless devices would be stimulated.
4. Communities can create flexible networks that connect community centers, school districts and universities without the need for licensing and coordination.

Timing: The Administration could make an announcement that it supports rapid FCC action on this in September, assuming that there are no inter-agency concerns. Companies could develop products that use this band of spectrum within 6-8 months of the establishment of FCC rules for the spectrum.

Cons:

1. There is some disagreement between computer companies and telecommunications companies as to the exact technical rules that should guide the use of this spectrum. Computer companies are interested in data -- telecommunications companies would like to see support for voice. The industry is currently working to develop a compromise.
2. Some companies may claim that this allocation would be unfair to those companies that have paid billions of dollars for licensed spectrum. However, this allocation will not support "roaming" or highly reliable, mission-critical services, so it will not be directly competitive with those services.

TIME WARNER "SOCIAL CONTRACT"

Goal

Time Warner Cable (TWC) which passes approximately ten percent of the nation, has agreed to the following as part of a Social Contract negotiated with the FCC:

- Service connections at one outlet in 100% of the public K-12 schools passed by TWC cable systems free of charge. (This is already provided to most schools.)
- Wiring for additional outlets in public schools without charge if TWC can coordinate with other comparable wiring installations (i.e. in the case of a rehab or new building) or at cost to TWC in all other cases.
- Unlimited service connections in each secondary private schools that receives funding under Title I of the Elementary and Secondary Education Act of 1965 at cost to TWC.

Assuming successful development by Time Warner Cable and Time Inc. of the on-line service for personal computers they are currently test-marketing, TWC will provide all public schools and Title I private schools whose local cable system provides this service:

- Free access to the TWC/Time Inc. on-line service for use during the school year and a free modem.
- Additional modems provided at cost and free service to each additional modem.
- A free monthly educational program guide with curriculum support ideas to assist educators in effectively using the new services.

The on-line system currently being test marketed includes access to the Internet as well as Time Inc.'s Pathfinder, news, weather and other information.

Actions

The FCC and Time Warner Cable have reached agreement on the proposed "Social Contract." The comment period on the proposed Contract ended on September 15th. A reply comment period closes on September 25th. After the Commission may act on a final order.

The Contract would resolve nearly 1,000 pending cable rate complaints involving TWC, provide \$4.7 million in refunds for subscribers, provide for \$4 billion in upgrades to TWC systems and provide schools with new teaching tools.

Barriers/Potential Downsides

Ratepayers will be charged an additional \$1 per year under the Social Contract over the next five years as a result of TWC's planned upgrades to service, in addition to increases due to inflation and certain increased cost.

TWC is just beginning to market an on-line service. Thus the scope of the service and whether it will be successful is unclear at this time. This is also true of the connections Time Warner will provide inside the schools.

Other industries may object that the Contract allows Time Warner to subsidize school connections on the backs of cable subscribers. More broadly, the Contract may open debate about the Cable Act and cable regulation.

Message

Reinventing government. The FCC is deregulating, lowering rates *and* networking schools by being proactive and goal-oriented.

**TIME WARNER
CABLE****FOR IMMEDIATE RELEASE**

**Contact: Michael Luftman
Time Warner Cable
(203) 328-0613**

**Peter Costiglio
Time Inc.
(212) 522-3927**

July 17, 1995

**TIME WARNER STARTS TEST OF HIGH SPEED ON-LINE COMPUTER SERVICE
Trial to Bring Wide Range of Services to PCS in 500 Homes in Elmira, N.Y.**

Time Warner Cable and Time Inc. have begun a market test of their new, high speed on-line service for personal computers at Time Warner's cable system in Elmira, N.Y. The two divisions of Time Warner Inc. announced in May they would jointly develop the service.

The new on-line service will deliver a wide range of information through the company's recently upgraded fiber optic and coaxial Elmira network. Customers will have access to Time Inc.'s Pathfinder™, one of the most popular sites on the Internet, new services developed by Time Inc. with a local partner, the Elmira Star Gazette, and popular existing on-line services such as America Online and CompuServe.

The market trial will include 500 homes, schools, libraries and government offices in Time Warner's Paragon Cable system, which serves nearly 27,000 customers in the Elmira area. The company will initially test a basic monthly charge of \$14.95, for which customers will receive a range of services including local, national and international news, shopping, sports, weather and e-mail, as well as information about local entertainment and activities, schools, government and libraries. For an additional \$9.95 per month, customers will receive high speed access to the Internet.

The basic monthly charge includes rental of a cable modem that, combined with the broadband capacity of Time Warner's fiber and coaxial network, allows information to be reproduced on computer screens 100 times faster than through standard telephone lines.

(more)

Page 2

Advances in modem technology are expected by the end of this year to allow speeds 1,000 times faster than telephone lines. Hewlett-Packard Company has been commissioned as the systems integrator for the project, including the design and development of the server complex as well as providing operations and support planning and training services. The HP Broadband Interactive Data Solution integrates the delivery and management of the on-line services, internet access and multimedia functions, as well as network and subscriber management.

The test deploys readily available cable modem technology from Zenith using its HomeWorks unit.

"Time Warner believes high-speed on-line services for personal computers can be an important part of a wide range of future offerings that will include local telephone service and interactive television," said Glenn Britt, president of Time Warner Cable Ventures. "Time Warner is the only company that combines large, well clustered, technologically advanced cable systems with vast creative resources in news and information."

"This makes us ideally positioned to succeed in creating a service that offers what home computer users want: high speed and compelling content," said Paul Sagan, senior vice president of Time Inc. New Media. "For the first time, people will be linked to their neighbors and the world at speeds that can reshape the way they become informed and entertained."

Of the 500 modems to be distributed for the trial, 100 will be provided at no charge to schools, government offices and libraries with the rest to be marketed to paying customers. The company has not set a specific duration for the test, but says it will continue at least until the end of 1995.

Time Warner Cable is the nation's second largest cable television operator, serving with affiliated companies 9.7 million customers in 37 states. After the closing later this year of the Cablevision Industries acquisition, the company will serve 11.5 million customers. It is a unit of Time Warner Entertainment, L.P.

Time Inc., America's largest magazine publisher and one of the largest book publishers, is a wholly-owned subsidiary of Time Warner Inc.

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Action: An Electronic HOMETOWN for a national collaboration on educational technology will be developed and maintained on the World Wide Web. This site would be maintained by a consortium of school and university groups. It would provide links to material which has been reviewed by the consortium as well as links to sites which provide access to a rich set of resources likely to be of uneven quality. The site would also establish discussion rooms for specific interest groups including sites for teacher discussions, in-service training, and other specialized meetingplaces. Other virtual discussion rooms would be operated by the Technology Learning Corps, the interagency research group chartered under the executive order, consortium of chapter 1 schools, links to Challenge Grants, National Technology Honor Society and many others

Goal: To provide a single, friendly opening to the rich, decentralized, flexible collaboration that will characterize the education and learning initiative.

Actions: The President will unveil a prototype of the site at one of the educational technology events in September or October.

Barriers: Somewhat difficult to keep a web site such as this one current. If it consists primarily of pointers to agency resources this problem is avoided. Responsibility for maintaining this site could be transferred to the Interagency Learning Technology Office.

Analogies: This web site would be similar to the U.S. Business Advisor (<http://www.business.gov>) which provides a single point of entry to government information relevant to the business community.

Current public and private sector activities: There are many federal resources available online already; this effort would link these together and leverage existing activities, rather than create an entirely new activity.

Web Site for Government Learning Technology Internet Resources

Description: A home page on the "Technology Learning Challenge Initiative" will be developed as part of the "Welcome to the White House" web site. WTTWH is a very popular site which is accessed by thousands of people each day. The TLC site will consist of:

- TLC White Paper, produced by the White House ETR task force
- NSTC Committee on Education and Training documents and information
- links to agency information on learning technology R&D and grant programs
- summary of executive actions under the TLC initiative
- links to web sites for Tech Corps, Challenge Grants, and National Technology Honor Society
- etc.

Goal: To provide a single point of entry to the wide variety of federal resources available online which are related to learning technology and to highlight activities under the Technology Learning Challenge Initiative.

Actions: The President will unveil the Web site at one of the educational technology events in September or October.

Barriers: Somewhat difficult to keep a web site such as this one current. If it consists primarily of pointers to agency resources this problem is avoided. Responsibility for maintaining this site could be transferred to the Interagency Learning Technology Office.

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Current public and private sector activities: There are many federal resources available online already; this effort would link these together and leverage existing activities, rather than create an entirely new activity.

TECHNOLOGY LEARNING CHALLENGE DEMONSTRATION OF TECHNOLOGY INSERTION IN DOD SCHOOLS

BACKGROUND

The Department of Defense Dependent School system has provided an educational environment for demonstrating the insertion of leading edge information technologies into the school setting. Working with Defense agencies and the OSTP, a collaborative learning environment for physics based curricula was demonstrated using advanced network technologies. Students geographically located in Germany, Korea, and the United States were brought together electronically into the same common environment. Students were provided connectivity and sophisticated computer based simulations that allowed them to work together in real time redesigning and flying simulated Wright brothers aircraft. The demonstration clearly exhibited the power of high end technology insertion into a school environment that is analogous to a public school setting. Additional technology insertion programs are currently underway in the DoD dependent schools under the auspices of the Advanced Research Projects Agency and the National Science Foundation. A principle goal of this program is the evaluation of the efficacy of the technologies and their effect on learning outcomes.

GOALS

Establish partnerships between the DoD, NSF, the educational community, and industry to provide the hand-off of demonstrated technologies for further development and use in the public school sector.

Demonstrate to industry and the educational community the potential market for educational technologies in the public school sector.

Disseminate to the nation's schools, other federal agencies, and industry, the outcomes, lessons learned, and effectiveness of technology insertion programs in a school system.

ACTIONS

Currently there is a short term program of limited scope to develop and deploy leading edge technologies in the DoD Dependent schools. Support is available only to a few selected DoD Dependent schools in Germany. No funds are available to fund additional schools for robust demonstrations in Korea, the United States or other DoD Dependent school locations. No long term program is supported to conduct longitudinal assessments of the impact of technology on learning outcomes.

Action: Establish funding for a long term program of technology infusion in current DoD testbed and additionally selected DoD Dependent schools.

The DoD Dependent school technology demonstration program is directed exclusively at the DoD Dependent schools system without direct consideration for like-type schools in the public sector or the market impact of technology programs in education.

Action: Provide funding to incentivize the creation of pilot programs involving the DoD demonstration program with other federal agencies, educational community, and the private sector.

BARRIERS

- * The DoD Dependent school system is an operating school system and cannot accommodate significant technology insertion programs at a few limited schools. Significant demonstration programs must include a larger number of available schools.

- * The overall market impact of educational technology is unknown and while the DoD Dependent school system is much the same as any public school system, access to the marketplace is not as pervasive.

- * Modification of the current demonstration program to "open it up" to other government agencies, educational interests, and the private sector would be difficult and would be better served in subsequent or follow-on demonstration programs.

- * The value of technology insertion in any program requires long term assessments with longitudinal studies over time required.

POTENTIAL DOWNSIDE

- * Funding of the DoD Dependent schools for an increased technology demonstration program may deflect funding from other critical defense programs.

- * Some may question the use of a federal school system rather than a broad-based, eclectic collection of public schools with wider diversity in population, background, skills, etc.

CATCHY PHRASES OR BENEFITS

Leveraging the on-going activities of the DoD Dependent school system technology demonstration program may be more cost effective than starting new programs with federal dollars for what are essentially state-run programs. Use of the DoD Dependent schools exhibits to the public that DoD is making a national contribution to the nation's educational readiness. Use of the DoD Dependent schools is politically neutral since the schools are not in any one state and primarily have a federal constituency. Lastly, the nation can be seen as paying a debt to its guardians of freedom by ensuring their dependents have the same opportunities for a quality education as any kid in America.

WHAT IS BEING DONE

- * The DoD demonstration program is being offered to the Interagency Learning Technology Office as a candidate for federal leadership and partnering for technology demonstrations under the Technology Learning Challenge.

- * Other elements of the Federal government are participating at a low level in certain aspects of the current demonstration program.

- * A plan is being developed to ensure the results of the current demonstration program are disseminated to agencies of the federal and state governments, our nation's schools, industry and the general public.

II. The Role for the Department of Defense in Accelerating Successful Educational Technology Insertion

1) Increase DoD Involvement in K-12 Education

- **The Department of Defense (DoD) has the critical challenge to remain trained and ready, while growing more capable. Each year DoD has the tremendous task of choosing 200,000 new recruits from among the larger number who are willing to serve and of deciding in which specialty each person should be trained. The objective basis for enlistment standards and for matching recruits to jobs should be reviewed for adequacy in relation to current status of K-12 education and reduced dollars for training in the military. Identification of technology and basic education skills that could be taught prior to enlistment would alleviate some resource requirements throughout DoD. A complete analysis of training programs is needed to match the specific technology and basic education skills required for all of the occupations in DoD. Involvement by DoD to encourage the development of appropriate curricula in K-12 or, through alternative training approaches, to develop identified skills is critical to meeting the need for cost reductions in DoD without a reduction in the future force's capabilities.**
- **DoD has a proven R&D success record. It should utilize this proven record to assist K-12, community colleges, vocational schools and universities in determining how best to apply sound CBT and related simulation technologies.**
- **DoD has demonstrated that the combined efforts of government, industry and academe can make remarkable breakthroughs in the development of sophisticated prototype systems. In this same vein, DoD can assist in bringing together key groups who can assist in implementing technology utilization in schools as well as in the training of teachers and administrators**
- **DoD has developed many training courses for a wide range of military courses. Industry has also developed training courses for its purposes. With additional funding, education could develop prototypes that could be of benefit to schools in much the same way. The present method of having the nation's school districts design their own programs with no strong guidance or prototypes from which they can adapt their particular course modules has produced many failures. Benefits could include the following:**
 - * **Curriculum could be enhanced by the integration of technology by using Artificial Intelligence and other technologies in course modules developed with the assistance of educational subject matter experts. Each year, teachers spend hours developing their**

courses to achieve the district and state objectives. Schools and their teachers could feed their curricular needs along with student profiles and other pertinent information into any of numerous databases and have curricula developed by a simpler and more economical method.

- * Develop a manual database in which teachers and other staff members can utilize the Internet, World Wide Web or an educational network to permit teachers, administrators and students to access, communicate and exchange workable educational information.
- * DoD has demonstrated the value of expanded use of simulation in research, acquisition, training and operation. Expand this present emphasis on the use of simulation and modeling to the school systems at the 9-12, community college and university levels. DoD should utilize the vast experience it has gained in using simulation technology by developing simulation-enhanced courses and helping to implement them in universities, community colleges and 9-12 schools. Simulation-enhanced courses could include mathematics, computer science, history, sciences, etc. DoD will benefit directly from those students who enter the Armed Forces.
- * DoD has conducted research and has developed an engineering operation in most of the states in the U.S. Utilizing the knowledge gained in setting up these operations, DoD should assist in establishing state-of-the-art training facilities for teachers, administrators and other pertinent educational staff member. These facilities can utilize surplus computers and other equipment to teach educators basic computer use, networking, Distributed Interactive Simulations, etc. These facilities will aid in the improvement in teacher training to facilitate the implementation of new technologies into classrooms to result in better trained applicants for the Armed Forces as well as for industry.
- Military laboratories such as Armstrong Lab in San Antonio, Texas invite teachers to the lab to be trained in utilizing technology. Other such laboratories and institutes should do the same. This program not only facilitates the transfer of information about military technology that can be used in the civilian classroom and trains teachers to use it but also produced good public relations in the civilian community.

-
- **Definition of technology skills needed for military and related industry operations can be used by DoD in the training of retired military personnel and those employees affected by downsizings due to base closure and industries. Resulting retraining should support a wide variety of educational service needs that could range from National Information Infrastructure systems operators to vocational education trainers.**
-

Author: David A. Lytel at ostp

Date: 8/23/95 5:34 PM

Priority: Normal

TO: Edward A. Fitzsimmons

TO: Henry C. Kelly

TO: Julie M. Swisshelm

CC: Lionel S. Johns

CC: David A. Lytel

Subject: improving distribution of excess federal property to schools

----- Message Contents -----

The Internet Access Contract for state and local govts is not going to get anywhere quickly. However, we may have some things we can say and do to accelerate the distribution of surplus Federal computer equipment.

There are two ways that used computers can get from govt agencies to educational institutions. The normal donation program is through State Agencies for Surplus Property. They have access to all property listed as surplus. GSA has created a closed online system called FED that lists all properties that have been designated surplus so states can match up their needs with what we have. Right now it is available to all Federal agencies. GSA is preparing to make it available to all state agencies for surplus property, who will be able to dial into it and query by types of commodity they are interested in, or location, or other parameters. May be about three months away from making it available to state agencies. In FY94 about \$79M went to state surplus agencies through the normal donation program. (But note that the value that is used is acquisition cost, which greatly inflates what this equipment is worth).

However, the EO makes it possible for agencies to make equipment available directly to educational institutions BEFORE it is designated as surplus. This makes the donation more direct but also creates a problem for GSA since the exchange is likely to be unreported. Under the EO federal agencies are supposed to report the amount of activity they have, but all we really have is anecdotal information. The best figure we have right now only covers DOD and only a portion of FY94, but under the EO \$51.7M went from DOD directly to 356 schools in 43 states. This was about 39K items, all of which were computer equipment of some kind. We are still waiting responses from NSF, NASA, DOE and USDA. The total figure is probably around \$100M.

Here are three concrete actions we can take to accelerate this activity:

1. Instruct agencies how they can comply with this EO: GSA is now getting ready to go out with a Federal Property Mgmt Bulletin reminding agencies of the reporting requirement under the EO and setting up a reporting mechanism. That should go out within the month.
2. Remind school districts where they should go to request equipment: The EO set up a coordinating committee that issued an interim report, which was distributed to school districts nationwide. It describes systems available to them to under the EO. It lists the state agencies for surplus property. These are now listed on GSA's Web site at: <http://www.fss.gsa.gov/property.html>.
3. Make it easier for school districts to peruse the list of equipment electronically and place their request electronically: Today there

Making Government Computing and Networking Expertise and Resources Available for Educational Use

Summary

Issue an Executive Order which directs agencies to (1) allow the use of release time or flextime by Federal employees for the purpose of volunteering in schools; (2) streamline the process by which excess or surplus government computing, networking and other technologies are transferred or donated to schools; and (3) make available 5% of agency computing and networking resources for educational use. In the message we could note the Bush Administration EO, which was a good first step (but limited the use of such resources for improving math and science education), and emphasize that we are going to go full speed ahead to publicize and implement the new EO provisions.

Background

In November of 1992, President Bush signed Executive Order 12821 directing agencies to assist in the mathematics and science education of the nation's students, teachers, parents, and the public. There are two key provisions in the EO. One allows excused absences for federal employees to assist with science and math education. The second states that highest preference be given to elementary and secondary schools in the transfer or donation of education-related federal equipment. While this EO goes a long way toward making government resources available to schools, it unnecessarily limits assistance to math and science education. This administration can broaden the order to apply to technology for education in any subject area.

Impact

This action would (1) greatly increase the potential size of the pool of talent for the Tech Corps by making all federal employees with computer and networking know-how available; (2) provide a significant infusion of technology into schools which otherwise may not be able to afford it by stimulating the supply of computers and other technology for recycling and refurbishing; and (3) allow schools to get access to federal network and computing resources which are not necessarily used to full capacity. While it certainly does not make sense to dump obsolete computers into schools, it does make sense not to waste resources which can be used (or can be made usable by some intermediary agent).

Specific Actions

Revise Executive Order 12821 (see attached). Amend Section 1 to read "Assistance in the Use of Technology for Education." Amend Section 1(a) to add "(iv) each office within each agency that has expertise in computing and networking technologies." Amend Section 1(a)(1) changing the phrase "mathematics and science education" to "use of technology for education" and "knowledge of mathematics and science" to "ability to use technology effectively for education." Amend Section 1(a)(2) changing "assist in the conduct of mathematics and

science education programs" to "volunteer in their local schools." Amend all occurrences of the phrase "Committee on Education and Human Resources of the Federal Coordinating Council for Science, Engineering, and Technology" to the "Committee on Education and Training of the National Science and Technology Council." Amend Section 2(b)(1) to read "Identify and transfer excess education-related equipment at that agency to elementary and secondary schools or community-based non-profit organizations that will refurbish and upgrade the equipment and make it available at cost to schools or other educational institutions in the community by". Amend Section 2(b)(4) changing "mathematics and science" to "educational technology." Amend Section 3(a) adding "including telecommunications equipment" after "related peripheral equipment" and change "mathematics and science" to "any appropriate subject area."

Additional Actions suggested by OVP

1. Instruct GSA to keep a record of the number and type of educational technologies which are transferred to schools under the Executive Order, with a report to the President after six months.
2. The President can announce the creation of the GSA Federal Disposal System (FEDS), a computer database listing of all available surplus federal property. The FEDS will allow state surplus agencies to quickly access information on available surplus equipment and request equipment online, thus speeding up the process of moving excess/surplus computers from the government into schools. Goals for the FEDS program include: paperless transfer of computer equipment; matching school wish-lists with available equipment; making FEDS available on the Internet and training State agencies to use the database. FEDS will provide a one-stop shop for schools to make requests and find out about the availability of equipment.
3. Consider targeting surplus/excess equipment to disadvantaged schools/communities through Title 1 funding or new orders.
4. The President could direct the DoD to give preference to schools when disposing of computers and telecommunications equipment from base closings. (Non-profits are reporting difficulty with red tape at DoD in getting surplus computing equipment from closed military bases.)
5. Challenge the private sector to create and support private non-profit enterprises which refurbish and upgrade computing equipment and provide them at cost to schools.

Executive Order 12821 of November 16, 1992

Improving Mathematics and Science Education in Support of the National Education Goals

By the authority vested in me as President by the Constitution and the laws of the United States of America, including the provisions of the Stevenson-Wydler Technology Innovation Act of 1980, as amended (15 U.S.C. 3701, *et seq.*), and the Federal Property and Administrative Services Act of 1949, ch. 288, 63 Stat. 377 (codified as amended in scattered sections of the United States Code), and in order to ensure that Federal departments, agencies, and laboratories assist in mathematics and science education to meet the National Education Goals, it is hereby ordered as follows:

Section 1. Assistance in Mathematics and Science Education. (a) Each executive department and agency (hereinafter referred to as "agency") that: (i) has a scientific mission; (ii) employs significant numbers of scientists, mathematicians, and engineers; or (iii) has a Federal laboratory; as determined by the Committee established by section 2(d) of this order, shall, to the maximum extent permitted by law:

(1) Assist in the mathematics and science education of our Nation's students, teachers, parents, and the public by establishing programs at their agency to provide for training elementary and secondary school teachers to improve their knowledge of mathematics and science. Such programs, to the maximum extent possible, shall involve partnerships with universities, State and local elementary and secondary school authorities, corporations, and community based organizations. These activities shall be coordinated with other relevant Federal teacher training programs (e.g., those administered by the National Science Foundation, the Department of Education, and the Department of Energy). Because of its extensive experience in teacher training programs at its Federal laboratories, the Department of Energy, when requested by other agencies, shall assist in the development of these activities.

(2) Provide brief periods of excused absence for Federal employees to assist in the conduct of mathematics and science education programs, in accordance with guidelines of the Office of Personnel Management.

(b) Develop, within 6 months of the issuance of this order, an implementation plan to fulfill the requirements of this section. The plan shall be consistent with approved agency budget totals. The plan shall be coordinated through the Committee on Education and Human Resources of the Federal Coordinating Council for Science, Engineering, and Technology.

Sec. 2. Transfer of Education-Related Federal Equipment to Elementary and Secondary Schools. (a) To the maximum extent permitted by law, all agencies shall give highest preference to elementary and secondary schools in the transfer or donation of education-related Federal equipment. All such transfers to the schools shall be made at the lowest cost permitted by law.

(b) Each agency, to the maximum extent permitted by law, shall:

(1) Identify and transfer excess education-related Federal equipment at that agency that can be transferred to elementary and secondary schools by:

(A) Direct transfer of excess Federal research equipment in accordance with the provisions of subsection 3710(i) of the Stevenson-Wydler Technology Innovation Act of 1980, as amended (15 U.S.C. 3710(i)). The transfer of such excess equipment shall be reported to the General Services Administration (GSA); or

(B) Reporting such excess equipment to the GSA for donation when declared surplus in accordance with the provisions of section 203(j) of the Federal Property and Administrative Services Act of 1949, as amended (40 U.S.C. 484(j));

(2) Allow the elementary and secondary schools sufficient time to select available education-related Federal equipment before it is disposed of elsewhere;

(3) Provide training and technical assistance, where possible, to recipients of education-related Federal equipment to ensure that the equipment will be utilized to its full capability; and

(4) Attempt to provide education-related Federal equipment to those elementary and secondary schools with the greatest need or to the recipients of federally funded mathematics and science projects where the equipment would further enhance the progress of the project.

(c) The GSA shall:

(1) To the maximum extent permitted by law, ensure that elementary and secondary schools are notified of the opportunity to obtain education-related Federal equipment, and, where practical, provide to elementary and secondary schools a current listing of education-related Federal equipment that is available for transfer, and, when requested, provide a current listing of this available equipment to agencies; and

(2) Maintain a record of the education-related Federal equipment provided to elementary and secondary schools pursuant to this order.

(d) There is hereby established a Coordinating Committee on Education-Related Federal Equipment (Committee). The Committee membership shall include, but not be limited to, representatives of the Departments of Defense, Education, Energy, and Health and Human Services, the National Science Foundation, the General Services Administration, and the National Aeronautics and Space Administration.

(1) The Co-chairs of the Committee shall be the Administrator of General Services and the Secretary of Education, or their designees.

Executive Orders

EO 12822

(2) The Committee shall assess the availability of appropriate education-related Federal equipment and mechanisms for expeditious notification and transfer of the equipment to elementary and secondary schools and shall resolve issues that may arise in implementing this order.

(3) The Committee shall inform, as necessary, non-Federal groups (e.g., National Governors Association, State Agencies for Surplus Property, etc.) of issues concerning the transfer of education-related Federal equipment.

(4) The Committee may consult with the Committee on Education and Human Resources of the Federal Coordinating Council for Science, Engineering, and Technology concerning activities outlined in this order, particularly those activities listed in section 1 of this order.

Sec. 3. Definitions. For the purposes of this order:

(a) "Education-related Federal equipment" means excess or surplus personal computers and related peripheral equipment, research equipment, and education-related equipment that is appropriate for use in mathematics and science curricula in elementary and secondary school education.

(b) "Elementary and secondary schools" means individual public or private educational institutions encompassing kindergarten through twelfth grade, as well as public school districts.

(c) "Federal laboratories" has the meaning set forth in the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710a(d)(2)).

(d) "Research equipment" means excess or surplus Federal property appropriate for mathematics and science education activities at the elementary and secondary education levels, as defined by and in accordance with the regulations of the agency that owns the research equipment.

GEORGE BUSH

THE WHITE HOUSE,

November 16, 1992.

DRAFT: 8/1/95

CHALLENGE GRANTS FOR TECHNOLOGY IN EDUCATION

The Challenge Grants for Technology in Education are designed to build alliances between educators, the private sector, and others to develop a new generation of interactive learning tools. These five-year grants will support partnerships that include at least one school district and other organizations seeking to meet educational goals through the use of technology – particularly in underserved and urban areas.

The first Challenge Grant competition is currently underway, and 505 applications were received by the June 2, 1995 deadline. Such a large number of applications indicates that the "Challenge" to local school districts, companies, universities, and other organizations to work together to develop new educational solutions involving technology has been very successful. Notable in these applications is strong participation from the private sector, universities, and non-profit organizations:

- Two-thirds of proposals have one or more private companies as partners, with one-third being telecommunications companies.
- More than half of the proposing agencies partner with institutions of higher learning (for a total of 900 colleges and universities).
- Over 300 libraries, 250 museums, and nearly 1000 non-profits are included as partners.
- Proposals have been received from every state.

Funding for Challenge Grants is \$9.5 million in FY 95. These funds will leverage millions more in private sector support and local community involvement in education. The grants are administered by a team led by Thomas Carroll at the Interagency Learning Technology Office. Approximately 19 grants will be awarded in September.

CHALLENGE GRANTS FOR TECHNOLOGY IN EDUCATION

Location (by state)

Focus

San Diego, CA

The "Triton Project" will improve student performance in mathematics and science, using a combination of technologies in an active learning curriculum with an ocean exploration theme. San Diego public schools will be networked with each other and with several area museums, research centers, and Aquariums. Partners include: Sea World; Scripps Institution of Oceanography; Pacific Bell; San Diego State University; San Diego Supercomputer Center at U. C. San Diego; the Naval Command Control & Ocean Surveillance Center; and San Diego Data Processing Corporation.

Redwood City, CA

Working through a consortium known as Smart Valley Inc., the Silicon Valley community is transforming its education system into learning communities that prepare students for the 21st century. Reform plans developed by teams of high schools with their feeder elementary and middle schools will receive infrastructure support from Silicon Valley's high-tech corporations. The Challenge Grant will support curriculum development and teacher training to meet the objectives of Goals 2000. Seventeen corporations have each pledged up to \$1 million in resources over three years in support of school reform. They include: Adobe Systems; Apple Computer; Applied Materials; Cirrus Logic; Hewlett-Packard; Robert Noyce Foundation; Silicon Graphics; Wells Fargo Bank; Bank of America; Intel; Logitech; NetMange; Network General; Symantec; Pacific Bell; Sun Microsystems, the 21st Century Education Initiative; and the Bay Area Multimedia Technology Alliance. Other partners include: SRI International, the Institute for Research on Learning, and Customers and Technologies.

Dover, DE

Telecommunications will connect families and schools, extending the time and place for learning and improving communication between parents and teachers. Content is focused on reading and arithmetic in early elementary grades. Activities are explicitly focused around Goals 2000. Cost-effective video based on set-top TV boxes will link the home and school. Partners include Lightspan Partnership; Bell Atlantic; and Delaware State Education Dept. --An initiative to connect every home and school in the state within five years.

Waukegan, IL The "Technology Learning Collaborative" will provide a comprehensive program of staff development, technology/curriculum integration and parent and community involvement to increase student performance in mathematics and science in the Waukegan School District. Engaged learning through project-based, collaborative teaching, high performance learning technologies, and extended day programs will be used to improve the workplace readiness of students. Partners include: Abbott Laboratories; Apple Computer; Legat Architects; U.S. Cable; Waukegan Public Library; YMCA; North Central Regional Education Laboratory; Northern IL Assistive Technology Consortium; four colleges; and the Illinois State Department of Education, among others.

Andersen, IN General Motors, the largest industry in Andersen, recently announced it will have no unskilled jobs at its Andersen facilities by the year 2000. In a community where education has not been highly valued in the past there is now a strong demand for all children to meet high academic standards -- leaving school with strong language skills, mathematics competency, mastery of new technologies, and collaborative work skills. The project will expand on the "Buddy" project to link homes and schools with computers and modems so that parents, teachers and students can work together on improving education. Teachers will receive support as they develop new curriculum and instructional strategies. Partners include: Andersen Area Chamber of Commerce; Andersen Federation of Teachers; National City Bank; TCI of Central Indiana; the Corporation for Educational Technology; Public TV; four local colleges, and the Indiana Department of Education.

Indianapolis, IN

"The Learning Cooperative", consisting of Indianapolis Public Schools, the Chicago Public Schools, Walled Lake Consolidated Schools, the North Central Regional Education Laboratory, and Ameritech will develop an affordable, scalable, and equitably distributed telecommunications infrastructure to deliver instructionally sound curriculum and technical support to schools, as well as effective professional development to all teachers in these schools.

Natchitoches, LA

The Louisiana Systemic Initiatives program, in conjunction with the Louisiana Department of Education and Northeast Louisiana University will integrate Internet resources with curriculum reform to help meet National Education Goals in the school districts of five communities with high percentages of undeserved students. Telecommunications will be used to increase achievement in: school readiness; professional development; parent involvement; school-to-work transitions; and life-long learning. Partners include: Bell South; Shell Oil; five universities; the Governor's Goals 2000 office; and 17 other community based organizations, libraries, museums, and agencies across the state.

Baltimore, MD

New technologies will strengthen the school-to-work transition in an Enterprise Zone / Empowerment Community. Electronic networks will link high school students with employers in real work experiences. State-of-the-art technology will give students access to digital video on demand for science and mathematics projects from the Discovery Channel. Partners include U. Md, College Park; Johns Hopkins U; Discovery Communications, Inc.; Apple Computer; Bell Atlantic; MD Public TV; American Training Standards Inst.; Learning Matters, Inc.; MD Business Round Table; Magic Me; two MD teachers associations; and ten other organizations. The U.S. Department of Education will partner with the U.S. Department of Labor on this Project.

White Cloud, MI

Newaygo County School District, the County Government, the Gerber Memorial Hospital, the Newaygo County Multi-Agency Consortium, the Public Libraries and five other school districts will form a network to improve educational opportunities and social services in this extremely rural, low income community. Local area networks in every school building will provide workstations and training for every teacher. A fiber optic network will link the schools, libraries, and over forty community service providers in a "no wrong door" approach to services. The Fremont Area Foundation will fund construction of the fiber optic network, and the Gerber Companies Foundation will provide significant project support.

Omaha, NE

Westside Community Schools and Prairie Visions: The Nebraska Consortium for Discipline-Based Arts Education will use telecommunications and digital technology to link urban and rural schools to the art collections of five major museums across the country. Activities include: an Electronic Art Museum in the Classroom, computer based instruction, curriculum design, and professional development. The project will begin with five Nebraska school districts and extend to schools across the U.S. Partners include: The Smithsonian National Museum of American Art; Joslyn Art Museum; Sheldon Memorial Art Gallery; The Getty Museum; The Kennedy Center for the Performing Arts; Pacific Imaging Center, Inc.; M Power, Inc.; Digital Visions, Inc.; Apple Computer; Far West Laboratory; Prairie Visions (a consortium of 100 school districts, three museums, the Nebraska Art Teachers Association and others); five school districts; and nine other art education institutes and teacher organizations.

Manchester, NH

Manchester is an active Goals 2000 community. To achieve high standards in core academic subjects it will create a multi-mode instructional technology network for audio, video, and data communications among nine school districts serving 25% of the state's population. It will involve all schools, community

resource centers, libraries and colleges in professional development, curriculum development, and administrative applications. Outreach will create improved lifelong learning opportunities for all community members. Over forty partners will participate in this program, including: Cabletron; Continental Cablevision; Cyber-Space; NH Public TV; Multimedia Systems, Inc; several Parent Teacher Organizations; eleven school districts and colleges; and the State Department of Education.

Laguna, NM Integrates new technologies with curriculum reform in Bureau of Indian Affairs Schools. Using Indian children's real life experiences, and building on the content of Native American cultures, the "Four Directions" project is an indigenous education model that will help students in BIA schools meet high academic standards. Telecommunications will link BIA schools across the country with a variety of university, museum, library, and Internet resources. BIA schools include: Ahfachkee Day School (FL); Indian Island School (ME); Quileute Tribal School (WA); Takini School (SD); Dilcon Boarding School (AZ); Laguna School (NM); Hannahville Indian School (MI); and Fond du Lac Ojibwe School (MN). Other partners include: the Heard Museum of Native Culture and Art; the University of Kansas; Southwest Indian Polytechnic Institute, Intel Corp.; and Sandia National Laboratories.

Cuyahoga Falls, OH

In consultation with the Center for Leadership in School Reform, the Summit County Office of Education and the Technology Academy will support teachers who are creating "new work" partnerships with their students -- work that meets the high academic standards embodied in Goals 2000, work that engages children, work in which children persist, and work that results in real accomplishments. The effort includes a technology work experience in which high school and college students operate a nonprofit company dedicated to rapid response support for classroom applications of technology. Partners include: Ameritech; LOGAL; the Akron Regional Development Board; the U. of Akron; Ashland U.; and Kent State U.; among others.

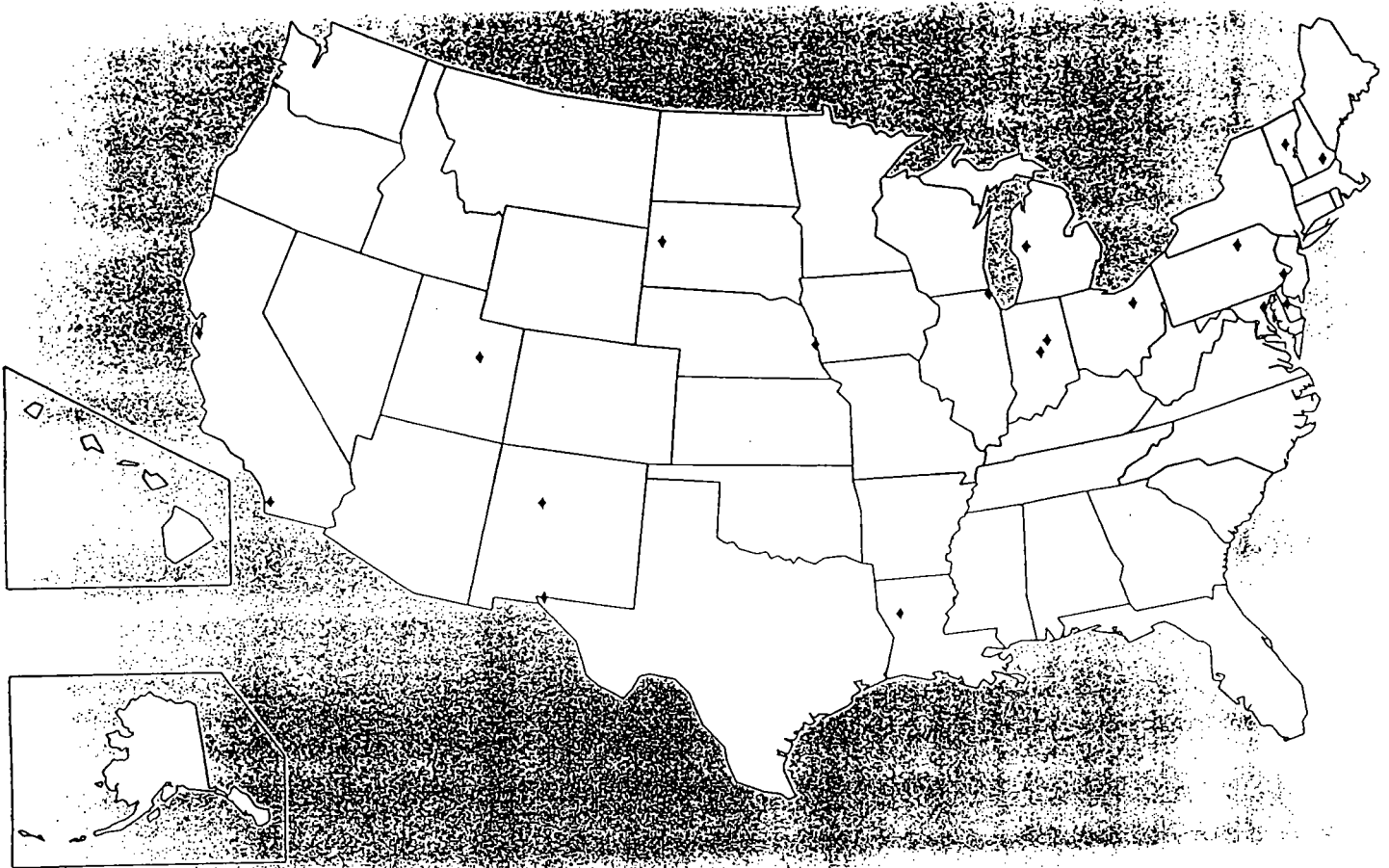
Philadelphia, PA

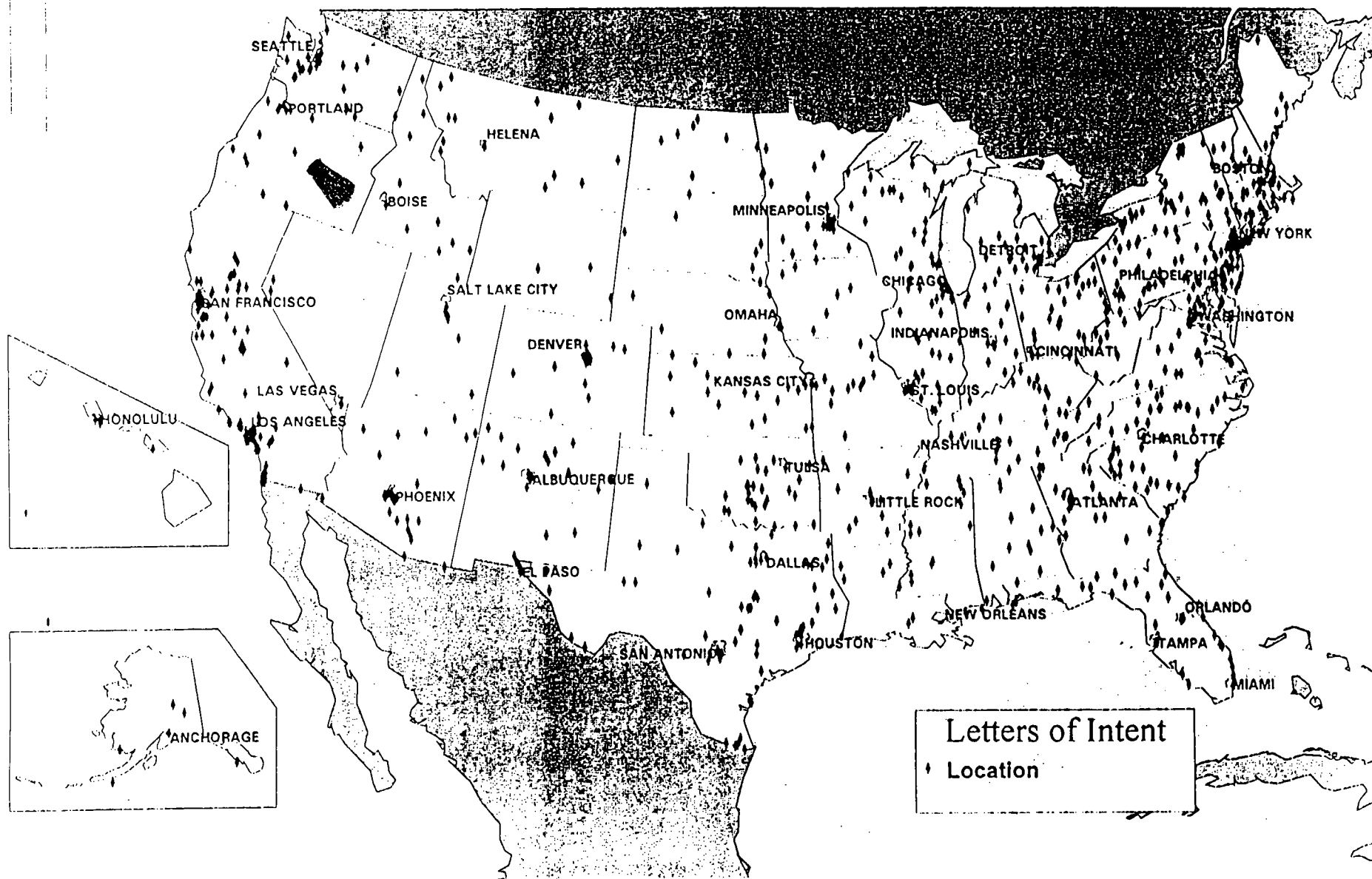
New technologies will support a comprehensive school reform strategy in a large urban school district (Enterprise Zone / Empowerment Community). Learning Communities consisting of high schools linked with clusters of elementary schools, middle schools and a college are forming "Virtual Schools", which support professional development for teachers and extended time and place for student learning. Partners include: Bell Atlantic; Unisys; IBM; Public TV; five colleges & universities; and the Private Industry Council.

- Towanda, PA** An interactive network based on compressed video will connect 23 small rural school districts in three states (rural PA, NY, & NJ). The project will grow to establish one of the largest (geographically) interactive learning networks in the country. School districts will share teaching personnel, curriculum resources, and teacher training. Schools will be linked to technical centers, museums, and colleges to extend the resources available to students beyond the confines of classroom walls. Partners include: Commonwealth Telephone Co.; Claverack Rural Electric; PA Rural Electric Assoc; Picturatel Inc.; N.E. PA Tech-Prep Consortium, International Paper Co.; and seven colleges , among others.
- Sturgis, SD** The “Technology in Education Challenge Grant for Rural Education” (TEC-RAM), will integrate technology with curriculum in six community based systemic reform efforts across the state. This state-wide effort uses technology to achieve objectives of the recently passed: Improving America’s Schools Act; Goals 2000 - Educate America Act; and School-To-Work opportunities Act. Partners include: Black Hills Special Services Cooperative; South Dakota Department of Education and Cultural Affairs; South Dakota Department of Labor; Black Hills and South Dakota State Universities; Spring Creek Video Productions, Inc.; and six local school districts.
- El Paso, TX** A “Community of 21st Century Learners” will be created among 15 partner schools belonging to a city wide collaborative for academic excellence. New technologies will be used to network the schools and the local university for professional development and the integration of technology with curriculum reform. Computers will be made available to low income parents through parent centers and libraries staffed with educators who will train parents in the use of educational software with their children. Partners include: University of Texas at El Paso; El Paso Community College; three school districts; El Paso Chamber of Commerce; El Paso Hispanic Chamber of Commerce; Region XIX Education Service Center; El Paso Collaborative for Academic Excellence; and others.
- Price, UT** The State of Utah Resource Web (SURWEB) will use telecommunications to provide quality educational opportunities in low income, rural, and culturally disenfranchised communities. Internet resources will be integrated with curriculum reform in several thematic areas, including: Native American Cultures, Western History, geology and paleontology. State Park and National Monument resources will be used to engage students in active learning projects. Partners include: Capitol Reef National Monument; Dinosaur National Monument; Far West Laboratory; Novell; Utah Office of Museum Services; U.S. West Communications; Utah State Parks; Utah State Office of Education; several Indian Councils, and others.

Montpelier, VT

Multimedia telecommunications will expand portfolio and performance based assessment of student achievement in the arts. Based on the Vermont Common Core Framework for Curriculum and Assessment, this technology creates a "WEB" of evidence of student performance in multiple learning domains represented by: sound, graphics, movement, data, and text. Partners include three VT school districts; VT Arts Assessment Project; VT Alliance for Arts Education; VT Center for Geographic Information; VT Institute Of Science, Math and Technology; and VT Department of Education.







Learning & Technology Themes



- ✱ ● **Expert Associates to Guide Individualized Learning (EAGIL)... Student, Teacher, & Parent Associates**
Intelligent guides (e.g. tutors and associates), which adapt to student learning styles, and respond to student progress, and support individualized learning
- **Collaborative Applications for Project-based Educational Resources (CAPER).... Tools for Development and Use**
Authentic, multi-media, synthetic environments (e.g. simulations) supporting involvement, experimentation, exploration and collaboration, in cross-disciplinary projects
- ✱ ● **Smart Navigators to Access and Integrate Resources (SNAIR)**
Intelligent agents for students, parents, and teachers which tailor access and integration of data and computational resources. Agents will make data and processes interoperable

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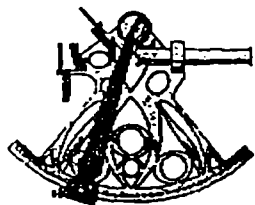
SNAIR

Smart Navigators to Access and Integrate Resources

*Search
Engine Tech Dev*



Integration technology for networked resources



Advanced
Navigation &
Text Browsing



Mediated
Collaboration
Teachers &
Students

Educational Goals:

- Improved skills in communication and collaborations
- Increased confidence in using networking systems
- Improved teacher efficiency..easier access to data and information

Components:

- Heterogeneous message passing
- Intelligent agents, repositories, and architecture
- Automatic generation of interfaces for multimedia

Project Types:

- Collaborative path authoring
- Automatic customization of networked resources
- Pulling in networked resources into collaborative environments



Initial Technology Insertion Teacher's Associate



15X
California

The Teacher's Assistant is an electronic aide for planning and managing classroom instruction that provides:

- Graphical interface tools to help the teacher efficiently cope with information and actions required for:
 - Classroom management (attendance, grading, calendars,...)
 - Lesson planning and staff resources
 - Accessing instructional materials via the Internet
 - Student performance assessment and tracking
 - Preparation of reports for parents and others
 - School administration linkages (supplies, budget, ...)
- Curriculum planning
- Technology insertion planning



Initial Technology Insertion Shepherd

*a Search
capability*



*UT
Arlington*

- **Shepherd is a personal assistant that helps the user:**
 - **Access remote resources in a user friendly fashion**
 - **Find materials of interest through a number of query and navigation systems**
 - **By modeling the user's preferences in:**
 - **Grade levels of interest**
 - **Subject matters of interest**
 - **Constraints on material types**
 - **Type of learner**
 - **Past productive resources**
 - **Visual material type strengths (graphical, textual,...)**
 - **Other material type strengths (auditory, kinesthetic, ...)**
 - **Requires high speed access to Internet**

Action: Issue an Executive Order establishing a coordinating office for federal research in learning technologies. The office would provide an efficient way to coordinate national learning technology efforts by combining the skills of the Departments of Education and Labor with those of technology agencies. It would support focused research, development, demonstration, assessment and dissemination in learning technologies, coordinate public/private research partnerships (such as the TLC grant program), and provide a source of expertise on learning technologies for both federal and other organizations.

Moniker: Schools can best deliver the skills needed in a high-tech economy if they state-of-the art themselves. Why not the best?

Impact: Provide the foundation for advances in learning technologies that will revolutionize classroom and home learning over the next 5-10 years. Highly visible demonstrations of advanced strategies involving creative business partners, universities, and schools during 1996/7.

Funding: *The office started under the executive order would require no new funds.* The office now plans to operate with a very small budget and staff on loan from agencies. However, limited funds present a major constraint on research opportunities. \$30 million in additional funding would fund five ambitious research demonstration projects -- projects which would test advanced with might be eligible for challenge grant awards when the next generation of hardware becomes widely available ins schools. The demonstrations would be selected on a competitive basis and cost shared with industry. Following the high-performance computer precedent, \$6 million could be put in the budget of five agencies and earmarked for the interagency office demonstrations.

Participants: Schools and businesses will participate as research partners/contractors in the sponsored research and demonstrations. A separate advisory group may be formed to review priorities.

Downsides: New funding requires Congressional approval and embroils the proposal in the budget debate. Federal applied research -- however well justified -- meets strong ideological opposition.

What's being done today: Approximately [\$200?] million is now being spent on education and training technology research in the agencies. Most of this is mission related with approximately 2/3 spent in DoD.

Interagency Technology Office Budget FY 95-97

Oct 95	Dec 95	Mar 96	June 96	Oct 96	Dec 96	Mar 97	June 97	Oct 97	Dec 97
FY 96				FY 97				FY 98	

FY 95	FY 96	FY 97
19 New	19 Continuations	19 Continuations
\$9.5 M	\$14.5 M	\$19 M

FY 96	FY 97
20 New	20 Continuations
\$10.5 M	\$20 M

'95 total
\$9.5 M

**'96 projected
\$25 M**

'97 projected
\$39 M

Action: Ensure that federal information resources are available in a form useful for developers of learning technology. This would be financed largely through partnerships with private information firms and software developers. Federal seed money would allow federal participants in partnerships to hold up their part of the bargain and avoid "cream-skimming". Priorities for FY1996/7 would be:

- Creating a comprehensive collection of American Cultural materials including documents, photographs, sound recordings, movies, and perhaps some 3-D renderings of materials in the collections of the Smithsonian, the National Archives, and the Park Service. [\$10 million for the consortium in the SI budget]
- Making the "crown jewels" of US statistical information useful for classroom work: Basic census data [permitting schools current data on local demographics], BEA and BLS statistics [job information, business data by state and region], and DoE/EPA information on energy and the environment, USDA information on soils, crops, etc.
- Creating a digital collection of drug-education materials (including curricula for teachers) for dissemination over the net. [Office of National Drug Control Policy is working to see what is possible]

Moniker: *Let schools get into the nation's attic.* The public paid for the information, the public owns this information, teachers and kids can use this information to make their teaching materials more interesting and more relevant to local conditions. Technology makes it possible to make the stuff available to all Americans at an extremely low cost. and without visiting Washington.

Impact: All schools with internet access would have immediate access to the resources. This is 30%[?] of schools and 3% of classrooms today and our goal is to have [?%] connected by the year 2000. Communication developers who would participate in the effort could have products based on the federal collections on the market by 1997.

Funding:

- American Cultural Collections \$10M
- Statistical information (Census, Jobs, Business activity, Energy/environment) \$1M (5 agency projects @ \$200K)
- Drug education on-line \$1M

Non-Federal Participants: Software developers/communication companies interested in developing products. School systems and universities.

Downsides: Funding from private developers for digitizing federal resources may require giving them an exclusive right to the data for a fixed period [e.g. two years]. They will want to "cream skim" collections.

What's being done today: NASA [space photos ...], NOAA [weather maps..], EPA [environmental information], USGS [maps...] and other technology agencies have made extensive collections available in digital form over the net and have requested funding in 1996 to expand this work. The new White House Home page and any new education home pages made available through this initiative will make these collections more accessible. SEC filings and Patent and Trademark information (after 1994) are available.