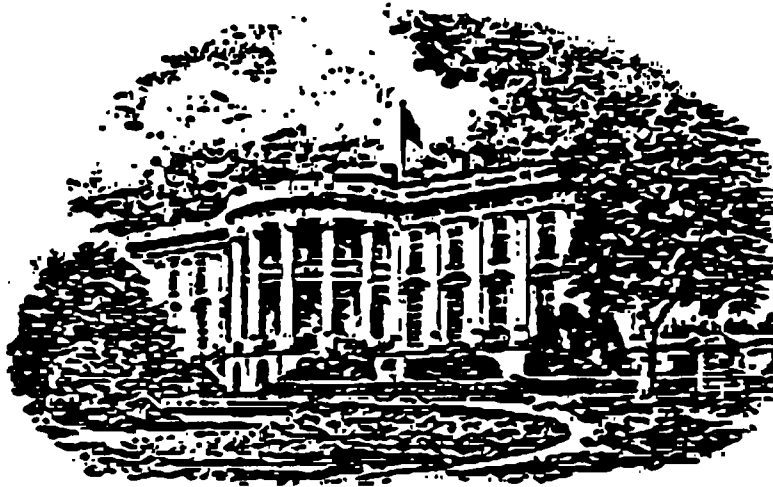


TLC Decision Memos

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DATE: 7-12-94
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TO:	<u>LARRY KATR 219-7971</u>	<u>Alankruger 219-7971</u>
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FROM: Paul DimondPHONE: (202) 456-6630PAGES FOLLOWING COVER SHEET: 1

THE WHITE HOUSE
WASHINGTON

July 12, 1994

MEMORANDUM FOR DISTRIBUTION

FROM: PAUL DIMOND

SUBJECT: A NEW SOCIAL CONTRACT FOR INCUMBENT WORKERS

We are scheduled to meet on Tuesday, July 19, from 12:00 to 2:00 in Room 230 to discuss Job-Changing and Skill-Building Tools for Incumbent Workers. Alan Kruger, who will be replacing Larry Katz soon, will join us. This memo will attempt to focus our discussion.

As you know, we have been looking at policy for education, training and reemployment from a variety of perspectives over the past several months -- REA, Kennedy-Kassebaum Consolidation discussions, Belle's ETR sub-group with Mike Smith and Tom Glynn, Gene-Bill-Tony Carnevale's thinking on how difficult public acceptance of embracing change is in the face of increasing inequality and substantial decline in upward mobility over the past 12 years, work in progress on transforming the Student Loan program, and as one part of Bo's four-part agenda for responding to Structural Transformation in the new economy. In order to focus our discussion on Tuesday, I want to pose one option for a new social contract for all American workers and make explicit the implications of such a social contract.

Premises: In the new economy, what an individual earns increasingly depends on what he or she learns; what a firm rewards increasingly depends on the learning and skills of the workers; work on the job increasingly involves learning; and what a country earns increasingly depends on the learning and skills of its workforce.

Federal Response: expand the opportunity for all workers to invest in improving their own learning and skills, in managing their own careers and in enhancing their ability to learn new skills, to find new jobs, and to take their own pathways to upward mobility. The analogy is the G.I.Bill: encourage ordinary Americans to invest in their own skills and expect extraordinary returns from the increase in human capital -- for the individual, for the firms which they form or with which they choose to associate, and for the country as a whole.

The policy implications of such a new social contract might include:

- Make flexible learning accounts available to all persons to invest in their own learning (with flexible repayment options, including based on future income returns to learning).

- Rely on better, more accessible information on what courses/skills/providers result in jobs, earnings, upward mobility (perhaps with some regulatory/financing mechanism for sanctioning providers who fail to deliver on promises)
- Make pensions, health care, and skills (whether learned on the job or elsewhere) fully portable
- Catalyze agile, accessible job-finding, job-changing, career counseling networks
- Limit any greater investments in "disadvantaged" individuals to subsidizing self-investment (e.g., grant/subsidy based on lower family income, hardship) and improving access to job-changing and job-finding networks to overcome isolation and discrimination
- Limit any federal support for firm-paid training to exhortation and example (e.g., amend Baldridge award to include recognition of firms that reward what is increasingly the work of the most competitive firms, continuous learning, on and off the job; provide agile standards process that will recognize worker skills wherever learned, including those learned while working at a job; and encourage consortia of firms to offer their workers training, internships, learning)
- Transform the unemployment system to encourage workers to get back to work as soon as possible so that they can earn while they learn at work (and base any extensions on individuals investing in improving their own skills and continuing to search for a job rather than on EUC or EB).

I pose this social contract -- and its implications -- for purposes of stimulating your thinking. In responding, please consider the potential and limits of federal policy and budget compared to the far larger investments that are and will continue to be made by individuals, states, localities, and firms. Would the proposed social contract increase the investments by these other sources? Does it provide a foundation for enabling all workers to embrace change by making the new economy a source of upward mobility and prosperity rather than a grudging and painful inevitability which is only better in comparison with the worse case of protectionism? Does it provide a basis for increasing the opportunity of all persons to take responsibility for succeeding in the new economy? Is it responsive to the President's call for a lifelong learning agenda that better serves all Americans?

LEARNING PRODUCTIVITY SEMINAR 9 JUL 94
PRINCIPAL ATTENDEES

WHITE HOUSE

Bridgewater, Gary

Chatelier, Paul

Cutter, Bo

Dimond, Paul

Fitzsimmons, Ed

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Hijakata, Heidi

Johns, Skip

Kalil, Tom

Kelly, Henry

Kohlenberger, Jim

McCowan, Gaynor

Ramos, Susan

Schmidt, Mike

Sperling, Gene

Bill Galston

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Sallet, Jonathan

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LEARNING PRODUCTIVITY SEMINAR 9 JUL 94

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REMARKS:

Mike ...

**Here are the lists of presenters and attendees. The latter is mostly checked out, but I still worry about errors of omission. If you see anyone missing, please let me know.
Dexter Fletcher**

CERTIFICATE: I certify that data being transmitted by FAX is completely
UNCLASSIFIED:


Dexter Fletcher

Name Printed and Signature

THE WHITE HOUSE
WASHINGTON

July 11, 1994

MEMORANDUM FOR DISTRIBUTION

FROM: BILL GALSTON, Domestic Policy Council
GENE SPERLING, National Economic Council
JOHN GIBBONS, National Science and Technology Council

SUBJECT: LEARNING AND TECHNOLOGY

On Saturday, July 9, Deputy Secretary Deutch hosted members of the ETR Working Group, Deputies from the ETR Agencies and the White House, and interested parties from other Agencies to discuss how Administration initiatives concerning Learning and Technology (including related DoD training experience and technology development) can be coordinated for purposes of implementing the President's Lifelong Learning Agenda and making decisions on the FY96 budget. From the preparatory work done by the ETR Group, the discussion among the meeting participants, and the demonstration of a variety of powerful DoD learning tools, it is clear that we are on the cusp of a revolution in learning, technology, and the means of communication that can dramatically improve the productivity of learning for all Americans in schools, workplaces, and homes all across the country. (See attached statement summarizing the common ground shared by the participants at the July 9 meeting.)

A number of Agencies are working on a series of related initiatives to exploit this unique opportunity. It is clear, however, that we need both (a) to coordinate these efforts so that the whole is at least as great as the separate parts and (b) to provide a focus, vision and sense of excitement that will permit the President, Vice-President and the Secretaries to highlight the ways in which powerful, new learning technologies can help implement the Lifelong Learning goals exemplified in our Headstart, Goals 2000, ESEA, School-to-Work, Student Loan, and Reemployment programs.

We therefore direct that the ETR Group work in cooperation with the Committee on Education and Technology (CET), Office of Management Budget(OMB), the Information Infrastructure Task Force (IITF) and the Office of Vice-President(OVP) to present the following five-points for review and, as necessary, decision for the FY96 Budget. Draft options and recommendations will be presented to Paul Dimond(NEC, Co-Chair of the ETR Working Group) by August 1 so that they can be presented in their full context to the ETR Working Group by August 8 and to the ETR Principals by August 15. The initial members of the teams for each issue are included in (parentheses), with the Chairs underlined. The chairs are encouraged to include input from other sources as may be appropriate to inform the options and decisions. Henry Kelly (OSTP, Co-Chair CET) will serve as Chief of Staff for this entire effort to provide daily oversight, assistance and coordination.

Technology and Learning Challenge. Should we have a flagship challenge process that enables the Administration to highlight our initiatives in this area by catalyzing learning communities across the country to develop interactive learning tools to help implement the Lifelong Learning Agenda? Is a focus on learning content most likely to spur the potential private and public sector participants to join in developing and using such effective learning tools? What criteria will stimulate the greatest public and private sector support and creativity to develop learning tools that can be broadly marketed throughout the country? What size initiative is essential for this purpose? How can it best be administered, managed and funded? (Kelly&Fitzsimmons(OSTP), Dimond, Sperling and Kalil(NEC), Kunin&Roberts(DoEd), Barram, Sallett, Prabhaker&Breedon(DoC), Deutch&Finch(DoD), Glynn&Donohue(DoL); Edelman&Golden(HHS), Schmidt(DPC), OMB - Edley & Sawhill, OVP - Kollenberger)

Federal R & D, Federal Personnel Training, and Federal ETR programs. How can we best structure, coordinate and finance the host of related federal R&D, personnel training and education and training programs (e.g., ESEA, JTPA) to promote the development and rapid deployment of interactive learning tools that will help achieve the goals of the President's Lifelong Learning Agenda? What are the key R&D budget choices and program changes that we can make that will enable us to promote the development and use of interactive learning technologies? (CET - Finch(DoD) & Robinson(DoEd), plus Sperling(NEC), Edley & Sawhill (OMB), Fitzsimmons(OSTP), and Portman(DoL))

Federal Information and Data. How can the vast amounts of federal information and data (e.g., in the Smithsonian, NASA, NSF, National Labs, Library of Congress, and the Census) be made easily accessible to learners of all ages? What are the priorities in making such information and data available? What is the cost and source of funding to make priority information accessible? (Kalil(NEC), Fitzsimmons(OSTP), Sallett(DoC))

Universal Access. How can we spur or otherwise influence competition so that such effective interactive learning tools and other educationally valuable information and data are easily accessible to schools, homes, and workplaces? (Liaison through Sallett & Irving(Doc) and Kalil(NEC) with IITF)

Communication on Technology and Learning. What is the appropriate policy vision for focussing Administration initiatives on Technology and Learning? How can it best be structured, developed, shared and communicated to build widespread support for invention and use of effective learning technologies? (Sperling&Kalil(NEC), Nelson&Kelly(OSTP), Simon and Kollenberger(OVP), Sallett&Breedon(DoC), Kunin&Roberts(DoEd), Portman(DoL), and Golden(HHS)).

We appreciate your full cooperation in this important work on behalf of the President.

Vision: Improving the Productivity of Learning through Interactive Learning Technologies

While virtually all other sectors of our economy have been transformed by technological innovation and accompanying structural reorganization in the twentieth century, education and training in schools looks much like it has for generations. Computers and advanced communication technologies are revolutionizing banking, finance, entertainment, and many other information-rich businesses and helping them tailor services to individual customers. But these technologies have had little impact on learning productivity. The most advanced communication system in most classrooms is not even the telephone but the classroom bell and the public address system -- technologies that have only reinforced the traditional "egg-crate" configuration of isolated classrooms. All of this is about to change. Three elements are now converging with the potential to create a revolution in the productivity of learning.

First, a new consensus is emerging about the dynamics of learning: The primary work of learning is done by the learner not the instructor. All students are different, they learn at their own pace, often in different styles. The work of learning is more engaging for the student if it involves active interaction and occurs in a meaningful context, rather than through passive listening or watching in the abstract. In this new perspective, the role of the teacher is no longer that of a talking head standing in front of a class of 25 students: the teacher becomes a coach of teams of learners, and students of all ages (including peers, parents, and easily accessible experts and tutors) are the active participants in a community of learning. Students taught by individual tutors do better than 98% of students taught in standard "mass production" class room settings (see figure 1). Emerging technology makes it possible to provide learner-centered contexts for learning tailored to individuals without a prohibitive investment in new materials or increases in instructional staff. America's teachers -- and their union leaders -- are demanding that schools not be left out of this revolution.

Second, technological advances in computers, multi-media, data-storage, and communication are creating dramatic new ways to communicate complex ideas and experiences. The potential for creating a new generation of interactive learning tools is upon us. The technology can create interactive learning environments that invite exploration and approximate the experience of working with individual tutors. We can realize this potential, however, only if we can bring the creators of the new technologies together with the makers of essential learning content to transform games, information, and entertainment into engaging curricula for all ages, interests, needs and styles of learners.

Third, diverse means of transmission and telecommunication are being developed that will enable learners of all ages to connect with these learning tools -- and with other learners, experts, and tutors -- in schools, workplaces, and homes. Virtual learning communities can thereby be created between coaches, tutors, peers, parents and children, and learners of all ages to use these new learning tools at all hours of the night or day, on weekends, throughout the year. The extent of learning and the effectiveness of teaching no longer need be a prisoner of the amount of seat time in a classroom.

The Department of Defense and many innovative education and training programs around

the nation have demonstrated that these three elements can combine to achieve a sharp increase in the productivity of learning. DoD has achieved such success with new learning tools that it is rapidly expanding its investment in these innovative technologies. The interactive technologies have been successfully used to promote learning in a diverse range of jobs (surgeons, nurses, electronic and mechanical repair technicians, operators of all kinds of equipment, and whole teams of combatants), as well as providing basic and advanced skills in areas like mathematics. In each of these areas, the participants achieve substantially higher results at lower costs than would be possible using traditional learning techniques. The DoD successes need to be moved rapidly to civilian learning. Defense training can also benefit from the growth of innovative civilian providers of learning technology since such businesses can provide improved training products at lower costs.

The full potential of technologies can only be captured if they incorporate engaging learning content and innovative learning strategies (Figure 2). To exploit the potential of such learning technologies, it is essential that we find a way to catalyze development of such effective learning tools for all learners. For example:

- Children's television programming like Sesame Street and Mr. Rogers Neighborhood has enriched the learning experiences of pre-children for the past 25 years even though the current generation of television watching is basically a passive experience. The new generation of interactive televisions, video-games, and other consumer equipment will permit -- indeed require -- active participation on the part of children. The challenge is to combine the experts on early childhood development, producers of engaging games and adventures for children, and technology experts to develop a new generation of children's programming that will combine exploration, adventure, games, and learning. If this happens, the first national education goal -- all children arriving at school prepared to learn -- will be much easier to reach.
- New information systems make it possible to create learning environments that simulate experiences ranging from walking through adventures set in synthetic representations of the historic discoveries in science, to exploring the biology of synthetic ponds to learning math through vivid confrontation with real-world problems. They permit instant access to state-of-the-art data and expertise around the globe. Math and science learning communities across the country are developing the curricula, frameworks, and assessment methods needed to reach the national education goal of preparing our high-school graduates to be first in the world in these critical subjects. Realizing this potential may well depend on catalyzing a unique collaboration between teachers, subject matter specialists, entertainment industries, software designers, and communities across the country.
- Only a quarter of high-school graduates complete four years of college. School systems around the nation are being challenged by the new School-to-Work program to design innovative programs (e.g. apprenticeships) to help all students learn in the context of work and to make a transition from learning in school to learning on the job, to higher

education, and to learning for next jobs. Emerging technology can make experiences simulating a variety of training on-the-job available in schools and student homes during the next few years. These systems will help students demonstrate that they have the practical skills and problem-solving ability needed by employers. Interactive programming capable of exploiting this potential can be developed by encouraging local businesses, schools, training institutions, and communication businesses to form teams with providers of relevant learning content.

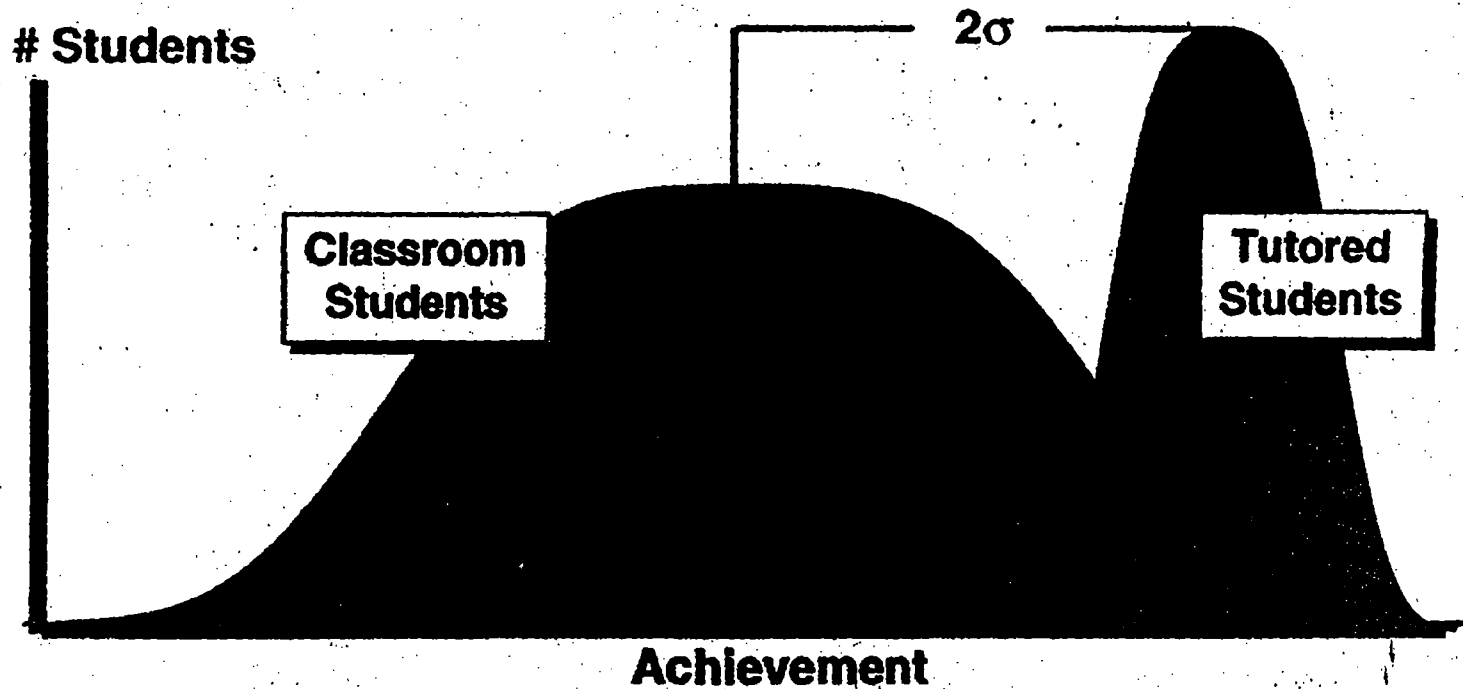
- Businesses of all sizes recognize that adaptability and flexibility are central to corporate survival. This flexibility can only be achieved if their workers -- as individuals and as teams -- are able to keep pace with advanced equipment without expensive off-site training. The kinds of simulated environment now possible with new technologies allow operators of all types of equipment to learn new levels of competence or quickly re-learn seldom used skills. But developing the interactive learning systems to realize this potential will require combining subject-matter experts, experienced trainers, and software developers -- a task that is well beyond the means of a typical small business or community college. If interactive learning experiences can be made available on the job or at home, the goal of lifelong learning is within our grasp.

Our challenge is to determine whether and how we can catalyze the development and deployment of interactive learning tools that can dramatically improve the productivity of learning for all Americans. If we succeed in this endeavor, we will help to create an important lever for achieving the President's agenda for lifelong learning.

Figure 1
Learning Productivity

High-Tech Learning is Effective

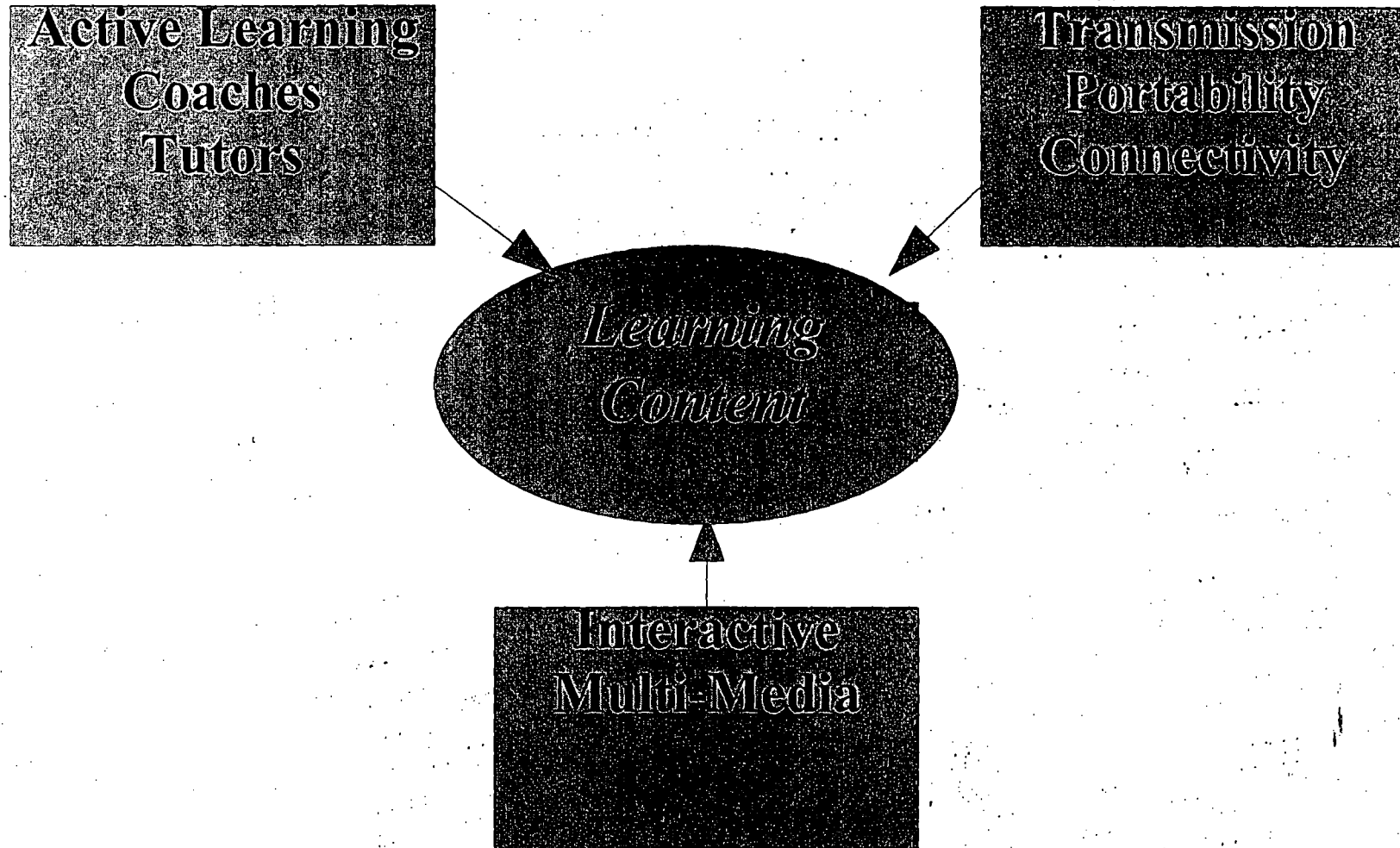
**ON AVERAGE, TUTORED STUDENTS SCORE BETTER THAN 98%
OF CLASSROOM STUDENTS – A 2-SIGMA SHIFT**



Adapted From: Bloom, B.S. The Two Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring. Educational Researcher. 13,4-16 (1984)

Figure 2

Learning Content: The Key to Improving Learning Productivity with Technology





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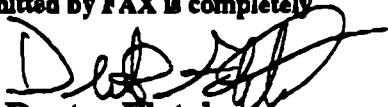
REMARKS:

Mike ...

It turns out I had Ed Fitzsimmons' title wrong. Here are corrected versions of the lists.

Dexter Fletcher

CERTIFICATE: I certify that data being transmitted by FAX is completely
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THE WHITE HOUSE

WASHINGTON

April 13, 1994

MEMORANDUM FOR EDUCATION, TRAINING, AND REEMPLOYMENT
POLICY GROUP MEMBERS

FROM: BILL GALSTON
PAUL DIMOND

SUBJECT: AGENDA FOR APRIL 14 MEETING AND REVIEW OF
ASSIGNMENTS FROM APRIL 7 MEETING

We will meet tomorrow, Thursday, April 7, at 6:30 in Room 230 OEOB. Representatives from the National Science Foundation (NSF) will be at the meeting to give us a presentation on their upcoming research initiative, "Investing in Human Resources: A Strategic Plan for the Human Capital Research Initiative." A copy of the draft executive summary of this report is attached.

Leading the briefing will be Dr. Henry Farber of Princeton. He will present the case for a coordinated, multi-disciplinary research initiative to increase understanding of the nature and causes of existing human resource issues in this country. Dr. Farber is a leading authority on workforce productivity and co-author of the upcoming NSF research initiative.

Issues suggested by NSF for discussion include:

- the advisability of launching such a research initiative;
- the development of an interagency action plan for launching such an initiative, and;
- mechanisms for linking mission-agency research needs to research supported under such an NSF initiative.

In addition to laying out the agenda for tomorrow's meeting, we thought it would be helpful to review the assignments that were handed out at last week's meeting:

- **Overcoming Discrimination and Extending Networks of Opportunity.** Peter Edelman, Sheryll Cashin, and Bill Dickens are putting together a subgroup to look at these issues. This group will report back to us at next week's meeting with a draft plan on how we should proceed on this issue.

- **Productivity of Lifelong Learning.** As we announced last week, pursuant to Secretary Reich's suggestion, this issue will be the topic for our first policy roundtable session, with specific focus on what we can learn from the Department of Defense's investments in learning technology and lifelong learning. Lou Finch, Jack Donahue, Henry Kelly, and Paul Dimond will work to organize this roundtable and will announce a time, date, and location for the event sometime in the next week.
- **Productivity and High Performance in the Service Sector.** Ev Ehrlich, Kent Hughes, and Bo Cutter will prepare a two-page paper on how we should proceed on this issue and will report back to the group at next week's meeting.
- **Understanding and Accepting the New Economy.** Bill Galston is working to flesh out this topic in more detail, and, with Tony Carnevale, will make a proposal for review within the next few weeks.
- **Improving Skills of Incumbent Workers.** Jack Donahue and Leslie Lobel, with Mike Smith, Kent Hughes, and Tony Carnevale, will propose a process for addressing this issue for review within the next several weeks.
- **Supporting Work and Family in the New Economy.** Peter Edelman will prepare a proposal for proceeding to review these issues with Secretary Shalala.
- **Implementing Goals 2000, School to Work, and the Reemployment Act and Reviewing Performance and Operation of Federal Education, Training and Reemployment Programs.** Belle Sawhill, Mike Smith, Tom Glynn, and Doug Ross will head-up this effort along with Bill Galston and Paul Dimond to assure effective implementation of these pillars of our legislative agenda and to review how all other programs and policies can complement these initiatives.
- **Creating a Virtual ETR Group Conference.** Dave Barram will make a proposal within four weeks as to how we can create an on-going network to do our work and to fully engage agency staff and resources.

We can discuss any suggested additions or revisions at the beginning of tomorrow's meeting.

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EXECUTIVE SUMMARY**INVESTING IN HUMAN RESOURCES:
A STRATEGIC PLAN FOR THE HUMAN CAPITAL INITIATIVE**

The human capital of a nation is a primary determinant of its strength. A productive and educated workforce is a necessity for long-term economic growth. Worker productivity depends on the effective use and development of the human capital of all citizens, which means that schools, families, and neighborhoods must function effectively. Unfortunately, there is substantial evidence that the United States is not developing nor using the skills of its citizens as fully as possible. Only if the United States invests wisely in its human resources will it be able to maintain its place in a global economy where human creativity and human skill is increasingly more important than raw materials or physical infrastructure.

This document lays out a research strategy on human capital issues designed to increase understanding of the nature and causes of existing problems and to develop the tools and data necessary to evaluate the effectiveness of policies aimed at improving the human resources of America's citizens. Past scientific research on issues of human capital made a significant contribution to the public understanding of these issues as well as to the specific design of policy. A coordinated, multi-disciplinary research effort, focussed on key theoretical and empirical gaps in the scientific literature, promises substantial future rewards.

Now is a propitious time to launch a major new human capital research initiative. The research community is better prepared than ever before to effectively undertake such an initiative. The policy community has demonstrated a rising interest in these problems and is increasingly looking to the scientific community to help design and evaluate policies aimed at human capital development.

A research agenda in six key areas is proposed.

1. Employing a Productive Workforce

America needs a skilled workforce and the organization of the workplace must fully utilize workers' skills. A human capital research initiative would improve the scientific understanding of how human behavior, group behavior, and organizational structure relate to employment and productivity. Among the key questions: How are workers and jobs effectively matched? How are workers motivated to acquire new skills and how are the skills demanded by employers changing? How are high-performance workplaces best organized?

2. Educating for the Future

Not all of America's youth are being adequately educated. Research focused on education and development of human capital among youth can improve our understanding of the human learning process and how it interacts with school

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structure and organization. Among the key questions: How can students sustain motivation to learn and perform in school? What organizational reforms are effective in improving student achievement and developing skills that foster life-long learning and productivity?

3. Fostering Successful Families

Families must provide children and adolescents with the resources to become competent adults and productive citizens. Research focused on families can improve our knowledge about the causes and consequences of recent radical changes in America's families. Among the key questions: What is the effect of America's changing family structure on children's development and behavior? What child/adult interactions within families most impact children's development and result in successful parenting?

4. Building Strong Neighborhoods

A neighborhood environment can facilitate or inhibit the life chances and human capital development of its residents. Research focused on neighborhoods can improve our knowledge of the impact of neighborhoods on their residents. Among the key questions: What are the neighborhood-level social processes that determine the nature of peer influences, criminal behavior, or employment? How do neighborhood organizations affect activities and future expectations of children and adults?

5. Reducing Disadvantage in a Diverse Society

America's population is growing in diversity. This creates challenges for workplaces, schools, and public policy. Diversity is also closely linked with disadvantage as certain groups are excluded from economic opportunities. Research in this area can help understand the nature of diversity and overcome the problems of disadvantage. Among the key questions: How and why do humans categorize people into groups? What are the consequences of categorization? What are the causes of group disadvantage and how is it perpetuated?

6. Overcoming Poverty and Deprivation

Problems of poverty and deprivation remain remarkably stubborn among certain groups in the U.S. Research focused on poverty could better define and describe the causes of poverty and help design and evaluate anti-poverty efforts. Among the key questions: What economic changes are causing deteriorating wages among less skilled workers? How have changes in families relate to changes in poverty in the U.S.? How do programs designed to reduce poverty shape the lives of low-income families?

Other Research Needs

In addition to research on the above topics, expanded data collection and development of new methodologies would produce returns for researchers from all disciplines who are involved in investigating various aspects of human capital formation and utilization.

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**INVESTING IN HUMAN RESOURCES:
A STRATEGIC PLAN FOR THE HUMAN CAPITAL INITIATIVE**

I. The Nature of the Problem

The human capital of a nation is a primary determinant of its strength. A productive and educated workforce is a necessity for long-term economic growth. Worker productivity depends on the effective use and development of the human capital of all citizens. Schools must function effectively to produce literate and skilled graduates. Families must function effectively to nurture children and assist in their cognitive and emotional development. Neighborhoods must be safe locations where children are raised and educated and where individuals and families participate in the public and private institutions that undergird the work of our society. Only if the United States invests wisely in its human resources will it be able to maintain its place as a dominant economic competitor in a global economy where human creativity and human skill are increasingly more important than raw materials or physical infrastructure.

There are disturbing trends in the United States today that indicate we are not developing nor using the skills of our citizens as effectively as we might. Workforce productivity has grown only slowly in recent decades. Widening wage inequality between more and less skilled workers raises a concern that some group of American adults are becoming increasingly obsolete in today's economy. Growing racial and ethnic diversity within the adult population has created social tensions that spill over into work environments and limit economic opportunities for disadvantaged groups. Even greater concern surrounds the preparation of today's youth for tomorrow's workplace. On every international comparison of elementary and secondary school achievement in mathematics and science, U.S. students perform worse than students in most other industrialized countries. Substantial changes in America's family structure and functioning also raise questions about how well families are providing children with a secure environment in which to mature and learn. The overall litany of social problems that appears daily on the television screen only underscores these concerns further: problems of crime and violence, particularly among youth; a large underground economy in our nation's cities; continuing economic inequality between different racial and ethnic groups; and stubbornly high levels of poverty, particularly among children and single mothers.

In response to these concerns, this document lays out a research strategy, designed to increase understanding of the nature and causes of these problems and to develop the tools and data necessary to evaluate the effectiveness of policies aimed at improving the human resources of America's citizens. It proposes a coordinated, multi-disciplinary approach that is designed to advance knowledge across a broad spectrum of interconnected issues.

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II. Background to This Document

The National Science Foundation's mission statement calls for it to work for the advancement of knowledge for the benefit of humankind. This includes exploring the social and economic world as well as the natural and physical world. NSF has long been deeply involved in the development of human capital through its work to improve science and mathematics education. The creation of the Directorate for Social, Behavioral, and Economic Sciences was intended to provide a more coherent research approach to scientific questions best addressed by the social and behavioral sciences. The formation of this directorate positions the NSF to take the lead in developing a research agenda that will generate knowledge useable by both the public and private sectors in their efforts to develop the nation's human capital.

Interest in human capital issues has grown substantially in both the scientific and the public realms. In 1990, a coalition of professional associations in the behavioral sciences came together to propose a research agenda for their members. They named this the Human Capital Initiative, and it has received widespread interest and political support. For example, the Senate Committee on Appropriations was "pleased to see that the behavioral and psychological sciences communities have produced a comprehensive vision for research in their disciplines called the human capital initiative." This document builds on these efforts within the behavioral sciences, expanding the Human Capital Initiative to include a broader range of issues from both the social and behavioral sciences.

III. The Contribution of Science to Problems of Human Capital

Given these widespread concerns with the use and development of our nation's human resources, the amount of research funding available to study the conditions that better facilitate or constrain human capital resources is amazingly small. Within the National Science Foundation, only 3.2 percent of the FY 1994 budget for research and related activity went to the Division of Social, Behavioral, and Economic Research, and only a limited share of that money went into research on problems directly related to human capital issues.

Yet, researchers who work on issues of human capital, from employment to schools to families, have made significant contributions to the public understanding of these issues as well as the specific design of policy. Much of this work is well-known within the scientific community because it has frequently used models, tools, and research methodologies that advanced theoretical and empirical agendas within specific disciplines. An indication of the scientific prominence of this work is exemplified by the recent Nobel Prize awarded to Gary Becker at the University of Chicago, who popularized the term human capital within economics, and whose work on rational models of individual decision-making has influenced researchers throughout the social and behavioral sciences.

Listed here are a few examples of the many research areas where scientific analysis has shaped our current understanding of human capital problems.

PRELIMINARY DRAFT

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Example 1: Labor market research has described the recent deterioration in wage rates and long-term earnings opportunities for less-skilled workers. These changes have been causally related to the growing internationalization of the U.S. economy, changing technologies in the workplace, and changes in labor market institutions. This research has provided direction for the current policy discussion about job training programs and wage subsidies for low-wage workers.

Example 2: A substantial number of studies carried out at the firm level indicate a clear link between profit sharing and productivity. There seems to be a much weaker relationship between productivity and other compensation and ownership arrangements (such as employee stock ownership plans), however. The private sector is paying close attention to this and other research on how workplace structure and organization affects productivity.

Example 3: Research on the impact of day care facilities for children of working mothers has indicated that children who spend considerable time in quality day care facilities fare as well as children reared at home (whether these conclusions apply to infants is still under debate.) Mothers who have day care facilities at their place of employment are more productive, have lower absenteeism than mothers who make outside child care arrangements. Findings such as these played a role in the recent passage of the Family and Medical Leave Act in 1993.

Example 4: An ongoing body of research has explored what matters about schools, classrooms, and teachers for student achievement. These studies indicate that children learn more in schools that are integrated into the community and have close connections with families, businesses and other community institutions. These studies have also shown that schools are more likely to improve children's educational outcomes if they target specific problems and encourage broad participation in the planning and implementation of reforms. This work has been widely cited in the ongoing discussion about school reform.

Example 5: Research has demonstrated that criminal events are disproportionately concentrated in certain neighborhoods and ecological places (such as taverns or parking lots.) This evidence on crime "hotspots", combined with other criminological research on the importance of informal social control in local communities for reducing crime, has led to major changes in recent police practice. Many cities are now implementing community policing strategies that stress the involvement of local residents and pay attention to the geography of the neighborhood and the location of crimes.

Example 6: The social sciences have defined and measured labor market discrimination by determining when pay and occupational differences exist that cannot be accounted for by measurable productivity differences or differences in qualifications. This research has been highly influential in determining the standards of statistical evidence the courts have used in employment discrimination cases.

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IV. An Agenda for Future Research

This report identifies six areas of substantial research importance, where further work in the social and behavioral sciences promises significant returns. A more extended discussion of the research agenda in each of these areas is available in six attached appendices to this report. The research agenda in each of these areas has emerged from consultation with a broad group of social and behavioral scientists. This section summarizes some of the key issues for future research within each topical area.

1. Employing a Productive Workforce

If America is to remain competitive in the world economy, American workers must have the skills required to compete effectively. It is also essential that the strategic decisions of firms and the organization of the workplace be conducive to full utilization of workers' skills. Future research in this area can improve our understanding of how human behavior, group behavior, and organizational structure relate to employment and productivity. Such work can have a substantial effect on the private sector as it works to design and staff workplaces for the future that are productive and that support a reasonable quality of life for workers and their families. Appendix I lays out a more detailed future research agenda in this area, including investigation into such issues as:

Effective matching between workers and jobs. Effectively matching workers into jobs where they can best use their skills and talents is important in fostering productivity. For instance, the process by which new workers find jobs is only partially understood, and more should be known about the role of social networks, the provision of employment-related information in the schools, or the role of public training and placement efforts. Similarly, we need to know more about the ways in which older workers can most effectively find new work and/or train for new skills when displaced from their jobs.

Skill acquisition among workers. The acquisition of skills by workers is highly important in helping them move through a career and cope with changing skill demands in the workplace. More work needs to be done to understand how workers are motivated to acquire new skills, the changing nature of skill demands, and the types of programs that foster skill acquisition.

Effective organization of the workplace. The workplace takes inputs (human and physical capital) and transforms them into outputs. Vast changes in modern workplaces have raised a host of new issues about this process, however. Concern with the need for high-performance workplaces has made it imperative that we understand better how individual workers respond to incentives, and what type of management and organizational systems produce greater worker efforts and worker satisfaction.

2. Educating for the Future

Not all of America's youth are being adequately educated for the future, as

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indicated by the poor performance by U.S. students on standardized tests, high school drop out rates and extensive criticism of the public schools. Schools face increasingly difficult challenges in preparing a wide range of students to be productive and involved citizens. For instance, violence is a major concern inside many schools; growing population diversity means schools must cope with issues of multiculturalism, bilingualism, and racism; changes in family structure suggest that children are receiving less help and support at home for their school work. Appendix II lays out a more detailed future research agenda in this area, including investigation into such issues as:

Sustaining motivation among students to learn and perform well in school. Researchers have documented the importance of motivation for learning. There is evidence that both student and teacher motivation declines over time in the schools, however. We need to understand the nature of the activities that occur in the classroom, and how specific student/teacher, student/student, and student/curriculum interactions help or hinder learning. We also need to understand more about how school activities relate to other activities and events in children's lives, particularly family and peer influences.

Making educational systems more effective. While there is widespread agreement that our current public school system is not working as it should, there is little agreement about how to improve this situation. For instance, we need to understand more about the link between what is learned in school, the skills needed in work settings, and how those skills are acquired. High-quality evaluations of a number of new or proposed school reform efforts would provide better direction for future reforms. We also need good research on how school reforms can be most effectively implemented, and the nature of the barriers that hinder the adoption of new procedures within schools. Finally, we need to know more about how to nourish the intellectual and cognitive potential of our best students and how to maximize educational benefits of college and other post-high school training.

3. Fostering Successful Families

Families play a pivotal role in the creation of human capital. Families must be able to provide children and adolescents with the resources to become competent adults and productive citizens and (eventually) to be effective parents themselves. American families are undergoing radical changes, however, and there is concern that today's children are not being nurtured as effectively as in the past. More limited economic opportunities are putting new stresses on lower-income families, while the growing number of single-parent families at all income levels is creating a new set of challenges and potential problems for parents and children. Appendix III lays out a more detailed future research agenda in this area, including investigation into such issues as:

The new demography of families. While a vast amount of research has studied changes in the composition and behavior of American families, there is still much we do not understand about these changes. The causes of changing marital and fertility patterns are still only partly understood. Researchers are only

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in the early stages of developing effective models and measurement of the relationship between changes in family composition and family roles, and their effect on the behavior outcomes of children and youth.

The internal world of the family. One of the most important determinants of children's development is their intimate emotional and interaction patterns with other family members. We need to spend more time studying successful families, looking at how a child interacts with other family members as he or she goes through various maturation stages. Are there particular times or transitions when the quality of family interactions is especially crucial for healthy development? Why are some children more resilient to family problems than others? Continuing research about families that exhibit serious problems, such as sexual abuse and family violence, is also important in understanding how to help children and adults cope with and overcome these destructive experiences.

The value of social capital for human capital development. Families are imbedded in complex social relationships with other individuals, families, and institutions. A family's social capital is the set of resources and opportunities that exist through its relationship with other individuals and institutions. We need to understand the ways in which families create and maintain social networks with extended relatives and friends or use the resources of local community organizations. We also need to understand how these networks foster the development of skills among children and adults.

4. Building Strong Neighborhoods

Neighborhoods and the capital they contain (both social, physical, and human capital) strongly shape social networks and the daily activities of local residents. A neighborhood environment can facilitate or inhibit the life chances of its residents. As our society becomes increasingly urban and segregated by race, class, and income, the neighborhoods may be increasingly important in shaping the opportunities of their residents. Research on neighborhoods includes looking at the importance of social networks among geographically proximate adults and children, the role of neighborhood organizations and institutions on the lives of residents, the negative effects of crime, decaying housing, or gangs within a neighborhood, and the causes of local economic development. Appendix IV lays out a more detailed future research agenda in this area, including investigation into such issues as:

Neighborhood change. Neighborhood change has typically been viewed as evolutionary, proceeding through specific stages. More expanded and multivariate models need to be developed, focusing on such issues as the rapid industrialization of previously rural communities, the role of financial and land development sectors in influencing neighborhood change, or the role of increasing ethnic diversity in neighborhood change.

Neighborhood social processes. We need to understand the processes that occur within the confines of the neighborhood, such as peer interactions, or street level social control exerted by gangs or by neighbors. We also need to understand the interaction between neighborhoods and their larger environment,

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such as population migration, diffusion of social norms and practices between areas, or the interaction between neighborhood institutions and larger economic and urban institutions.

Neighborhood organizations. Neighborhood organizations are important in developing human capital among residents. We know too little about the long-term effects of the involvement by neighborhood residents in such activities as local political parties, youth centers, or religious institutions.

5. Reducing Disadvantage in a Diverse Society

America is and always has been a society of diverse peoples. Growing immigration has led to increases in diversity in recent years. Diversity has been linked to disadvantage as certain groups, identified by race or ethnicity, have long faced different economic opportunities and outcomes, limiting their contribution. To develop the human skills of all citizens of this country, we need to find ways to meet the social challenges that diversity represents. Appendix V lays out a more detailed future research agenda in this area, including investigation into such issues as:

The nature and consequences of diversity. The tendency to categorize people into groups is fundamental to the human species. We need to understand better how people categorize different ethnic, racial, and gender groups. Potential insight into policies that address the problems of diversity can emerge from research into how individual perceptions of social categories are changed, including the role of interpersonal contact, the expressed opinions of public leaders, and the role of the mass media.

Understanding group disadvantage and its effects. We know that groups differ in outcomes ranging from education, to income, to health status. While we are able to document the direct role of discrimination in producing disadvantage in some of these areas, we have had less success in understanding how discrimination and disadvantage overlap and reinforce each other. For instance, there is often a marked difference between what is judged discriminatory by different persons and groups. We need to better understand the persistence of behaviors that are categorized as discriminatory, as well as the development of perceptions of discrimination by disadvantaged groups. At the level of the individual, we need to understand why some persons are better able to cope with and overcome disadvantage and discrimination in their background, while others are blocked by it.

Economic and political influences on group disadvantage. Not all group outcome differences are due to current discrimination. The impact of past disadvantage and discrimination have left some groups more vulnerable to economic and social change. By better modelling and measuring the impact of economic change on more disadvantaged families, we can develop a clearer idea of how disadvantage is perpetuated. Similarly, we need to explore the differential impact of government policies designed to correct disadvantage on different groups.

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6. Overcoming Poverty and Deprivation

Problems of poverty and deprivation have been remarkably stubborn in the United States. In 1992, 37 million Americans (14.5 percent of the population) lived in families whose income was below the U.S. poverty line. Other problems of deprivation, beyond income poverty, may be even more disturbing: growing homelessness, rising incarceration rates due to violence and drugs, or high illiteracy rates. Scientific research on poverty and deprivation has helped to better define and describe the causes of poverty and has been instrumental in both designing policies to combat poverty and in accurately evaluating their effectiveness. Appendix VI lays out a more detailed future research agenda in this area, including investigation into such issues as:

Jobs and the changing economy. Real wages in low skilled jobs have fallen steadily, increasing concern about prospects for the working poor. We do not yet fully understand the causal forces behind these changes. Further research is needed to model and measure the effect of changes in international product and labor markets on less skilled U.S. workers. We also need to better understand the incentives that drive the working poor, as well as the barriers and disincentives that affect those who don't work. Such research could investigate how demographic changes in family structure relate to long-term trends in labor market participation by different gender and ethnic groups.

Families and poverty. Families serve as the primary social institution that nurtures children and prepares them for adulthood. Research indicates that family poverty negatively affects the cognitive and emotional development of children. Further research in this area could focus on the causes and consequences of the growing number of single mothers, particular those who are never married, where we know too little about the causes of teen pregnancy or how to prevent it. Similarly, we understand too little about family-level differences that produce wide differences in child-related outcomes among low-income families. Some children from poor families become effective and successful adults while others develop serious emotional and behavioral problems. More attention to the parenting strategies associated with resilient and effective children is necessary.

Institutions, policy and poverty. Individual behavior is shaped by government institutions and policies, such as education, criminal justice, transportation and political systems, as well as key government programs like social security, welfare, or tax systems. We need to learn more about the way in which programs designed to reduce poverty actually shape the lives of low-income families. Among other things, this includes attention to school effectiveness, to welfare and income transfer programs, and to criminal justice institutions and policies.

IV. Data Needs

Our research on human capital issues is limited by the data available. There are several key areas where additional attention to data set design and collection could provide substantial scientific rewards.

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The extension of longitudinal data sets. Over time, persons invest in skills, form families, and make employment decisions. While point-in-time data on individual behavior is useful, many of the human capital questions discussed in this report demand longitudinal data. Existing longitudinal data sets have vastly increased our knowledge of dynamic behavior. Their ongoing collection and extension is crucial. For instance, we are just beginning to have enough data within the Panel Survey of Income Dynamics to relate childhood family characteristics to the labor market outcomes of young adults 10 to 15 years later.

Collecting data from multiple sources with multiple perspectives. Research on human behavior is complex because human beings are affected by so many external forces. Much of our data focusses on limited aspects of human behavior. Economists tend to collect data on income and employment; sociologists focus on family and neighborhood environments; psychologists ask about mental and cognitive functioning. More data sets need to link information from multiple disciplinary perspectives. This may mean including economic and psychological measures on individual surveys, and linking this with external data on neighborhood and school characteristics, as well as the workplace where individuals are employed. Only with this sort of multiple-source and multiple-perspective information, can we effectively investigate the linkages between individuals and families, families and neighborhoods, and families and government institutions and policies.

Imbedded studies, that merge alternative forms of empirical analysis. Some of the most promising new empirical work in recent years has used multiple empirical techniques, administering large-scale individual surveys of employment and family behavior while also directing more intensive interview techniques to a subset of the survey population. For instance, researchers may use focus groups, psychological methods, or ethnographic work to gather more nuanced and complete individual information as a supplement to standard survey results.

VI. Methodological Needs

Methodological limitations also constraint research on human capital issues. Across the social and behavioral sciences, there is a need for greater development of our theoretical and analytical tool-kit to analyze key questions.

Analytical techniques for dynamic questions. Questions about dynamic behavior require complex modelling and empirical techniques, that estimate the effect of multiple events in a persons' past history on current behavior. While our understanding of time-dependent analysis has greatly increased over the past few years, there are still serious limits to what we can do. Expanded methodologies for dynamic modelling would provide much clearer answers to questions about sequential employment and promotion patterns, movements in and out of schooling and training among younger workers, or changes in family composition over time.

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Models that link individual behavior to family and environmental characteristics. Providing better policy prescriptions from research on human capital issues requires better modeling of the simultaneous nature of the interactions between individuals and their families. It also requires the development of better models that link micro-level development and decision-making processes among individuals with the macro-level institutions and environments with which individuals interact.

Exchange between the social and behavioral sciences on human capital research problems. In part because of disciplinary boundaries, different social and behavioral sciences tend to focus on different levels of behavior. Psychologists investigate individual cognition and motivation; economists look at individual choices regarding schooling and jobs; political scientists tend to study institutions, while sociologists typically study groups and neighborhoods. It is the interaction between these different levels of behavior that is often crucial to fully understanding human capital issues. A coordinated research agenda that explicitly includes shared information and conversations across these and other disciplines would expand the understanding and knowledge base of researchers in separate disciplines.

VII. Organising a Research Strategy on Human Capital

A coordinated strategy for major new research on human capital issues will necessarily have many components.

Individual research projects within disciplines. The core of any research initiative is top quality scholars with the interest and background to conduct useful research on human-capital related questions out of their disciplinary perspective. Funding individual research projects by one or a small group of within-discipline collaborators is central to encouraging scholars to become engaged in human capital-related research.

Research centers or research networks. While much good work is done by scholars working on their own, it is often useful to fund groups of scholars who may not be collaborating on single projects, but whose work and research interests overlap. Any such funding should be explicitly designed to include researchers from a variety of disciplinary perspectives. While this traditionally means providing funds to a university which then serves as the geographic location for a research center, those involved in these centers should include researchers from other locations as well.

Graduate training programs. Attracting the best young scholars into active research on human capital questions throughout the social and behavioral sciences is the best way of encouraging long-term scientific interest in this topic. Some of this occurs when students are hired to work as research assistants for senior scholars funded through the initiative. There may also be a role for graduate training programs aimed at attracting and training young scholars, such as the one currently funded by the NSF on race and urban poverty issues. Run jointly by two universities, it is designed to supplement the disciplinary training of graduate students in the social sciences.

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Data collection efforts. In addition to specific research projects, building the tool-kit of scientists through improved data is important. Section V of this report lists some key data needs with regard to human capital research. Any research strategy should involve expanded data collection efforts, with priority to data that can be useful in a broad range of research questions.

Multi-disciplinary coordination. Any research strategy should explicitly work to expand conversations and research networks across scholars working on similar problems from different disciplinary perspectives. This will provide opportunities to share results, to talk about different theoretical and methodological perspectives, and encourage future collaboration.

Dissemination of research results in the policy community. One of the primary reasons to undertake the human capital initiative is its close connection to key policy concerns. Any research strategy should promote the dissemination of research results within public forums, help establish networks and conversations between policy-analysts, policy-makers and researchers, and find ways to assure that the policy world is aware of scientific advances with regard to our understanding of human capital issues.

VIII. Prospects for Success in the Human Capital Initiative

There are a variety of reasons to believe that this is an extremely promising time to launch a major research agenda on human capital issues. In particular, the research community is better prepared than ever before to effectively undertake such an initiative and the policy community is better prepared to effectively utilize the results of the new research findings such an initiative would generate.

There is rising social concern with these problems. Recent years have seen a resurgence of attention to issues of stagnant productivity, inadequate worker skills, and related social problems of families, schools and neighborhoods. Both growing concern with economic competition from abroad and rising awareness of social problems in this country has fueled an expanded public discussion of the problems of inadequate skills and underutilized (or misutilized) human resources in America.

Policy-makers are increasingly consulting with the social and behavioral research community in their work. The social and behavioral sciences are more closely involved with the policy community than ever before. In part, wanting to know which policies have worked and which have not, the policy world has turned to the scientific community to design and implement evaluation studies. In part, this is due to the growing number of persons in policy-related positions who have training in the social and behavioral sciences due to the growing popularity of masters degrees in public policy analysis. Finally, stronger connections between the scientific and the policy world reflect the emergence of a number of applied policy research and advocacy organizations, who disseminate research findings and link researchers with policy analysts.

There is rising interest in the research community about these topics. The

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number of social and behavioral scientists working on human-capital related topics has grown in the social and behavioral sciences. In part, this is because rising social interest in these problems has fueled a rise in scientific interest. In addition, the availability of new data sets and new research questions relating to human resources and human capital has produced research on the cutting edge of theoretical and empirical analysis in a number of disciplines. This in turn has attracted younger scholars into the field.

There is rising interest in coordinated and multi-disciplinary conversations on these topics. Over the past several years, a variety of multi-disciplinary groups have been formed to work on some of these issues. For instance, the Social Science Research Council brought together a broad group of social and behavioral scientists to study extremely poor urban ghetto neighborhoods in the late 1980s, generating a series of new research studies and data collection projects. These projects have created research networks among scholars in different disciplines interested in human capital questions and increased the general interest throughout the research community in such shared conversations.

IX. Conclusion

This report proposes a research strategy to launch the human capital initiative within the National Science Foundation. The impetus for this initiative comes out of growing social concern over this nation's inadequate utilization and development of the human capital of its citizens, and the awareness that better use of our human resources is necessary to maintain the long-term economic strength and social health of this country. Past research in this area has been used extensively in the design of policy and in the public understanding of these issues. Further research, particularly a major coordinated research effort that engages top quality scientists in a wide variety of questions relating to the development of human skills and human resources, promises large future rewards. To be successful, such an initiative will require expanded resources. The NSF is particularly well positioned to coordinate this effort, with the establishment of the new Social, Behavioral and Economics Research Division. A research agenda in six key topical areas is developed in this report, along with proposed directions for the organization and implementation of the research strategy.

DRAFT

August 30, 1994

**MEMORANDUM FOR EDUCATION, TRAINING, AND RE EMPLOYMENT
GROUP PRINCIPALS**

FROM: Bill Gaston, Economic Policy Council
Gene Sperling, National Economic Council
Paul Dimond, National Economic Council
Henry Kelly, Office of Science and Technology Policy

SUBJECT: Decision Memorandum on the Technology Learning Challenge

This memorandum presents options and recommendations for your decision on a Technology Learning Challenge (TLC). TLC is designed to realize the potential of interactive learning technologies to empower learners of all ages to achieve one of the Administration's highest priorities: Goals 2000 (see Attachment 1 for description of full TLC). TLC includes a number of components, only three of which have impacts on the FY96 Budget and require your attention now:

- **Challenge Grant** -- recommendation on the appropriate management and funding of a challenge to learning communities all across the country to develop and to integrate engaging learning content designed to implement one or more of the objectives of Goals 2000 into state-of-the art, interactive technologies in schools, homes, workplaces, or other places of learning.
- **Longer Range R&D** -- recommendation to support the cross-cutting, inter-agency review process to make longer range research, development and demonstration on improving learning productivity one of the high priority investments for the President's FY96 R&D budget [The Science and Technology Advisor, and Director of OMB on behalf of the member agencies of the National Science and Technology Council (NSTC) have previously circulated memoranda detailing the scope of this review, which is now being conducted by the Committee on Education and Technology (CET) of the NSTC. The ETR Working Group has cooperated fully in this effort, and we have coordinated closely with CET to avoid any duplication of effort. The proposed recommendation serves to reiterate the importance -- and difficulty -- of achieving this R&D interagency cross-cut for the FY 96 Budget and, thereafter, for effective implementation.]
- **Digitization** -- recommendation on funding to support digitization to make the wealth of archive materials in federal repositories (e.g., Library of Congress, Smithsonian, National Archives and Records Administration) readily accessible to interactive learners across the country, and redirection of existing formula-driven library construction program to fund digital libraries.

This memorandum provides a discussion of each of the three recommendations and asks for your approval of specific options (see decision blocks on pages 7-9). The suggestions and recommendations arising from a Deputy-level meeting of the ETR on August 11 are incorporated herein. Background information on the ETR and a summary of the TLC vision is provided in Attachment 1.

RECOMMENDATIONS

This Administration has made a major commitment to serious education reform, guided by the Education Goals set forth in Goals 2000. We have made an equally serious commitment, through the National Information Initiative and related initiatives, to promoting the development and use of information technologies that have the potential to affect all Americans in both the workplace and at home. The question before us is, can we bring these two commitments together in a plan of action that supports the goals of both and catalyzes local communities to seize the tremendous opportunities that each initiative provides? The three recommendation areas that we bring to your attention below represent the first steps in our TLC proposal that we feel can seize this opportunity.

A. The Funding and Management of a Challenge Grant Program. The Challenge Grant Program is designed to catalyze learning communities to develop and to deploy the relevant learning content and curriculum that will enable them to achieve one or more of these Goals 2000 objectives among the respective populations of learners -- now and over the next five years for this generation of learners, not sometime in the 21st century for succeeding generations. This Challenge is not a long-range R&D or demonstration project designed to achieve great leaps in technology or basic research. It is instead a concerted strategy -- consciously modeled after the President's Empowerment Zone Challenge which has been led by the Vice-President -- to realize the full potential of interactive learning for this generation of students.

As part of the ETR subgroup's work on this issue, we asked participating agencies to create and submit mock applications as if they were an eligible learning community. As a part of this process, we asked them to think about this challenge grant program in relation to other agency education/training initiatives, particular agency expertise that could be brought to bear, and the nature and amount of Federal funding. We also reviewed a wide range of Agency technology and learning development and deployment applications. We consulted with learning theorists; academics; teachers; students; developers of learning standards, assessments, curriculum, software and games; and experts from the cable, telephone, TV and entertainment programming, and computer industries. This input enabled us to craft a fairly detailed program description along with three options on how the program can be managed and funded. In this section we summarize the program description and lay out the three options for your decision.

Purpose of the Program

The purpose of the Challenge Grant Program is to stimulate community-based design and implementation of creative new uses of technology to advance life-long learning objectives of Goals 2000 for all Americans.

Why it is Needed

There are five major reasons why a new learning Challenge Grant Program is needed:

- Despite all of the activity and growth in communications and information technology, there is a major under-investment in learning-content that can be accessed through these technologies;
- Existing markets for learning technology are fragmented and hard to reach -- particularly in schools and small businesses;
- Requirements for developing learning content are still poorly defined by potential users (schools, homes and workplaces);
- Those few learning-content products that are being developed tend to be limited in scope, and successful concepts have not yet moved to larger markets;
- The essential learning communities (e.g. the makers of learning standards, curriculum, and assessments; developers of interactive multi-media tools, games, and entertainment; teachers, students and parents; schools, workplaces and homes; and the competing providers of interactive networks or portable learning kits to connect them together) necessary to capture the potential of interactive learning technologies have been slow to form.

Program Description

The Challenge Grant Program would be modeled after the Empowerment Zone program, in that it would challenge learning communities all across the country to bring together the critical elements of a successful learning technology application in a way that helps schools, businesses, families and the community as a whole meet one or more of the objectives of Goals 2000. These elements could include, but need not be limited to, some consortium of schools, colleges and universities, local businesses, content experts (including teachers), learning and cognitive development experts, software designers (broadly defined here to include video, music, and computer graphics designers), and telecommunication firms.

As in the case of the Empowerment Zone application process, we expect that the most important achievement of the challenge is likely to be the creation of community teams that can use existing resources to work together to improve interactive learning focused on advancing Goals 2000. A relatively small Federal funding "carrot" focused on the development of learning content and curriculum only should be sufficient. Hardware and network capacity or connections would be provided by the proposal team. Unlike the Empowerment Zones, the definition of "community" would be broadened to include both communities linked by geography (a city, state, or region) and "virtual" communities linked by a common interest (disabled groups, nationwide teachers of math or history, small businesses with common training problems, etc.).

Program Criteria

Applications would be judged on the following types of criteria:

- Does the application offer a creative new vision for using technology to advance one or more of the lifelong learning objectives in Goals 2000?
- If successful, are the results readily exportable to other communities on a profit-making basis? [Note: The federal government would explicitly eschew any ownership of patents, copyrights, and other intellectual property interests. Our goal is to catalyze new markets for creation, deployment and use of interactive learning tools, not to share in the ownership of products.]
- What is the extent of investment by the partners in the plan?
- What is the evidence that the proposed program will succeed, what benchmarks will be established, and how will progress toward the goals be evaluated?

Program Cost

One key question is, "How large a grant would be needed to entice a learning community to make the effort to craft a proposal and implement it if accepted?" Based on our discussions and the mock applications, we estimate that an effective challenge grant program would include:

- 10-15 grants of \$4-6 million/year for 4 years;
- 100 grants for \$500 thousand/year for 4 years

Total: \$100 million/year for 4 years.

We believe that this approach provides sufficient incentives to generate large numbers of mutually self-interested learning communities to join together to create and to use state-of-the-art, interactive learning tools designed to realize one or more of the objectives of Goals 2000. We also believe that the diverse communities will provide substantially larger investments in developing the content and curriculum for engaging interactive multi-media learning tools, and that the several competitors for the NII and alternative portable communication devices will be major investors in the more costly hardware and software necessary to demonstrate the potential depth and reach of this market. And, as with our experience with the empowerment zone applications, learning communities that enter the process seriously will find resources, mutuality of interests, and potential they never knew they had -- whether or not they "win" a federal award. Finally, the Challenge Grant will provide a continuing focus: for making the objectives of Goals 2000 real to learners all across the country, and highlighting the potential of interactive learning technologies in learning markets in schools, homes, firms, and communities all across the country.

Management and Funding Options

There is consensus at the Deputy level on the need for effective inter-agency participation, coordination and support of the grant program from the outset. Participating agencies could include DoED, DoL, DoD, DoC, HHS, DoE, NSF, NEH, NASA, OSTP, OVP, OMB, NEC-DPC. There is also consensus on the need for line responsibility and funding in one, or at most two, agencies. To gain the full benefit of the diverse agency expertise and full cooperation of each agency, however, there is also consensus that effective joint management is appropriate -- for example, through the detailing of experts from other agencies to the agency with lead responsibility for implementation. In addition, each participating agency can add particular support for the planning and implementation of this Challenge Grant program. For example, the Department of Commerce may prove particularly helpful in encouraging the support and involvement of private sector firms, in addition to coordinating the Challenge Grant process with DOC's lead responsibility for the NII. Similarly, DOL may have particular insights and expertise on shaping and implementing the Challenge Grant process to serve incumbent workers, while HHS may have insights on how preschool learning communities can be encouraged to participate. There is also consensus that this Challenge Grant -- as with the Empowerment Zone Challenge -- should be supplemented to the extent practicable and feasible with related Agency technical assistance and support (e.g., from the Department of Energy Labs and NASA education centers) and grant programs (e.g., DoEd Goals 2000 or School-to-Work applications, DoC technology deployment grants).

Finally, there is consensus that the White House must be actively involved in a Challenge Grant program of this political and substantive importance to implementing Goals 2000, and that the Vice-President is uniquely qualified to inspire public outreach and to provide leadership for this TLC Grant program.

The question is, which agency should have line responsibility? The Department of Education has the primary mission in this area, especially since the passage of Goals 2000, but the Department of Defense has unique experience in this field and unique dual-use needs. The Departments of Labor, Commerce, and Health and Human Services also have important major interests in this program.

After lengthy discussions with the relevant agencies, and an examination of the results so far of the FY 95 Appropriations process for these agencies, we have come up with the following three options on funding and managing the Challenge Grant Program:

Option (1) Direct all funding to ARPA in DoD

Advantages:

- Comparative ease of adding funding in a respected and experienced R&D agency
- Strong program management abilities
- Proven track record in development of technology for learning

Disadvantages:

- Pre K-12 education is not central to DoD mission
- Not entirely consistent with shift to civilian R&D
- Links to the Administration's major education and training initiatives (Goals 2000, ESEA, and School-to-Work) would be unclear
- Little experience with such a wide-ranging challenge to learning communities all across the country to capture the full potential of the current state-of-the-art

Option (2) Direct all funding to DoED

Advantages:

- Mission covers most relevant learning communities -- philosophically consistent with other education and training initiatives and with the mission of Goals 2000
- DoED needs to develop R&D expertise in learning technologies to support its mission
- Builds on possible ESEA funding available in FY95 for this purpose to enable starting Challenge Grants as soon as the President wishes to announce this campaign

Disadvantages:

- Administration difficulties in getting FY 95 education priorities through relevant appropriations committees
- Little experience with managing R&D

Option (3) Combined program with programs for children and youth (pre-school through school to work and college) funded through DoED and programs for adults funded through DoD.

Advantages:

- Most likely to achieve total funding needed
- Follows successful model of Empowerment Zones using HUD and USDA funding combined with an interagency management process
- Would require even closer collaboration if not actual joint management by the personnel from the two lead agencies

Disadvantages:

- Two funding agencies requires more complex management structure
- Funding would require dealing with more Congressional committees
- Could discourage proposals combining programs for children and adults

ETR Recommendation. We recommend Option 3, a combined DoEd/DoD program with a joint management effort between DoD and DoEd and active participation, review, coordination with an interagency team and the White House. The broader interagency team would be charged with

designing the application, implementing outreach efforts with their various constituencies, review and selection of applications, and coordination with their own grant programs or other relevant resources. For any reason if Option 3 cannot be achieved, then Option 2 can be an effective alternative, particularly if the DOD expertise in this field is fully integrated by the detailing of experienced staff for a virtual DoEd-DoD joint management of the Challenge Grants at DoEd.

Decision

___ Option 1

___ Option 2

___ Option 3

___ Discuss

2. Longer Range, Federal Research, Development, and Demonstrations on Improving the Productivity of Learning. Research, development, and demonstrations aimed at improving the productivity of learning in the longer range for the next century are another important part of the overall Technology Learning Challenge. As set forth in the August 5 memorandum from OMB Director Rivlin and Science Adviser Gibbons, learning productivity is one of the seven priority areas for research funding in this Administration, along with, for example, the environment, a new generation of vehicles, and peacekeeping in the post Cold War era.

Fragmented and uncertain markets and high risk have discouraged private R&D in this area-- the primary exceptions being entertainment markets and projects focused on sophisticated military or industrial training requirements. We do not currently have a well-balanced federal R&D program on technology and learning, and fragmented management runs a high risk of poor use of existing assets. Aside from R&D supported in DOD, Energy, and NASA, research funding to plumb the potential of learning technologies to improve learning productivity is virtually nil in the main line ETR agencies -- DoEd, DoL, HHS, and DoC.

There is -- and should be -- some overlap between the Federal R&D agenda and the Challenge Grant Program: evaluation of the results of the implementation of the Challenge Grant program will provide a wealth of information and a seedbed of natural experiments that can feed back into the longer range R&D plan. In contrast to the Challenge Grants, longer range, federally-funded R&D projects will generally fall in higher-risk areas; and the design and results will be less targeted on meeting the current objectives of Goals 2000 and more focused on the relationship between learning, cognition, intelligence and learning technologies for the 21st century.

Close coordination between the Challenge Grants and federal R&D is crucial to the success of the overall Technology Learning Challenge initiative in the generation to come. Consistent with this, Alice Rivlin and Jack Gibbon's August 5 memorandum to NSTC agencies states that the activities of the ETR in this area will not duplicate the NSTC reviews and assessments of Federal research, development, and demonstrations in learning technology, "but will incorporate the results of relevant NSTC assessments into their analysis." At the working level, this coordination is already taking place: Madeline Kunin and Henry Kelly, co-chairs of the NSTC Committee on Education and Training (CET) effort, are active ETR participants, as are the co-chairs of the CET's Subcommittee on Education and Training (Research and Development), Sharon Robinson (DoEd) and Lou Finch (DoD).

Our review of the NSTC/CET's progress in this endeavor reveals that there is a significant amount of work that needs to be done in a short period of time to enable the NSTC/CET to fully understand, let alone coordinate federal R&D across the agencies in this crucial area. With this in mind, and with the full support of the NSTC/CET representatives on our working group, we offer the following two recommendations to the ETR principals for your approval/disapproval:

Recommendations:

- (1) The ETR should fully and formally support the NSTC/CET's efforts (a) to craft a detailed plan for federal activities in this area, (b) to estimate the priority and funding recommended for this major R&D area, and (c) to recommend how each participating agency can best contribute to the research needed. (A list of critical R&D areas prepared by the CET is listed in Attachment 2).

___ Approve

___ Disapprove

___ Discuss

- (2) Demonstrations of learning technology that stress the state-of-the art are critical for identifying research needs and testing concepts in realistic learning environments. Agencies with education and training missions should work closely with the technology agencies in the CET group to define a small number of ambitious demonstration projects that could become the focus of major interagency efforts. The group should, in coordination with the ETR's Technology Learning Challenge, propose ways of funding demonstrations in FY95 as well as suggesting appropriate funding levels for inclusion in FY96 requests (Attachment 3 shows a representative list of demonstrations).

___ Approve

___ Disapprove

___ Discuss

3. Funding for Digitization of Federal Resources Digital representations of text, sound recordings, data, photographs, motion pictures, and other information are key raw materials for learning technologies. Once digitized these materials can be stored, copied, and communicated throughout the nation and the world at very low cost. The federal government controls access to unique collections of information whose availability in digital form could greatly accelerate development of content and use of learning technology. This is especially relevant to the progress of the overall Technology Learning Challenge initiative, as schools and adult learning institutions begin to come "on-line" and teachers, curriculum builders, and trainers look for materials to build exciting and meaningful learning content. To accomplish this, we offer four relatively minor technical and funding recommendations for your approval/disapproval.

Recommendations:

- (1) The authorization for the Library Services and Construction Act LSCA Title II should be changed to encourage use of the funds (FY94 authorization \$18 million) for development and dissemination of digital resources. The "construction" funding provided by Title II is now spread so broadly by formula allocations that US libraries are not well served by the program. If redirected to take advantage of emerging information technology, the LSCA would provide libraries with powerful and practical new information resources.

___ Approve

___ Disapprove

___ Discuss

- (2) While adequate funding appears to be available in NASA, NOAA, USGS and other agencies for making technical information available in digital form, resources for digitizing cultural resources are inadequate. \$4 million should be made available to a consortium of the Smithsonian, the National Archives, and the Library of Congress for a major coordinated program to digitize historical archives.

___ Approve

___ Disapprove

___ Discuss

- (3) Support the NEH request for an increase in appropriations for their digital resources program from \$11M in FY95 to \$21M in FY96.

___ Approve

___ Disapprove

___ Discuss

Attachment 1

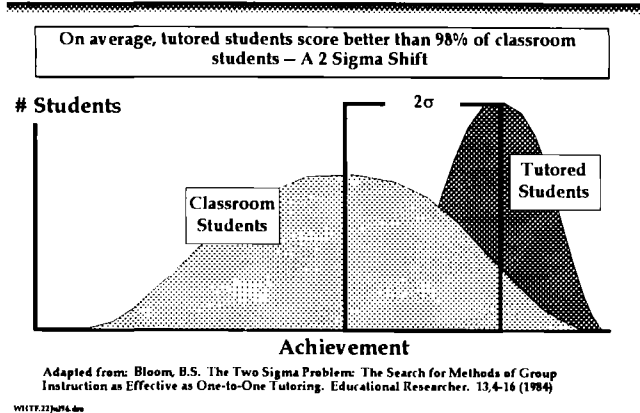
1. BACKGROUND.

A. The ETR Working Group. As you know, the President set up the ETR Group in February 1994, with a mission to develop Administration policies to help implement the President's lifelong learning and workforce development agendas and to coordinate enactment of related legislation. The ETR Group is co-chaired by Carol Rasco, Assistant to the President for Domestic Policy, and Bob Rubin, Assistant to the President for Economic Policy, with Bill Galston (Deputy Assistant to the President for Domestic Policy) and Paul Dimond (Special Assistant to the President for Economic Policy) heading up the work of the ETR Group. Members of the Policy Group include the Departments of Education, Labor, Health and Human Services, Commerce, and Defense, as well as the Offices of the Vice-President, Science and Technology Policy, and Management and Budget.

B. The TLC Subgroup. ETR formed a small number of sub-groups. The TLC subgroup focuses on learning productivity and is examining the extent to which learning technologies may provide an important lever to help the Nation achieve Goals 2000. This sub-group is headed by Paul Dimond, with the assistance of OSTP's Henry Kelly, the White House Co-Chair of CET. The work of this subgroup led to an ETR Seminar on Improving the Productivity of Learning, hosted on July 9 by Deputy Secretary of Defense John Deutch and attended by Deputies from most of the ETR-member agencies, as well as representatives from other interested agencies (e.g., Department of Energy and NASA).

The seminar shared a vision of the potential of emerging interactive technologies for improving learning and a concept for how we might create a sense of national excitement and purpose around this vision to help the President make Goals 2000 real for every American. To better focus this discussion, seminar participants were able to view and, then, to participate in a series of real-life demonstrations of DOD learning technologies: these technologies are already in place and have had a measurable impact on improving the quality and lowering the cost of training of DOD personnel in a wide variety of occupations, missions, and settings. The goal of DOD in using such interactive learning technologies is breathtaking: to engage each learner so actively and effectively in the process of learning that the measured outcome approaches the levels possible through the use of an individual tutor for each student at a fraction of the cost:

Learning Productivity High-Tech Learning is Effective



C. Work on the Technology and Learning Challenge. To examine the potential of such a dramatic vision for making the achievement of Goals 2000 a reality, the ETR Deputies directed the subgroup to launch work on a series of related program and policy proposals that will ensure that the promise of learning technologies is realized. In response to this directive, the subgroup charged a series of interagency working groups to address specific components of the TLC. They were asked to review FY96 Budget issues that must be considered promptly and to prepare a more detailed plan outlining non-budget program and outreach issues by early November, 1994 so that we are prepared to launch a coordinated and comprehensive TLC as soon thereafter as the President may direct. The TLC work is divided as follows:

Task Description	Team Leaders
Challenge-Grant Competition for Learning Communities to Develop and Use Interactive Learning Tools	Henry Kelly (OSTP)
Interagency Plan for Research, Development and Demonstration on Learning Technology	Sharon Robinson (DoEd) and Lou Finch (DOD), Co-chairs of the R&D subcommittee, NSTC Committee on Education and Training
Federal Digitization Resources	David Lytel (OSTP)
Using the National Information Infrastructure for Education and Training	Tom Kalil (NEC), Jonathan Sallet (DOC)
Use of Learning Technology in Major Federal Education and Training Programs	Rob Portman (DOL), Mike Schmidt (DPC)
Procurement of Learning Technologies for Defense and Federal Civilian Training	Mike Schmidt (DPC)
Outreach	Jim Kohlenberger (OVP)

The Decision Memorandum includes our recommendations on the first three tasks only because of their implications for the FY96 Budget.

2. THE TLC VISION

"The television, the set-top-box, the personal computer, and the telephone won't exist anymore; their descendants will."

Fortune Magazine, August 22, 1994

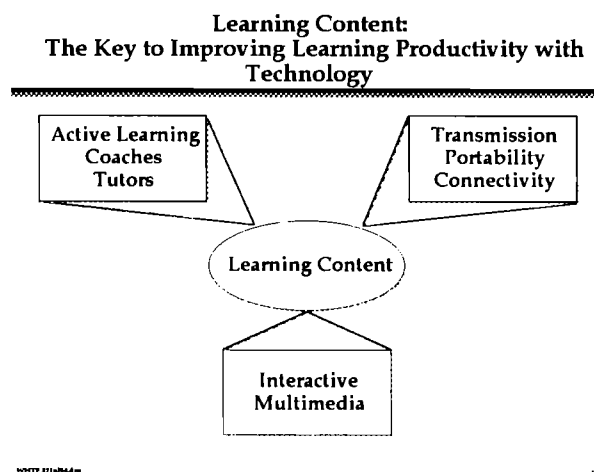
A. The Opportunity This quotation summarizes the state of interactive communication technology in the country today: rapid turnover in communication products and continuous innovation in the means of interaction offer the potential to transform the lives of all Americans. The telephone companies and cable companies are about to engage in a "land rush" to connect all parts of America to a cheap and affordable means of participating in networks to plug and play all variety of interactive, multi-media communications devices. To remain competitive, satellite, wireless, and providers of portable programming (e.g., CD ROMS) will have to find new ways to deliver and finance their products. The open question is whether engaging, interactive learning curriculum will play across this revolutionary multi-media network in schools, homes, workplaces, and other places of learning in communities all across the country. The Technology Learning Challenge is designed to decisively answer this question "Yes" so that new tools -- true learning levers -- will enable learners of all ages to achieve the world-class objectives set for the Nation by the President in Goals 2000.

B. The Problem Looking back over this century, the prospects for any such new technology impacting how we learn appears improbable at best. While virtually all other sectors of our economy have been transformed by technological innovation and accompanying structural reorganization in the twentieth century, education and training in schools (and to a lesser extent in the workplace) look much like it has for generations. Computers and advanced communications technologies may be revolutionizing banking, finance, entertainment, and many other information-rich businesses, but they have had little impact on learning productivity. The most advanced communication system in most classrooms is not even the telephone. Instead, it is the classroom bell and the public address system, both of which only serve to further reinforce the traditional "mass-production" isolation of students and teachers in separate classrooms during the typical school day. Equally troublesome, this industrial model of mass education in isolated classrooms often fails to engage students in active learning as they are forced to listen passively to a teacher talking in the front of the class. "Drill and Kill" rote computer programs and aging PCs sit in the back of such classrooms or in separate "labs," largely unused and largely unuseful for improving the learning enterprise. Improving the productivity of learning in schools has proven a most difficult task for generations of reformers.

The impact of technology on improving learning at home has not been much better. For example, many argue persuasively that the TV still operates in most homes as a pacifier for children and youth, a passive form of entertainment to wile away hours. Similarly, most of the interactive games have proven much more engaging than instructive, largely because they have little learning content let alone a curriculum to provide a pathway to discovery, exploration, or achieving any learning goals. We run the risk that the next generation of programming that plays

on the information superhighway will include only home shopping, movies on demand, violent games, and narrow casting to suit every personal fancy, but precious little interactive learning.

C. Three Converging Shifts in Paradigm. Three major shifts in paradigm are now converging that provide a new base for launching a revolution in the productivity of learning in schools and homes, as well as in workplaces:



First, a new consensus is emerging about the dynamics of learning: The primary work of learning is done by the learner, not the instructor. All students learn at their own pace, often in different styles. Learning is more engaging for the student if it involves active interaction and occurs in a meaningful context, rather than through passive listening in the abstract. In this new perspective, the role of the teacher shifts from a "talking head" imparting knowledge onto the students to a learning "coach" or "tutor" working with students who are actively exploring issues and ideas in a contextual setting. To effectively implement this active approach to learning, clear goals and engaging content and curriculum are essential.

Second, as we have seen demonstrated by DOD experience with training, new technologies are emerging -- in computers, simulation, data compression, multi-media -- that do offer new ways for learners and their coaches and peers to engage actively in learner-centered environments. Sophisticated simulations allow learners to experiment and explore using simulated equipment (telescopes, submarines, etc.) walk freely through ancient cities, or conduct experiments in exotic environments (jungle settings, outer-space, etc.). We can exploit this potential, however, only if we can bring the creators of these new technologies together with the makers of essential learning content to transform games, information and entertainment into engaging curricula for all ages, interests and styles of learners.

Third, diverse means of transmission, telecommunication and portability are being developed that will enable such learners to connect with these learning tools -- and with other learners, experts and tutors -- in schools, daycare centers, workplaces, and homes. Virtual learning communities can thereby be created that will enable students of all ages to use these new learning tools at all hours of the day, weekends, throughout the year. The extent of learning and the effectiveness of teaching no longer need be a prisoner of the amount of time in the classroom

at school nor a captive of passive watching in front of TV at home. What is needed is engaging, entertaining content and curriculum that will entice learners of all ages to play a new game -- learning to meet Goals 2000.

D. A Political Case Study of the Convergence of the Three Paradigm Shifts. Most policy pundits and industry cynics assume that America's school teachers will either stoutly resist such change out of fear of job loss or will serve as an inertial anchor that prevents change out of ignorance or indifference. The rank and file of teachers, and their representatives, have taken a much different stance: they are demanding that schools not be left out of this technological revolution as they have been in the past with respect to the telephone, the fax and the computer. They have approached the Administration from day one to demand that the NII does not pass them by. In recent months, they have offered their insights and support for a TLC that will catalyze America's teachers to join with academics, cognitive learning theorists, multi-media and game developers, parents and schools to build a new generation of learning tools for a new generation of active learners. Teachers want to make sure that the curriculum to achieve Goals 2000 is embedded in the content of interactive simulations, games, problem-solving, and exploratory research and discovery.

Just as welcome, America's teachers are beginning to appreciate the potential buying and market-building power that schools have in their operating budgets to purchase constantly improving sources of interactive content, software, hardware, and telecommunication networking. Teachers, like administrators and taxpayers, are beginning to realize that they can't afford to waste capital budgets to buy expensive equipment and materials for schools that may prove obsolete the day after it is purchased. Teachers are beginning to appreciate that the information superhighway may develop more like a land rush paid for by competitors seeking vast new markets than a government funded interstate highway system. Teachers are beginning to understand that making a case for connecting schools and learning to the superhighway should not be based on charity, but on the potential buying power of schools and their effective gateway to connecting nearby homes and firms. Realizing this potential, however, depends on the development of learning curriculum and content for schools and homes so that the competitors for the information superhighway appreciate the enormous potential of this new learning market.

America's teachers are savvy enough to know that the President does not have the discretion in the federal budget he inherited to increase the federal share of funding the costs of elementary and secondary schooling to anything approaching 10%, as has been their call for the past 25 years. They are asking that this Administration invest the far smaller resources -- dollars, leadership, vision and focus -- in a Technology Learning Challenge that can achieve a different result: realizing the potential of interactive learning technologies to help teachers coach this generation of students to learn to the levels contemplated by Goals 2000. Such a challenge can make help make the meaning of Goals 2000 real to every parent, student and teacher and bring the reach of Goals 2000 within the grasp of every school and student by the end of the decade.

E. The Foundation for Moving Forward. TLC is our proposal to seize the opportunity afforded by such major shifts in thinking, technology, goals and politics. The Administration has already laid the groundwork for this initiative in several important ways. First, the Department of Defense has been working to integrate learning technologies into its training mission for over a

decade, and the Clinton Administration has given these efforts a high priority. As the ETR Deputies learned at a Seminar hosted by DoD on July 9, this means that we have a significant body of experience and evidence to build on as we move to influence the creation of similar technologies in the civilian marketplace.

Second, the Administration has made educational research and development a top priority through the efforts of the National Science and Technology Council (NSTC) over the past year. To underline this commitment, OMB Director Alice Rivlin and Science and Technology Advisor Jack Gibbons sent a memorandum to all NSTC agencies on August 5 listing Learning Productivity as one of seven high priority R&D areas for the FY96 Budget.

Finally, and perhaps most importantly, Goals 2000 provides an essential framework for stimulating innovation and collaboration at the local level in learning communities that are ready to develop and to deploy interactive learning technologies. At the same time, interactive technologies with engaging learning content and curriculum offer our best chance to realize many of the objectives of Goals 2000 for the Nation, including:

Preschool:

- all children will have access to high-quality and developmentally appropriate pre-school programs that help prepare children for school
- every parent will be a child's first teacher and devote time each day to helping such parent's preschool children learn.

School Age:

- all students will leave grades 4, 8, and 12 having demonstrated competency over challenging subject matter
- the percentage of all students who demonstrate the ability to reason, solve problems, apply knowledge, and to communicate effectively will increase substantially
- students will be the first in the world in mathematics and science achievement

Teachers:

- all teachers will have access to continuing professional development activities that will provide such teachers with the knowledge and skills needed to help an increasingly diverse student population learn
- all teachers will have continuing opportunities to acquire additional knowledge and skills needed to teach challenging subject matter and to use emerging new methods, forms of assessment, and technologies

Adult Learners:

- every major American business will be involved in strengthening the connection between education and work
- all workers will have the opportunity to acquire the knowledge and skills, from basic to highly technical, needed to adapt to emerging new technologies, work

methods, and markets through public and private educational, vocational, technical, workplace or other programs

- the number of quality programs that are designed to serve more effectively the needs of the growing number of part-time and mid-career students will increase substantially
- schools, in implementing comprehensive parent involvement programs, will offer more adult literacy, parent training and lifelong learning opportunities to improve the ties between home and school, and enhance parents' work and home lives.
- every school will actively engage parents and families in a partnership which supports academic work of children at home and shared educational decision-making at school
- parents and families will help to ensure that schools are adequately supported and will hold schools and teachers to standards of high accountability

Attachment 2

Research and Development Focus Areas:

- 1) Basic research on learning and cognitive processes;
- 2) New models for evaluating learning productivity; and
- 3) High-quality, affordable learning tools.

Attachment 3

Suggested CET Demonstrations:

Target Groups	Goal	Lead Agency
Pre-School	All students start school ready to learn	HHS
Grades K-8	All students leave grades 4, and 8 having demonstrated competency over challenging subject matter...	DoED
Grades 8-12	Every school in America will ensure that all students learn to use their minds well so they may be prepared for responsible citizenship	DoED
Vocational Education	All U.S. high school graduates should have increased opportunities to obtain meaningful employment	DoED/DoL
Higher Education	All graduates of higher education should be equipped for success in the 21st century	DoED
Incumbent Workers	Incumbent workers will acquire the new skills needed in the 21st century	DoL/DoD
Military Personnel	The U.S. Military shall be the best equipped, trained, and led fighting force in the world	DoD

THE WHITE HOUSE

WASHINGTON

August 23, 1994

**MEMORANDUM FOR EDUCATION, TRAINING, AND RE EMPLOYMENT
GROUP PRINCIPALS**

FROM: Bill Galston, Domestic Policy Council
Gene Sperling, National Economic Council
Paul Dimond, National Economic Council
Henry Kelly, Office of Science and Technology Policy

SUBJECT: Decision Memorandum on the Technology Learning Challenge

This memorandum presents options and recommendations for your decision on a Technology Learning Challenge (TLC). TLC is designed to realize the potential of interactive learning technologies to empower learners of all ages to achieve one of the Administration's highest priorities: Goals 2000. TLC includes a number of components, only three of which have impacts on the FY96 Budget and require your attention now:

- **Challenge Grant** --recommendation on the appropriate management and funding of a challenge to learning communities all across the country to develop and to integrate engaging learning content designed to implement one or more of the objectives of Goals 2000 into state-of-the art, interactive technologies in schools, homes, workplaces, or other places of learning.
- **Longer Range R&D** --recommendation to support the cross-cutting, inter-agency review process to make longer range research, development and demonstration on improving learning productivity one of the high priority investments for the President's FY96 R&D budget [The National Science Advisor, the Chief of Staff, and Director of OMB on behalf of the member agencies of the National Science and Technology Council (NSTC) have previously circulated memoranda detailing the scope of this review, which is now being conducted by the Committee on Education and Technology (CET) of the NSTC. The ETR Working Group has cooperated fully in this effort, and we have coordinated closely with CET to avoid any duplication of effort. The proposed recommendation serves to reiterate the importance -- and difficulty -- of achieving this R&D interagency cross-cut for the FY 96 Budget and, thereafter, for effective implementation.]
- **Digitization** -- recommendation on funding to support digitization to make the wealth of archive materials in federal repositories (e.g., Library of Congress, Smithsonian, National Archives and Records Administration) readily accessible to interactive learners across the country.

This memorandum provides: (1) background on the ETR; (2) the TLC vision; and (3) a

discussion of each of the three recommendations. The suggestions and recommendations arising from a Deputy-level meeting of the ETR on August 11 are incorporated herein.

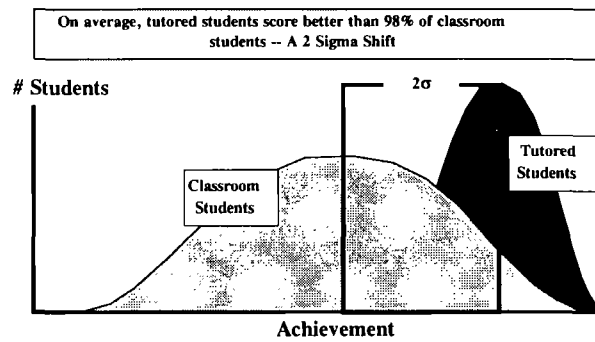
1. BACKGROUND.

A. The ETR Working Group. As you know, the President set up the ETR Group in February 1994, with a mission to develop Administration policies to help implement the President's lifelong learning and workforce development agendas and to coordinate enactment of related legislation. The ETR Group is co-chaired by Carol Rasco, Assistant to the President for Domestic Policy, and Bob Rubin, Assistant to the President for Economic Policy, with Bill Galston (Deputy Assistant to the President for Domestic Policy) and Paul Dimond (Special Assistant to the President for Economic Policy) heading up the work of the ETR Group. Members of the Policy Group include the Departments of Education, Labor, Health and Human Services, Commerce, and Defense, as well as the Offices of the Vice-President, Science and Technology Policy, and Management and Budget.

B. The TLC Subgroup. ETR formed a small number of sub-groups. The TLC subgroup focuses on learning productivity and is examining the extent to which learning technologies may provide an important lever to help the Nation achieve Goals 2000. This sub-group is headed by Paul Dimond, with the assistance of OSTP's Henry Kelly, the White House Co-Chair of CET. The work of this subgroup led to an ETR Seminar on Improving the Productivity of Learning, hosted on July 9 by Deputy Secretary of Defense John Deutch and attended by Deputies from most of the ETR-member agencies, as well as representatives from other interested agencies (e.g., Department of Energy and NASA).

The seminar shared a vision of the potential of emerging interactive technologies for improving learning and a concept for how we might create a sense of national excitement and purpose around this vision to help the President make Goals 2000 real for every American. To better focus this discussion, seminar participants were able to view and, then, to participate in a series of real-life demonstrations of DOD learning technologies: these technologies are already in place and have had a measurable impact on improving the quality and lowering the cost of training of DOD personnel in a wide variety of occupations, missions, and settings. The goal of DOD in using such interactive learning technologies is breathtaking: to engage each learner so actively and effectively in the process of learning that the measured outcome approaches the levels possible through the use of an individual tutor for each student at a fraction of the cost:

Learning Productivity High-Tech Learning is Effective



Adapted from: Bloom, B.S. The Two Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring. Educational Researcher. 13,4-16 (1984)

W1177-21.00001.doc

C. Work on the Technology and Learning Challenge. To examine the potential of such a dramatic vision for making the achievement of Goals 2000 a reality, the ETR Deputies directed the subgroup to launch work on a series of related program and policy proposals that will ensure that the promise of learning technologies is realized. In response to this directive, the subgroup charged a series of interagency working groups to address specific components of the TLC. They were asked to review FY96 Budget issues that must be considered promptly and to prepare a more detailed plan outlining non-budget program and outreach issues by early November, 1994 so that we are prepared to launch a coordinated and comprehensive TLC as soon thereafter as the President may direct. The TLC work is divided as follows:

Task Description	Team Leaders
Challenge-Grant Competition for Learning Communities to Develop and Use Interactive Learning Tools	Henry Kelly (OSTP)
Interagency Plan for Research, Development and Demonstration on Learning Technology	Sharon Robinson (DoEd) and Lou Finch (DOD), Co-chairs of the R&D subcommittee, NSTC Committee on Education and Training
Federal Digitization Resources	David Lytel (OSTP)
Using the National Information Infrastructure for Education and Training	Tom Kalil (NEC), Jonathan Sallet (DOC)
Use of Learning Technology in Major Federal Education and Training Programs	Rob Portman (DOL), Mike Schmidt (DPC)
Procurement of Learning Technologies for Defense and Federal Civilian Training	Mike Schmidt (DPC)
Outreach	Jim Kohlenberger (OVP)

Part 3 below includes our recommendations on the first three tasks only because of their implications for the FY96 Budget.

2. THE TLC VISION

"The television, the set-top-box, the personal computer, and the telephone won't exist anymore; their descendants will."

Fortune Magazine, August 22, 1994

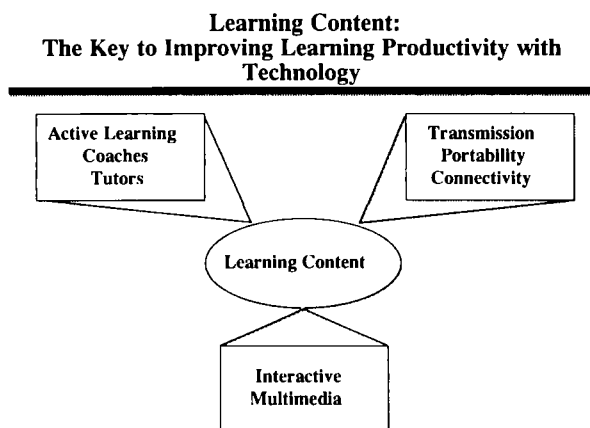
A. The Opportunity. This quotation summarizes the state of interactive communication technology in the country today: rapid turnover in communication products and continuous innovation in the means of interaction offer the potential to transform the lives of all Americans. The telephone companies and cable companies are about to engage in a "land rush" to connect all parts of America to a cheap and affordable means of participating in networks to plug and play all variety of interactive, multi-media communications devices. To remain competitive, satellite, wireless, and providers of portable programming (e.g., CD ROMS) will have to find new ways to deliver and finance their products. The open question is whether engaging, interactive learning curriculum will play across this revolutionary multi-media network in schools, homes, workplaces, and other places of learning in communities all across the country. The Technology Learning Challenge is designed to decisively answer this question "Yes" so that new tools -- true learning levers -- will enable learners of all ages to achieve the world-class objectives set for the Nation by the President in Goals 2000.

B. The Problem. Looking back over this century, the prospects for any such new technology impacting how we learn appears improbable at best. While virtually all other sectors of our economy have been transformed by technological innovation and accompanying structural reorganization in the twentieth century, education and training in schools (and to a lesser extent in the workplace) look much like it has for generations. Computers and advanced communications technologies may be revolutionizing banking, finance, entertainment, and many other information-rich businesses, but they have had little impact on learning productivity. The most advanced communication system in most classrooms is not even the telephone. Instead, it is the classroom bell and the public address system, both of which only serve to further reinforce the traditional "mass-production" isolation of students and teachers in separate classrooms during the typical school day. Equally troublesome, this industrial model of mass education in isolated classrooms often fails to engage students in active learning as they are forced to listen passively to a teacher talking in the front of the class. "Drill and Kill" rote computer programs and aging PCs sit in the back of such classrooms or in separate "labs," largely unused and largely unuseful for improving the learning enterprise. Improving the productivity of learning in schools has proven a most difficult task for generations of reformers.

The impact of technology on improving learning at home has not been much better. For example, many argue persuasively that the TV still operates in most homes as a pacifier for children and youth, a passive form of entertainment to wile away hours. Similarly, most of the interactive games have proven much more engaging than instructive, largely because they have

little learning content let alone a curriculum to provide a pathway to discovery, exploration, or achieving any learning goals. We run the risk that the next generation of programming that plays on the information superhighway will include only home shopping, movies on demand, violent games, and narrow casting to suit every personal fancy, but precious little interactive learning.

C. Three Converging Shifts in Paradigm. Three major shifts in paradigm are now converging that provide a new base for launching a revolution in the productivity of learning in schools and homes, as well as in workplaces:



First, a new consensus is emerging about the dynamics of learning: The primary work of learning is done by the learner, not the instructor. All students learn at their own pace, often in different styles. Learning is more engaging for the student if it involves active interaction and occurs in a meaningful context, rather than through passive listening in the abstract. In this new perspective, the role of the teacher shifts from a "talking head" imparting knowledge onto the students to a learning "coach" or "tutor" working with students who are actively exploring issues and ideas in a contextual setting. To effectively implement this active approach to learning, clear goals and engaging content and curriculum are essential.

Second, as we have seen demonstrated by DOD experience with training, new technologies are emerging -- in computers, data compression, multi-media -- that do offer new ways for learners and their coaches and peers to engage actively in such learner-centered environments. We can exploit this potential, however, only if we can bring the creators of these new technologies together with the makers of essential learning content to transform games, information and entertainment into engaging curricula for all ages, interests and styles of learners.

Third, diverse means of transmission, telecommunication and portability are being developed that will enable such learners to connect with these learning tools -- and with other learners, experts and tutors -- in schools, daycare centers, workplaces, and homes. Virtual learning communities can thereby be created that will enable students of all ages to use these new learning tools at all hours of the day, weekends, throughout the year. The extent of learning and the effectiveness of teaching no longer need be a prisoner of the amount of time in the classroom

at school nor a captive of passive watching in front of TV at home. What is needed is engaging, entertaining content and curriculum that will entice learners of all ages to play a new game -- learning to meet Goals 2000.

D. A Political Case Study of the Convergence of the Three Paradigm Shifts. Most policy pundits and industry cynics assume that America's school teachers will either stoutly resist such change out of fear of job loss or will serve as an inertial anchor that prevents change out of ignorance or indifference. The rank and file of teachers, and their representatives, have taken a much different stance: they are demanding that schools not be left out of this technological revolution as they have been in the past with respect to the telephone, the fax and the computer. They have approached the Administration from day one to demand that the NII does not pass them by. In recent months, they have offered their insights and support for a TLC that will catalyze America's teachers to join with academics, cognitive learning theorists, multi-media and game developers, parents and schools to build a new generation of learning tools for a new generation of active learners. Teachers want to make sure that the curriculum to achieve Goals 2000 is embedded in the content of interactive simulations, games, problem-solving, and exploratory research and discovery.

Just as welcome, America's teachers are beginning to appreciate the potential buying and market-building power that schools have in their operating budgets to purchase constantly improving sources of interactive content, software, hardware, and telecommunication networking. Teachers, like administrators and taxpayers, are beginning to realize that they can't afford to waste capital budgets to buy expensive equipment and materials for schools that may prove obsolete the day after it is purchased. Teachers are beginning to appreciate that the information superhighway may develop more like a land rush paid for by competitors seeking vast new markets than a government funded interstate highway system. Teachers are beginning to understand that making a case for connecting schools and learning to the superhighway should not be based on charity, but on the potential buying power of schools and their effective gateway to connecting nearby homes and firms. Realizing this potential, however, depends on the development of learning curriculum and content for schools and homes so that the competitors for the information superhighway appreciate the enormous potential of this new learning market.

America's teachers are savvy enough to know that the President does not have the discretion in the federal budget he inherited to increase the federal share of funding the costs of elementary and secondary schooling to anything approaching 10%, as has been their call for the past 25 years. They are asking that this Administration invest the far smaller resources -- dollars, leadership, vision and focus -- in a Technology Learning Challenge that can achieve a different result: realizing the potential of interactive learning technologies to help teachers coach this generation of students to learn to the levels contemplated by Goals 2000. Such a challenge can make help make the meaning of Goals 2000 real to every parent, student and teacher and bring the reach of Goals 2000 within the grasp of every school and student by the end of the decade.

E. The Foundation for Moving Forward. TLC is our proposal to seize the opportunity afforded by such major shifts in thinking, technology, goals and politics. The Administration has already laid the groundwork for this initiative in several important ways. First, the Department

of Defense has been working to integrate learning technologies into its training mission for over a decade, and the Clinton Administration has given these efforts a high priority. As the ETR Deputies learned at the July 9 Seminar, this means that we have a significant body of experience and evidence to build on as we move to influence the creation of similar technologies in the civilian marketplace.

Second, the Administration has made educational research and development a top priority through the efforts of the National Science and Technology Council (NSTC) over the past year. To underline this commitment, OMB Director Alice Rivlin and Science and Technology Advisor Jack Gibbons sent a memorandum to all NSTC agencies on August 5 listing Learning Productivity as one of seven high priority R&D areas for the FY96 Budget.

Finally, and perhaps most importantly, Goals 2000 provides an essential framework for stimulating innovation and collaboration at the local level in learning communities that are ready to develop and to deploy interactive learning technologies. At the same time, interactive technologies with engaging learning content and curriculum offer our best chance to realize many of the objectives of Goals 2000 for the Nation, including:

Preschool:

- all children will have access to high-quality and developmentally appropriate pre-school programs that help prepare children for school
- every parent will be a child's first teacher and devote time each day to helping such parent's preschool children learn.

School Age:

- all students will leave grades 4, 8, and 12 having demonstrated competency over challenging subject matter
- the percentage of all students who demonstrate the ability to reason, solve problems, apply knowledge, and to communicate effectively will increase substantially
- students will be the first in the world in mathematics and science achievement

Teachers:

- all teachers will have access to continuing professional development activities that will provide such teachers with the knowledge and skills needed to help an increasingly diverse student population learn
- all teachers will have continuing opportunities to acquire additional knowledge and skills needed to teach challenging subject matter and to use emerging new methods, forms of assessment, and technologies

Adult Learners:

- every major American business will be involved in strengthening the connection between education and work

- all workers will have the opportunity to acquire the knowledge and skills, from basic to highly technical, needed to adapt to emerging new technologies, work methods, and markets through public and private educational, vocational, technical, workplace or other programs
- the number of quality programs that are designed to serve more effectively the needs of the growing number of part-time and mid-career students will increase substantially
- schools, in implementing comprehensive parent involvement programs, will offer more adult literacy, parent training and lifelong learning opportunities to improve the ties between home and school, and enhance parents' work and home lives.
- every school will actively engage parents and families in a partnership which supports academic work of children at home and shared educational decision-making at school
- parents and families will help to ensure that schools are adequately supported and will hold schools and teachers to standards of high accountability

3. RECOMMENDATIONS

A. The Funding and Management of a Challenge Grant Program. The Challenge Grant Program is designed to catalyze learning communities to develop and to deploy the relevant learning content and curriculum that will enable them to achieve one or more of these Goals 2000 objectives among the respective populations of learners -- now and over the next five years for this generation of learners, not sometime in the 21st century for succeeding generations. This Challenge is not a long-range R&D or demonstration project designed to achieve great leaps in technology or basic research. It is instead a concerted strategy -- consciously modeled after the President's Empowerment Zone Challenge which has been led by the Vice-President -- to realize the full potential of interactive learning for this generation of students.

As part of the ETR subgroup's work on this issue, we asked participating agencies to create and submit mock applications as if they were an eligible learning community. As a part of this process, we asked them to think about this challenge grant program in relation to other agency education/training initiatives, particular agency expertise that could be brought to bear, and the nature and amount of Federal funding. We also reviewed a wide range of Agency technology and learning development and deployment applications. We consulted with learning theorists; academics; teachers; students; developers of learning standards, assessments, curriculum, software and games; and experts from the cable, telephone, TV and entertainment programming, and computer industries. This input enabled us to craft a fairly detailed program description along with three options on how the program can be managed and funded. In this section we summarize the program description and lay out the three options for your decision.

Purpose of the Program

The purpose of the Challenge Grant Program is to stimulate community-based design and implementation of creative new uses of technology to advance life-long learning objectives of Goals 2000 for all Americans.

Why it is Needed

There are five major reasons why a new learning Challenge Grant Program is needed:

- Despite all of the activity and growth in communications and information technology, there is a major under-investment in learning-content that can be accessed through these technologies;
- Existing markets for learning technology are fragmented and hard to reach -- particularly in schools and small businesses;
- Requirements for developing learning content are still poorly defined by potential users (schools, homes and workplaces);
- Those few learning-content products that are being developed tend to be limited in scope, and successful concepts have not yet moved to larger markets;
- The essential learning communities (e.g. the makers of learning standards, curriculum, and assessments; developers of interactive multi-media tools, games, and entertainment; teachers, students and parents; schools, workplaces and homes; and the competing providers of interactive networks or portable learning kits to connect them together) necessary to capture the potential of interactive learning technologies have been slow to form.

Program Description

The Challenge Grant Program would be modeled after the Empowerment Zone program, in that it would challenge learning communities all across the country to bring together the critical elements of a successful learning technology application in a way that helps schools, businesses, families and the community as a whole meet one or more of the objectives of Goals 2000. These elements could include, but need not be limited to, some consortium of schools, colleges and universities, local businesses, content experts (including teachers), learning and cognitive development experts, software designers (broadly defined here to include video, music, and computer graphics designers), and telecommunication firms.

As in the case of the Empowerment Zone application process, we expect that the most important achievement of the challenge is likely to be the creation of community teams that can use existing resources to work together to improve interactive learning focused on advancing Goals 2000. A relatively small Federal funding "carrot" focused on the development of

learning content and curriculum only should be sufficient. Hardware and network capacity or connections would be provided by the proposal team. Unlike the Empowerment Zones, the definition of "community" would be broadened to include both communities linked by geography (a city, state, or region) and "virtual" communities linked by a common interest (disabled groups, nationwide teachers of math or history, small businesses with common training problems, etc.).

Program Criteria

Applications would be judged on the following types of criteria:

- Does the application offer a creative new vision for using technology to advance one or more of the lifelong learning objectives in Goals 2000?
- If successful, are the results readily exportable to other communities on a profit-making basis? [Note: The federal government would explicitly eschew any ownership of patents, copyrights, and other intellectual property interests. Our goal is to catalyze new markets for creation, deployment and use of interactive learning tools, not to share in the ownership of products.]
- What is the extent of investment by the partners in the plan?
- What is the evidence that the proposed program will succeed, what benchmarks will be established, and how will progress toward the goals be evaluated?

Program Cost

One key question is, "How large a grant would be needed to entice a learning community to make the effort to craft a proposal and implement it if accepted?" Based on our discussions and the mock applications, we estimate that an effective challenge grant program would include:

- 10-15 grants of \$4-6 million/year for 4 years;
- 100 grants for \$500 thousand/year for 4 years

Total: \$100 million/year for 4 years.

We believe that this approach provides sufficient incentives to generate large numbers of mutually self-interested learning communities to join together to create and to use state-of-the-art, interactive learning tools designed to realize one or more of the objectives of Goals 2000. We also believe that the diverse communities will provide substantially larger investments in developing the content and curriculum for engaging interactive multi-media learning tools, and

that the several competitors for the NII and alternative portable communication devices will be major investors in the more costly hardware and software necessary to demonstrate the potential depth and reach of this market. And, as with our experience with the empowerment zone applications, learning communities that enter the process seriously will find resources, mutuality of interests, and potential they never knew they had -- whether or not they "win" a federal award. Finally, the Challenge Grant will provide a continuing focus: for making the objectives of Goals 2000 real to learners all across the country, and highlighting the potential of interactive learning technologies in learning markets in schools, homes, firms, and communities all across the country.

Management and Funding Options

There is consensus at the Deputy level on the need for effective inter-agency participation, coordination and support of the grant program from the outset. Participating agencies could include DoED, DoL, DoD, DoC, HHS, DoE, NSF, NEH, NASA, OSTP, OVP, OMB, NEC-DPC. There is also consensus on the need for line responsibility and funding in one, or at most two, agencies. To gain the full benefit of the diverse agency expertise and full cooperation of each agency, however, there is also consensus that effective joint management is appropriate -- for example, through the detailing of experts from other agencies to the agency with lead responsibility for implementation. In addition, each participating agency can add particular support for the planning and implementation of this Challenge Grant program. For example, the Department of Commerce may prove particularly helpful in encouraging the support and involvement of private sector firms, in addition to coordinating the Challenge Grant process with DOC's lead responsibility for the NII. Similarly, DOL may have particular insights and expertise on shaping and implementing the Challenge Grant process to serve incumbent workers, while HHS may have insights on how preschool learning communities can be encouraged to participate. There is also consensus that this Challenge Grant -- as with the Empowerment Zone Challenge -- should be supplemented to the extent practicable and feasible with related Agency technical assistance and support (e.g, from the Department of Energy Labs and NASA education centers) and grant programs (e.g., DoEd Goals 2000 or School-to-Work applications, DoC technology deployment grants).

Finally, there is consensus that the White House must be actively involved in a Challenge Grant program of this political and substantive importance to implementing Goals 2000, and that the Vice-President is uniquely qualified to inspire public outreach and to provide leadership for this TLC Grant program.

The question is, which agency should have line responsibility? The Department of Education has the primary mission in this area, especially since the passage of Goals 2000, but the Department of Defense has unique experience in this field and unique dual-use needs. The Departments of Labor, Commerce, and Health and Human Services also have important major interests in this program.

After lengthy discussions with the relevant agencies, and an examination of the results so far of the FY 95 Appropriations process for these agencies, we have come up with the following

three options on funding and managing the Challenge Grant Program:

Option (1) Direct all funding to ARPA in DoD

Advantages:

- Comparative ease of adding funding in a respected and experienced R&D agency
- Strong program management abilities
- Proven track record in development of technology for learning

Disadvantages:

- Pre K-12 education is not central to DoD mission
- Not entirely consistent with shift to civilian R&D
- Links to the Administration's major education and training initiatives (Goals 2000, ESEA, and School-to-Work) would be unclear
- Little experience with such a wide-ranging challenge to learning communities all across the country to capture the full potential of the current state-of-the-art

Option (2) Direct all funding to DoED

Advantages:

- Mission covers most relevant learning communities -- philosophically consistent with other education and training initiatives and with the mission of Goals 2000
- DoED needs to develop R&D expertise in learning technologies to support its mission
- Builds on possible ESEA funding available in FY95 for this purpose to enable starting Challenge Grants as soon as the President wishes to announce this campaign

Disadvantages:

- Administration difficulties in getting FY 95 education priorities through relevant appropriations committees
- Little experience with managing R&D

Option (3) Combined program with programs for children and youth (pre-school through school to work and college) funded through DoED and programs for adults funded through DoD.

Advantages:

- Most likely to achieve total funding needed
- Follows successful model of Empowerment Zones using HUD and USDA funding combined with an interagency management process
- Would require even closer collaboration if not actual joint management by the personnel from the two lead agencies

Disadvantages:

- Two funding agencies requires more complex management structure
- Funding would require dealing with more Congressional committees
- Could discourage proposals combining programs for children and adults

ETR Recommendation. We recommend Option 3, a combined DoEd/DoD program with a joint management effort between DoD and DoEd and active participation, review, coordination with an interagency team and the White House. The broader interagency team would be charged with designing the application, implementing outreach efforts with their various constituencies, review and selection of applications, and coordination with their own grant programs or other relevant resources. For any reason if Option 3 cannot be achieved, then Option 2 can be an effective alternative, particularly if the DOD expertise in this field is fully integrated by the detailing of experienced staff for a virtual DoEd-DoD joint management of the Challenge Grants at DoEd.

Decision

___ Option 1 ___ Option 2 ___ Option 3 ___ Discuss

2. Longer Range, Federal Research, Development, and Demonstrations on Improving the Productivity of Learning. Research, development, and demonstrations aimed at improving the productivity of learning in the longer range for the next century are another important part of the overall Technology Learning Challenge. As set forth in the August 5 memorandum from OMB Director Rivlin and Science Adviser Gibbons, learning productivity is one of the seven priority areas for research funding in this Administration, along with, for example, the environment, a new generation of vehicles, and peacekeeping in the post Cold War era.

Fragmented and uncertain markets and high risk have discouraged private R&D in this area-- the primary exceptions being entertainment markets and projects focused on sophisticated military or industrial training requirements. We do not currently have a well-balanced federal R&D program on technology and learning, and fragmented management runs a high risk of poor use of existing assets. Aside from R&D supported in DOD, Energy, and NASA, research funding to plumb the potential of learning technologies to improve learning productivity is virtually nil in the main line ETR agencies -- DoEd, DoL, HHS, and DoC.

There is -- and should be -- some overlap between the Federal R&D agenda and the Challenge Grant Program: evaluation of the results of the implementation of the Challenge Grant program will provide a wealth of information and a seedbed of natural experiments that can feed back into the longer range R&D plan. In contrast to the Challenge Grants, longer range, federally-funded R&D projects will generally fall in higher-risk areas; and the design and results

will be less targeted on meeting the current objectives of Goals 2000 and more focused on the relationship between learning, cognition, intelligence and learning technologies for the 21st century.

Close coordination between the Challenge Grants and federal R&D is crucial to the success of the overall Technology Learning Challenge initiative in the generation to come. Consistent with this, Alice Rivlin and Jack Gibbon's August 5 memorandum to NSTC agencies states that the activities of the ETR in this area will not duplicate the NSTC reviews and assessments of Federal research, development, and demonstrations in learning technology, "but will incorporate the results of relevant NSTC assessments into their analysis." At the working level, this coordination is already taking place: Madeline Kunin and Henry Kelly, co-chairs of the NSTC Committee on Education and Training (CET) effort, are active ETR participants, as are the co-chairs of the CET's Subcommittee on Education and Training (Research and Development), Sharon Robinson (DoEd) and Lou Finch (DoD).

Our review of the NSTC/CET's progress in this endeavor reveals that there is a significant amount of work that needs to be done in a short period of time to enable the NSTC/CET to fully understand, let alone coordinate federal R&D across the agencies in this crucial area. With this in mind, and with the full support of the NSTC/CET representatives on our working group, we offer the following two recommendations to the ETR principals for your approval/disapproval:

Recommendations:

- (1) The ETR should fully and formally support the NSTC/CET's efforts (a) to craft a detailed plan for federal activities in this area, (b) to estimate the priority and funding recommended for this major R&D area, and (c) to recommend how each participating agency can best contribute to the research needed. (A list of critical R&D areas prepared by the CET is listed in Attachment 1).

___ Approve

___ Disapprove

___ Discuss

- (2) Demonstrations of learning technology that stress the state-of-the art are critical for identifying research needs and testing concepts in realistic learning environments. Agencies with education and training missions should work closely with the technology agencies in the CET group to define a small number of ambitious demonstration projects that could become the focus of major interagency efforts. The group should, in coordination with the ETR's Technology Learning Challenge, propose ways of funding demonstrations in FY95 as well as suggesting appropriate funding levels for inclusion in FY96 requests (Attachment 2 shows a representative list of demonstrations).

___ Approve

___ Disapprove

___ Discuss

3. Funding for Digitization of Federal Resources. Digital representations of text, sound recordings, data, photographs, motion pictures, and other information are key raw materials for learning technologies. Once digitized these materials can be stored, copied, and communicated throughout the nation and the world at very low cost. The federal government controls access to unique collections of information whose availability in digital form could greatly accelerate development of content and use of learning technology. This is especially relevant to the progress of the overall Technology Learning Challenge initiative, as schools and adult learning institutions begin to come "on-line" and teachers, curriculum builders, and trainers look for materials to build exciting and meaningful learning content. To accomplish this, we offer four relatively minor technical and funding recommendations for your approval/disapproval.

Recommendations:

- (1) The authorization for the Library Services and Construction Act LSCA Title II should be changed to encourage use of the funds (FY94 authorization \$18 million) for development and dissemination of digital resources. The "construction" funding provided by Title II is now spread so broadly by formula allocations that US libraries are not well served by the program. If redirected to take advantage of emerging information technology, the LSCA would provide libraries with powerful and practical new information resources.

___ Approve

___ Disapprove

___ Discuss

- (2) While adequate funding appears to be available in NASA, NOAA, USGS and other agencies for making technical information available in digital form, resources for digitizing cultural resources are inadequate. \$4 million should be made available to a consortium of the Smithsonian, the National Archives, and the Library of Congress for a major coordinated program to digitize historical archives.

___ Approve

___ Disapprove

___ Discuss

- (3) Support the NEH request for an increase in appropriations for their digital resources program from \$11M in FY95 to \$21M in FY96.

___ Approve

___ Disapprove

___ Discuss

Attachment 1

Research and Development Focus Areas:

- 1) Basic research on learning and cognitive processes;
- 2) New models for evaluating learning productivity; and
- 3) High-quality, affordable learning tools.

Attachment 2

Suggested CET Demonstrations:

Target Groups	Goal	Lead Agency
Pre-School	All students start school ready to learn	DoED
Grades K-8	All students leave grades 4, and 8 having demonstrated competency over challenging subject matter...	DoED
Grades 8-12	Every school in America will ensure that all students learn to use their minds well so they may be prepared for responsible citizenship	DoED
Vocational Education	All U.S. high school graduates should have increased opportunities to obtain meaningful employment	DoED/DoL
Higher Education	All graduates of higher education should be equipped for success in the 21st century	DoED
Incumbent Workers	Incumbent workers will acquire the new skills needed in the 21st century	DoL/DoD
Military Personnel	The U.S. Military shall be the best equipped, trained, and led fighting force in the world	DoD

**Crafting a Technology and Learning Challenge (TLC)
Decision Document for a Meeting of the
Education, Training, and Re-employment (ETR) Working Group**

August 11, 1994

The ETR working group has been preparing options for a national program aimed at using the power of modern information technology to achieve the Administration's lifelong learning goals -- including Goals 2000 and School-to Work. This paper summarizes the work completed thus far. The primary purpose of the August 11 meeting will be to review a decision memorandum being prepared for the ETR principals on issues that must be resolved for FY96 budget decisions. A draft of the memo is attached.

THE VISION:

Computer and multi-media technology makes individualized, learner-centered, exploratory learning possible at affordable prices.

Communication systems can connect homes, schools, workplaces, and vast information resources by leveraging time at home (i.e. out of school and not at work)

These learning environments can lead to a major (2-sigma) improvement in learning productivity (see chart A)

CHALLENGE FOR THE ETR:

The technology of computers, communication systems, and multi-media systems is advancing at a rapid rate. The Administration's National Information infrastructure strategies aimed at ensuring universal physical connectivity are in progress. Investment in the development of high-quality interactive learning however, has been much less than investment in development of computer applications for businesses and entertainment. Education and training markets are fragmented and difficult to reach since the advantages of the new technology require major changes in learning strategies and pedagogic techniques and therefore extensive training for teachers and instructional staff.

OUR APPROACH:

Accelerating the development and adoption of technologies for learning requires integrated management of a wide variety of federal programs (see Chart B). The specific tasks undertaken by working groups are:

- 1. Craft a coherent program for research, demonstration, and deployment of technology-based approaches to learning productivity. Three key components:***

- fundamental research
- technology-forcing demonstrations
- technology deployment and institution building

We believe that this last task requires more efficient management of existing research programs in many different agencies and, we believe, a major new program is needed: a community-based grant program for innovations in learning technology patterned roughly after the Administration's highly successful empowerment zone program.

2. *Ensure that the federal government exercises leadership in the use of productive learning technologies in federal programs*

- technology should be used wherever it is cost-effective in federal programs for education and training (such as Goals 2000, ESEA, Head Start, and Job Corps)
- effective federal procurements of learning technology can lower the cost and increase the quality of training of DoD and federal civilian employees, as well as stimulate private development of advanced instructional products

3. *Effective coordination with National Information Infrastructure programs designed to provide universal access to the new information superhighway.*

THE POLITICAL MESSAGE:

The Challenge Grant Program permits a high-visibility opportunity to focus attention on the administration's accomplishments in reshaping lifelong learning goals and introduces a powerful new tool for achieving these objectives.

In particular, the program is a powerful example of defense conversion and dual use technology -- much of what can be done is possible because of DoD's extensive investment in learning technology.

The program is based on federal partnerships with business as well as with state and local governments. There are obvious opportunities for creating major new business opportunities in an area where the US has a clear comparative advantage in world markets.

The program will provide a vivid and easily grasped example of the payoffs possible from the Information Superhighway.

Creative management of existing federal programs underscores the power of the "reinventing government" strategy.

PROGRESS TO DATE

1. The ETR established an interagency task force to explore opportunities for technology and learning.
2. OMB and NSTC, working in cooperation with ETR, issued guidance asking agencies to give high priority to technology and learning in their research budgets on May 6, 1994.
3. DoD hosted a workshop for Deputies on July 9th, and a consensus vision statement (attachment 1) was developed.
4. A series of interagency working groups are now charged with addressing specific issues. They were asked to review budget issues that must be considered promptly (to be discussed in the August 11 meeting), and to prepare a more extensive document outlining programmatic decisions by mid November, 1994.

Task Description	Team Leaders
Design an interagency plan for Research, Development and Demonstration on technology for learning productivity	Sharon Robinson and Lou Finch cochairs of R&D subcommittee, NSTC Committee on Education and Training.
Digitization Resources	David Lytel
Using the National Information Infrastructure for Education and Training	Tom Kalil Jonathan Sallet
Procurement for Defense and Federal Civilian Training	Mike Schmidt
Use of Learning Technology in Major Federal Programs	Rob Portman Mike Schmidt
Outreach	Jim Kohelenberger
Challenging competition for learning communities to develop and use interactive learning tools	Henry Kelly

Agencies involved include: DoD, DoC, DoL, DoED, HHS, DoT, NASA, DoE, Smithsonian, US Park Service, National Archives, Library of Congress, VA, National Endowment for the Humanities. Support provided by MITRE and IDA.

5. An August 5 memorandum from OMB (attachment 2) asks for a detailed budget analysis on a small number of high-priority administration R&D areas, including R&D on learning productivity, by September 29. It also suggests that "where useful and appropriate, Committees should review agency contributions prior to

September 9, 1994" in order to ensure that agencies request a balanced program in the area. The NSTC Committee on Education and Training (CET) is asked to conduct the review of R&D for learning productivity. The memo specifically notes the close coordination between the CET R&D analysis in learning technology and the ETR project.

**FOCUS OF AUGUST 11, 1994 MEETING WILL BE ON CRAFTING A
DECISION MEMORANDUM FOR ISSUES REQUIRING IMMEDIATE
DECISION, SPECIFICALLY:**

- size and structure of the new grant program
- management and funding for technology and learning R&D and Demonstrations
- funding for creating and disseminating digital resources

NEXT STEPS:

Based on decisions made by the ETR principals and the in-depth review by CET, agencies will include elements of a coordinated technology and learning program in their FY96 budgets by 9 September.

ETR task force will continue to define options concerning federal programs and procurements for decision by November 4.

Outreach efforts will solicit advice and guidance from businesses, NGOs, states and localities, teachers and, following the announcement of the program, help to ensure wide national participation in TLC programs and objectives.

**PROGRESS REPORTS OF THE TASK FORCES WITH REPORTS DUE
NOVEMBER 4.**

1. Using Technology to increase the effectiveness of federal programs in education and training

Technology capable of significant advances in learning productivity can make it easier to achieve the goals of many federal programs. Wise management of procurements made under these programs can help stimulate markets for innovative learning technology. An interagency task force has been working to identify programs where technology can have a particularly significant impact and to identify specific changes in program management that can help secure these benefits.

Attachment 3 summarizes the work underway in each of the following programs:

Teams of people familiar with each of these programs are preparing brief analyses of following topics:

- How learning technologies can be used to improve the effectiveness of the program
- Specific recommendations for using existing FY95 funding and authority
- New legislative authority, if any, needed to ensure effective use of technology

The project teams will work together on common themes and areas where interagency coordination appears to be particularly useful, including:

- How the programs can use the technological expertise available in other federal programs
- Improving methods for federal purchasing of computer hardware and software for education and training
- Coordinating purchases of hardware and software by program recipients to help these recipients get the highest quality products at low cost and to help stimulate markets for high-quality instructional materials.
- Using the outreach centers available to different programs (Chapter 1, Head Start, others) to improve communication among program recipients about instructional technology and improving coordination between these programs
- Defining methods for measuring and specifying quality standards for educational and training technology and gaining consensus on technical standards and interoperability
- Improving and coordinating technical assistance and training

2. Procurement for Military and Civilian Training

Efficient operation of the federal government depends on maintaining the skills of its workers. The Nation's security has always depended on the quality of the training programs available for the uniformed and civilian personnel in the Department of Defense -- including maintenance of skills in the reserves. The challenge has become greater as new technologies constantly redefine the skill requirements of federal civilian and military employees. Defense Training programs, the Office of Personnel Management, and other federal agencies responsible for federal training are coordinating their work to (a) ensure that federal training makes efficient use of cost-effective training technology

available on the market and, (b) procures training products and services in ways that stimulate innovations in instructional technology. All federal procurement will be designed to stimulate innovative private firms capable of selling innovative, technology-based training systems to civilian as well as to government training organizations. Federal training programs will get more for the public money they spend, and federal employees will receive better training in less time, if innovative private businesses compete to provide efficient, low-cost training systems.

3. National Information Infrastructure

Improving the quality of education and training has been one of the key goals of the administration's National Information Infrastructure Task Force. The principles guiding the NII are as follows: encouraging private investment in the NII, promoting and protecting competition, providing open access to the NII by consumers and service providers, preserving and advancing universal service to avoid creating a society of information "haves" and "have nots", and ensuring flexibility so that the newly adopted regulatory framework can keep pace with the rapid technological and market changes that pervade the communications and information industries. The ETR task force has identified a variety of options for applying these principles to the needs of education providers. Options include use of existing FCC authority and new state authority resources potentially available from pending legislation for ensuring universal access, model practices, the purchasing power of provider operating budgets and home learner demand, and direct funding from federal and state agencies. The analysis also includes options that may make education markets more profitable for communication companies and software providers.

4. Outreach

This task force is designing a program to contact key stakeholders and potential collaborators in education, training, and state/local governments to identify programmatic needs. Business interests include communication, entertainment, software publishing as well as business organizations with broad interests in improving the quality of US education.

The group is planning a series of focused workshops and seminars this fall aimed at identifying the barriers to expansion of learning technology in different markets.

Finally, this group will prepare a communication and events strategy to make the Technology and Learning Challenge a major component of the President's life-long learning strategy to empower all American schools and students, firms and workers to compete and win in the global economy of the 21st century.

Chart A 2 Sigma Learning Shift

Chart B Federal Programs

Attachment 1 Vision Statement

Attachment 2 Rivlin Memo

Attachment 3 Federal Programs

Attachment 4 R&D Focus Areas

Attachment 5 Demonstrations

CHART A

CHART B

CHART B

Moniker	Authority
Goals 2000	Goals 2000 Educate America Act
School to Work	School to Work Opportunities Act
Eisenhower	Dwight D. Eisenhower Mathematics and Science Education Act
Vocational Education	Carl D. Perkins Vocational and Applied Technology Education Act
Head Start	Head Start program in the Human Services Amendments of 1994
Technical Assistance Centers	Elementary and Secondary Education Act (ESEA)
Regional Education Laboratories	Goals 2000 Education Act Title 10
Special Education	Individuals with Disabilities Education Act
Compensatory Education	Chapter 1 of the Elementary and Secondary Education Act of 1965 (1994 amendments pending)
Individuals with Disabilities	Technology, Educational media, and materials program for individuals with disabilities, Part G of the Education of the Handicapped Act 1986 Technology-Related Assistance for Individuals with Disabilities Act of 1988 as Amended in 1994 Captioned Films, Television, Descriptive Video and Educational Media in Part F of the Individuals with Disabilities Act National Institute on Disability and Rehabilitation Research in the Small Business Innovation Development Act of 1982
NIST Manufacturing Extension Program	Omnibus Trade and Competitiveness Act of 1988 (1994 amendments pending)

Attachment 1 Vision Statement

Figure 1
Learning Productivity

Attachment 2 Rivlin Memo



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

THE DIRECTOR

MEMORANDUM FOR THE HEADS OF DEPARTMENTS AND AGENCIES

FROM: Alice M. Rivlin
Acting Director

AMR

SUBJECT: FY 1996 R&D Data Collection and Review

On May 6, 1994, the agencies were sent a memorandum from OMB (M-94-20) outlining the FY 1996 research and development (R&D) policy principles and priorities. Attached you will find a memo signed by the President's Science Advisor and I providing you with the additional FY 1996 R&D data collection and review information that was mentioned to be forthcoming in the May 6th memorandum. Also attached is a list of NSTC agency representatives. You should address any further questions you might have on this memorandum to your agency's NSTC representative.

Attachments

**NATIONAL SCIENCE AND TECHNOLOGY COUNCIL
DEPUTIES GROUP ON FY 1996 R&D PRIORITIES**

**William M. Wise
Timothy Wirth
John Deutch
Deborah Knopman
Richard Rominger
David Barram
D. James Baker
Robert Portman
D.A. Henderson
Mortimer Downey
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Department of Health and Human Services
Department of Transportation
Department of Energy
Department of Education
Environmental Protection Agency
National Aeronautics and Space Administration
National Science Foundation
Office of Management and Budget
National Economic Council
Domestic Policy Council
Council of Economic Advisers
National Security Council
National Institutes of Health
Arms Control and Disarmament Agency**