

HRPC -- TLE White Paper

PHOTOCOPY
PRESERVATION

THE WHITE HOUSE
WASHINGTON

January 12, 1995

**MEMORANDUM FOR CAROL OKIN, DIRECTOR, HUMAN RESOURCES
DEVELOPMENT GROUP, AND DON MIZUR, ASSISTANT
DIRECTOR, MARKETING AND INFORMATION, HRDG**

FROM: Paul Dimond, Special Assistant to the President for
Economic Policy

Henry Kelly, Assistant Director for Technology, Office of Science
and Technology Policy

SUBJECT: Follow-up to the Human Resource Development
Council's White Paper on the Use of Learning Technologies

Thank you for your help in the Administration's efforts to promote the use of technology in places of learning across the country. The white paper that the HRDC prepared, "The Federal Workforce: Surviving or Thriving in the 21st Century," raised a number of critical issues that must be addressed if our federal government is to succeed in the next century.

As we move ahead with the Technology Learning Challenge, we would like to work with you to explore two of the white paper's recommendations in more detail: Recommendation 1, "Create a learning fund," and Recommendation 2, "Utilize existing magnet learning centers." In the white paper, the HRDC offered to take a number of actions to make these recommendations a reality, including:

- Helping to establish criteria for distributing learning funds;
- Assisting with continuing research to develop a Learning Fund program;
- Asking each agency to nominate centers of excellence.

We would like to take you up on these offers of assistance. **By February 27, 1995, we would like the HRDC to provide a more specific plan of action to implement Recommendations 1 and 2.** This plan may want to offer a range of options for implementation, or it may recommend only one option -- the choice is up to you. As before, we want to give the HRDC the flexibility to decide how best to proceed. Our only requirement is to have a plan in hand by the end of February that will allow us to work with you to begin to implement these recommendations as soon as possible.

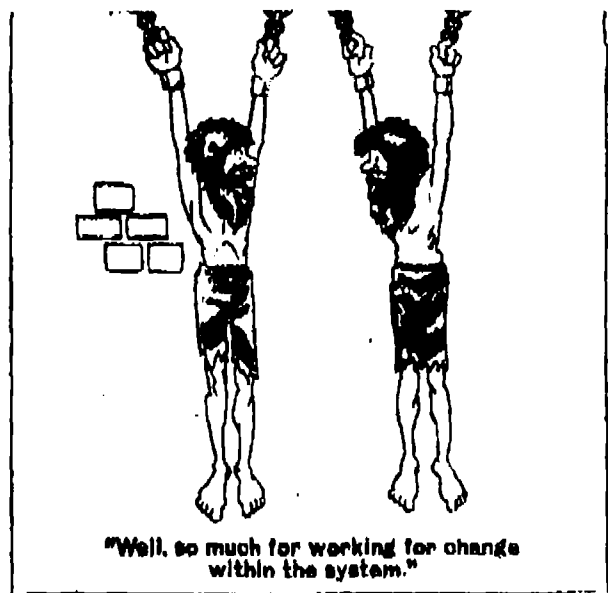
Our liaison for this project will once again be Mike Schmidt, Senior Policy Analyst for the White House Domestic Policy Council. Please contact him at (202) 456-5567 at your earliest convenience for more details on this request.

Thank you again for all of your help on this important Administration initiative. We look to the HRDC's expertise and wisdom to provide critical guidance and direction for these efforts, and look forward to continuing to work in partnership with you to achieve our common goal of making the Federal Government a true learning organization.

Dear Mike,

Here at last is the white paper on learning technologies in the federal workplace. As we discussed, I'll continue adding to the appendices. I'm waiting for a clean copy of the Fed Tech Transfer Act, for example, so have attached only one page from the act in this package.

Give me a call on next steps. I hope I'll be able to contribute and be actively involved in follow activities and efforts to implement some of the ideas.



PAGE 22 • FEBRUARY 20, 1994 • PARADE MAGAZINE

Amro

The Federal Workforce:
Surviving or Thriving in the 21st Century?

A White Paper on the Federal Government's Use of
Learning Technologies in Education and Training
for the Federal Workforce

Submitted by the
Human Resources Development Council

November 4, 1994

The White Paper on the Use of Learning Technology in Education and Training for the Federal Workforce was submitted by the Human Resources Development Council.

Executive Committee, Co-chairs
Carson Eoyang, NASA
Renelle Rae, EPA

White Paper Advisory Committee
Richard Indelicato, OPM
Eileen Mason, NRC
Don Mizaur, OPM
Donna Oriana, DLA
Stephen Ramp, DoD
Carol Townsend, GSA
Roy Tucker, HHS

This paper was prepared by Anna Doroshaw, EPA

November 4, 1994

LEARNING TECHNOLOGY IN THE FEDERAL WORKFORCE

"While traditional organizations require management systems that control people's behavior, learning organizations invest in improving the quality of thinking, the capacity for reflection and team learning, and the ability to develop shared visions and shared understandings of complex business issues."

Peter Senge
The Fifth Discipline

The Human Resources Development Council is a recently constituted body that serves as the principal advisory board on federal training and development policy and practices. It is composed of the chief training officers of the major federal departments and agencies and provides guidance and direction to OPM's Human Resources Development Group on human resource development matters. In addition, it serves as a coordinating mechanism across federal agencies as well as a forum for the consideration and approval of new initiatives in training and development for the federal civil service.

This White Paper focuses on the relationship of learning and the use of educational technology on workforce performance in the Federal government. It looks at how learning technologies are being utilized, including factors that support success and others that create barriers. The Council makes recommendations for actions that will support federal training and learning through improved applications of technology.

John Kenneth Galbraith described technology as "... the systematic application of scientific or other organized knowledge to practical tasks."¹ Technology is also defined as "... the tools, process, material resources, and creative human intelligence applied to the solution of practical problems."² Technology is used to describe "*both the tools and the processes that facilitate the establishment of learning systems*", rather than just the tools (microcomputers, videodisc players, hypermedia, expert systems, etc.). The process of technology is a systems approach, using a dynamic, iterative process to forge the tools into technologies for addressing the challenges of training and learning, and finding the solutions to practical problems.

¹Galbraith, John Kenneth, *The New Industrial State*, Boston: Houghton Mifflin, 1967.

²Barbee, David and Gabriel Ofiesh, *A Report on the Nationwide 'State of the Art' of Instructional Technology*, Washington D.C.: Institute for Technological Solutions, 1990.

The HRDC is looking at how learning technologies are being used to improve federal workforce performance. We want to ensure that we are not merely creating more technology, but are creating the "tools, processes, material resources and creative human intelligence" to enable the federal worker to grow into the Agile Learner³ capable of meeting the challenges of the 21st century.

Increasing the role of educational technology in federal training, even if it results in improved training, is not an end in itself. As Vice-president Al Gore wrote in Earth in the Balance:

"We now face a crisis entirely of our own making: we are drowning in information. We have generated more data, statistics, words, formulas, images, documents and declarations than we can possibly absorb. And rather than create new ways to understand and assimilate the information we already have, we simply create more, at an increasingly rapid pace."⁴

Educational technology will not bring overall changes and desired long term improvements if we do not make the transformation from a culture focused on teaching (training) to one that is focused on learning. The move toward competency-based training and outcomes is reflected in the work of many organizations within government, industry and academia. Throughout industry and government, there is a growing recognition that "a workforce with superior skills is the only sustainable source of competitive advantage." Training and development systems are being viewed as critical to creating readiness and flexibility for change across all levels of the organization.⁵ Learning technologies are playing increasingly important roles in the changing the direction of training and development systems.

³ The agile learner is a concept developed by the National Learning Foundation, Paul Messier, Ph.D., President. According to Messier, the agile learner is a strong individual in a self-governing system -- one who is not a sponge for information, but rather one who has sovereignty over information and is capable of reflection and choice.

⁴ Gore, Albert, Boston: Houghton Mifflin, 1992.

⁵ "Designing Training and Development for Competitive Advantage: Lessons from the Best" by Judy D. Olian, Cathy C. Durham, Amy L. Kristof (Maryland Business School, University of Maryland), Kenneth G. Brown (Department of Psychology, Michigan State University), and Richard M. Pierce (Human Technology, Inc.).

THE CURRENT STATE OF TRAINING AND LEARNING

The most common category of training incorporating computer or other non-classroom/lecture delivery is computer and systems training. Almost across the board, agencies have turned to some form of computer-based training (CBT)⁶ delivery to teach workers to use the computers and software systems required on the job. Much of the computer training is still delivered as hands-on training in formal classrooms with an instructor. More self-paced learning alternatives are being introduced, ranging from video tapes and video disc courseware to online systems with huge libraries of courses that are fully managed electronically. (See the examples described in Appendix D for the U.S. Customs Service.) Computer-based training, in use since the early 60's, continues to have a major role in federal training delivery.

In the mid-80's, information centers--technology support organizations frequently operated by the Information Resource Management (IRM)/Information Technology (IT) organizations--were widely established throughout the federal government. Focus here was on supporting the use of computers, however, not on computer technology as a tool for learning regardless of the content or programmatic area. Since the late 80's, the growth of multimedia (computer plus graphics, audio, and video in an interactive mode) has continued to fuel the movement toward more and better use of educational technology applications, especially for education. Today the use of various technologies is widespread across the government in both types of technology employed and types of applications. (See table in Appendix B for a sample of applications across the Federal government.)

Technological advances are transforming the workplace, and demographic trends are changing the nature of work. The HRDC focus is on identifying and supporting actions that will enable the Federal Government to develop the workforce learning necessary to meet the demands of a rapidly changing workplace. Adding more technology is not going to bring the desired outcomes by itself. The use of appropriate technology appropriately used is the key.



Courtesy of Rich Tennant
and Federal Computer Week

⁶ See Glossary in Appendix A for definitions and related terms.

BARRIERS TO IMPLEMENTING EDUCATIONAL TECHNOLOGY SOLUTIONS

The four biggest barriers to the effective application of technology in training are:

- 1) the technology itself,
 - 2) the people who use or might use it,
 - 3) budget,
- and
- 4) procurement.

Technology:

Technology is often complicated, incompatible, costly, and subject to constant change. Some level of technological knowledge is required if technology is to be used effectively. Human resource developers, managers and trainers need to learn:

Technical Feasibility

- Compatibility of systems
- Evaluating the competition
- Potential problems

Planning, Design and Development

- Role of various technologies
- Applications
- Interest among various departments and agencies
- Means of introducing or producing products
- Availability
- Off-the-shelf, adapted courseware (developed by another Agency), or custom courseware
- Timetable for introducing
- Justification
- Cost Analysis (economic analysis)
 - Traditional cost/benefit analysis does not measure outcomes

Implementation issues and strategies

- Adequate support (contractor or in-house)
- Maintenance and obsolescence (life cycle planning)

People:

Government personnel often lack basic information about the potentials of technology as well as the how-to skills to begin incorporating new approaches for human resource development, training and learning into the existing framework. Our predominant experience as educators, trainers and human resource developers is in the classroom and follows the old pattern of

teacher as lecturer, student as listener. We estimate that 90 percent of training still occurs using traditional methods. When the fear of the uninitiated (or technophobic) meets the sometimes mindless enthusiasm of the "techno-guru", common sense may be one of the casualties. Whether enthusiast or technophobe, human resource professionals all need to acquire new knowledge and expand their skills:

Human Resource Management Needs

- work in multidisciplinary teams
- navigate complex multimedia databases
- create real-life scenarios for teaching skills

Overcoming fear

- Perceived threats to job security
- Fear of technology and the unknown

Evaluation

- Evaluation of methodologies, determining best methods
- Evaluation of outcomes

Management/Administration Issues

- Integrating technologies into the existing technological, social, and political infrastructure
- Competing human and capital investment issues
- Decentralized training functions within Agencies

Accountability

- Training is often delivered without being linked to competencies or outcomes.
- Technology gatekeepers do not understand training and learning needs and are often unresponsive when asked for help in planning and implementing technology solutions for training and learning, especially for non-systems (computer) related training.
- Lack of baseline information on traditional training prevents development of realistic comparisons or standards to help evaluate alternative methods.

Budget:

After the idea of incorporating technology has been accepted and the management decisions have been made, another major barrier often impedes the progress--**budget issues:**

Financial

- Tight budgets
- Funding constraints

(e.g.: restrictions on purchase of computers and/or software because they are not seen as learning systems and educational materials)

Procurement:

Even when all other barriers have been overcome, another major source of trouble includes the ever-looming procurement issues:

Procurement

- How, where, how much, etc.
- Restrictions
- RFP process
- Lag-time for procurement (RFP process can take months to years to complete, making the purchase obsolete before the award is even made)

The most frequently cited problem outside of the technology, people, budget and procurement is **communication**--having access to information. We don't know what's being done, who's doing it, where to go for help, how to share what we have and/or know, or how to sort out what we're getting. We become victims of information overload as much as lack of access.

SUCCESS FACTORS

People and planning are key. Most successful applications of technology have been spawned by creative, courageous, and thoughtful risk takers who match the applications of technology to genuine needs and who have accounted for the context in which the technology has to operate. They have had to think about audience, access, affordability, affordances, accommodation, anticipated obsolescence, advocacy and education. These factors affect successful application of all technology-based education and training efforts, not just those for the federal workforce.

Technological advances are transforming the workplace, and demographic trends are changing the nature of work. Today's technologies provide many keys to unlock future productivity. Their appropriate application can serve to extend the opportunities for learning in real-world situations, expand our abilities to think and learn, improve accountability, and establish and manage learning environments where people work.

RECOMMENDATIONS

The Human Resource Development Council focus is on identifying and supporting actions that will support Federal workforce learning requirements to meet the demands of a rapidly changing workplace. The following recommendations are designed to provide incentives, access to resources including capital and expertise, rewards and protection to the human resource learning entrepreneurs and innovators in our agencies.

The HRDC offers recommendations on several levels:

- Incentives for individual and organizational entrepreneurs to develop innovative solutions to workforce performance issues and the institutional structure to support lifelong learning.
 - Clearer vision of the role of technology to support learning, workforce competency and productivity improvements in the Federal workplace.
 - Learning opportunities for management and human resource personnel to acquire the understanding and skills to make the transformations in their own agencies and departments.
 - Relationships between federal government, private industry, universities and others to allow the government to leverage its people, knowledge and resources most effectively.
1. **Create a Learning Fund** -- a working capital fund or revolving fund -- to support innovative learning ventures within the federal sector from single program offices up to entire agencies. The fund would support efforts similar to the reinvention labs developed out of the NPR.
- Operate the Learning Fund through an existing lead agency or organization capable of coordinating a national program.
 - The National Demonstration Laboratory for Interactive Information Technologies has operated a learning and demonstration center with public and private sector support. It is currently housed with the Academy for Educational Development, a private association supporting educational development.
 - Other possible agencies include the Office of Personnel Management, National Science Foundation, National

Technical Information Service (Dept. of Commerce) and Naval Research Lab among others.

- Use the Federal Technology Transfer Act as a model to encourage collaboration among public, private and academic sectors. Research parks dot the US where Technology Transfer Act efforts have been successful. (See Appendix C)
- Allow "profits" from ventures to accrue to the government (back to the Learning Fund) to support additional projects, research and educational activities.
- Facilitate joint ventures for new development and research projects.

The HRDC will help to establish criteria for distributing learning funds.

The HRDC will assist with continuing research to develop a Learning Fund program.

2. **Utilize existing magnet learning centers** that provide working environments for learning, experimenting, innovation, and change. Examples include: CD-ROM Information Resources Center (CIRC); the National Demonstration Lab (Academy for Educational Development); US Geological Survey Centers for Learning; General Accounting Office Training Institute.
 - Operate these magnet facilities as centers of excellence for education and learning (Excellence Center for Education and Learning--EXCEL). Results from research and development efforts would be shared through the EXCEL network.
 - Use existing centers as models for transforming training operations into learning centers within other federal agencies.
 - For example, the National Library of Medicine operates a Learning Center for Interactive Technology that has been functioning as a "magnet center" for over ten years. It also houses the National Coordination Office for High Performance Computing and Communication (HPCC) that coordinates the efforts of several agencies with contracts in these areas to avoid duplication and leverage resources.

The HRDC will ask each agency to nominate centers of excellence and will coordinate improving access to information-sharing through existing Bulletin Board Systems (BBS) and/or Internet access.

The HRDC will explore the feasibility of operating a listserv for Internet access through the National Technical Information Service (NTIS) and National Audiovisual Center.

3. Develop incentives for people to take risks, trying innovative and new approaches to meet learning and training requirements.

- Create a Vice Presidential award for significant accomplishments in learning and the innovative application of technology to improve workforce training. Recognize individuals and organizations for best practices and innovation in learning.

The HRDC will work to develop criteria similar to Quality awards for outstanding accomplishments.

The Council will work with other Agencies to identify best practices across the federal government.

- Agencies will submit nominees to the OPM and/or the HRDC annually, with the finalists being forwarded to the Vice President's office for an annual recognition and award ceremony.
- Encourage the use of existing mechanisms to reward human resource entrepreneurs with money, recognition, academic or other exchange time, and other career enhancing and developmental opportunities (e.g., Intergovernmental Personnel Assignment (IPA) process, developmental details and rotational assignments, and sabbaticals for academic and research work).

4. Include planning for workforce learning as key component in all Reinvention efforts such as Business Process Re-engineering (BPR), Work Process Reengineering, and TQM. Plans should include evaluating role of educational technology and incorporating alternatives to traditional classroom training.

5. Include the federal workforce in the Administration's vision for learning. Sponsorship should be shared by lead agencies such as the Office of Personnel Management, Departments of Labor, Health and Human Services, Education, and Commerce.

"In moving toward the 21st Century, we must, above all, become an 'education nation' -- and support public sector leaders at all levels who will make training and education their unmistakable top priority (policy and dollars).

Tom Peters
Liberation Management

- Set **Learning** as a national priority
- Sponsor a research initiative by the White House Domestic Policy Council and/or Office of Science and Technology Policy to bring new learning theories and learning technologies into the mainstream for workforce development, productivity and quality improvement, and achieving national and international competitiveness in government and business.

Research findings would apply to issues of competitiveness, education reform, school-to-work transition, and related areas.

- Annual recognition of best practices (see Recommendation 2) will continue to reinforce the vision and commitment to this national priority.
 - The Federal Government should place more emphasis on technology transfer and training as an integral part of human resource development and management.
 - Technology transfer will be facilitated through the joint efforts of the participants in the EXCEL network and projects sponsored through the Learning Fund.
6. **Identify best practices in performance measurements** for the transfer of learning and training to the workplace. Focus on evaluation of learning technologies and transfer of learning to job performance.
- Focus on how to demonstrate the impact of human resource, organizational development, and learning programs on business performance.
 - Utilize research and findings of the Dept. of Labor Office of the American Workplace.
 - Identify tools, models and metrics necessary to design, implement, and evaluate impacts of training and organizational development efforts.

- Host a conference on evaluation and performance measurements which brings together participants from government, academia, educational associations, and business to share knowledge and experience. Findings should be published and distributed (electronically) by OPM through the Human Resource Development Group.

7. **Leave delivery decisions about training to the discretion of the learning experts** rather than mandate delivery details in the training provisions of Legislation and Executive Orders.

The following two recommendations address the need to focus on the planners and implementers, to help them acquire a strategic view of learning and training for the organization while also learning how to adapt learning programs and integrate technologies appropriately:

8. **Incorporate technology into the basics** for training, especially for senior management (SES and political managers). E.g.: give managers a laptop at check-in for their four week stint at the Federal Executive Institute, along with help to learn to use the software, email, etc. Set up programs for paperless (almost) work with the products delivered by the Institute participants coming out in electronic form. Set up node on Internet for FEI and perhaps a listserv to promote continued collaboration and sharing of learning, etc.
- SES executives need programs that will help them to understand the role of learning as a strategic part of mission
 - Non-Technical SES career officials need training and learning opportunities about information and learning technology.

The HRDC can provide guidance and subject matter expertise in helping to develop a learning program through the FEI and other federal training institutes and programs which incorporates strategic planning and learning with technology.

8. **Create a Federal Human Resource Learning Institute** to help human resource professionals develop learning skills and competencies.
- Develop a "virtual" university environment drawing upon the existing resources, best practices and model programs across the country.

- Establish opportunities for employees to become members of learning teams, teaching and learning simultaneously, with their roles as facilitator and learner interchangeable.

The HRDC will inventory the existing models such as the Federal Executive Institute, Federal Quality Institute, Staff College on Learning and Technology (Center for Substance Abuse Prevention) and other government and non-government organizations.

The HRDC will assist in developing curriculum designed to help federal trainers and HR professionals acquire the skills to move federal training to a learning culture which measures competency and develops training based on learning outcomes, applies best practices and continuous learning to methodologies.

APPENDICES

- Appendix A. Technology Definitions and Descriptions
- Appendix B. Table of Typical Educational Technology Applications by Agency and Technology
- Appendix C. Technology Transfer Act
- Appendix D. Demonstration Center, Laboratories and Resource Centers
- Appendix E. EPA NPR Initiative: 3% for Training
- Appendix F. Interagency Resource Sharing Panel - Federal Government Bulletin Board Systems
- Appendix G. Contributors to White Paper

Learning Technology in the Federal Workforce References and Resources

APPENDIX A: TECHNOLOGY DEFINITIONS AND DESCRIPTIONS

The following descriptions of the tools available for human resource development include machines, software, and complete systems. The categories are arbitrary, but the tools they represent are real; they hold substantial promise for providing solutions to practical problems.

THE TOOLS AND PROCESSES

Microcomputer At the heart of the new technologies lies the microcomputer. It has made possible the creation, delivery, and management of learning environments that provide textual, audio, video, and graphical stimuli, as well as control, to the learner. Simulation, tutorials, practice, sophisticated branching, manipulation of data and information are available in highly interactive modes.

The computer is more than just another tool. It can program and manage a CD-ROM, videodisc player, expert system, or other tool, functioning as part of a *learning technology*. When used in this way, computer-based systems not only deliver training, but also act as *tools of learning* that can help humans gather and manipulate relevant information, and even create intelligence. Computer systems hold the promise of creating more *ideal* instructional systems. (Barbee and Ofiesh, 1990)

Artificial Intelligence (AI) AI computer programs have the ability to *think* in response to user input and to provide information based on user queries or responses. The programs may emphasize problem-solving applied to specific tasks or may be used as training programs. AI is related to Expert Systems, which organize and apply the knowledge of human experts for specific problems.

Intelligent Computer-Assisted Instruction (ICAI), also known as Intelligent Tutoring Systems (ITS), is an intelligent computerized instructional system that makes use of artificial intelligence programming techniques to enhance instructional effectiveness. It is used to organize a comprehensive knowledge base into a clearly defined instructional model which can interact with the learner tailored to the learner's performance and needs.

Authoring Systems In the past the cost of programming the computer for instructional use was very high. Authoring systems were developed to enable instructional developers,

Learning Technology in the Federal Workforce

References and Resources

without the knowledge of a programming language, to generate text and graphic lessons on the computer. They can call upon the still frame, motion and audio sequences of a random access videotape or videodisc player, or they can call other peripherals driven by the computer for sound, visuals, text, graphics, or other electronically stored material.

Compact Disc Technologies There is an entire family of compact disc technologies growing out of the CD audio so familiar to the consumer electronics market.

Compact Disc-Read Only Memory (CD-ROM) The 12 cm. CD-ROM disc can store 550 megabytes or more of digital data (the equivalent of about 250,000 pages of text, 500 1.2 MB floppy disks, or a 20' high stack of paper). The data on the disc is in digital form, allowing the computer to read and manipulate it. For education and training purposes, pictures, text, graphics, sound, and even color video sequences can be stored. However, it does not provide full-motion video sequences as a videodisc or videotape does.

Compact-Disc Interactive (CD-I) This system combines a microcomputer and a CD-ROM player in a stand-alone unit, providing random access to graphics, sound, and both still and full motion video. The data format, however, is proprietary, requiring CD-I discs to be played only on CD-I players. This technology, under development by Philips and Sony, was originally targeted for the home market; the developers are now marketing to the business environment as well. Few applications exist at present.

Digital Video Interactive (DVI) DVI allows real-time presentation of up to 72 minutes of full motion, full screen digital video, audio and graphics from a CD-ROM or other large storage device. The technology employs a set of algorithms to compress and decompress digital signals through a chip set on a PC board. Because all the signals are digital, every screen pixel, and every second of sound may be adjusted by the user, providing a highly interactive tool.

Computer Based Training (CBT) CBT can incorporate a wide range of concepts, techniques, media, and technologies. Computers can bring many specific capabilities to training delivery systems, however, with a high degree of interactivity unavailable with other instructional approaches, except, perhaps, for a direct dialogue between a student and instructor. A current definition of CBT from Gloria Gery is

Learning Technology in the Federal Workforce

References and Resources

"an interactive learning experience between a learner and a computer in which the computer provides the majority of stimulus, the learner must respond, and the computer analyzes the response and provides feedback to the learner." This new definition moves CBT away from many of the traditional limitations such as little learner control and criticism that it is primarily an electronic page-turner.

CBT is a versatile medium, available from mainframe, mini, and PC networks or on stand-alone units from a hard drive or floppy disk. Some of the distinct capabilities of CBT training include:

- Creation of files for storing information
- Organization of text, video, and numerical data
- Random access to data and programs
- Manipulation of variables and the calculation of outcomes
- Creation of linear, conditionally branched, or non-linear interactions
- Evaluation of student responses and decision-making based on performance assessments

Interactivity and learner control are the primary factors separating CBT from other more traditional instructional media. The wide range of learner control options and levels of interactivity permit a higher degree of individualized learning and add teaching value beyond that achieved with other media. (See also *Artificial Intelligence*, which is an important related topic area.)

Variations of CBT include computer-aided instruction (CAI), computer-based instruction (CBI), computer-based education (CBE), computer-based tutorials (CBI), and interactive tutorials.

Computer Conferencing Using the computer as a delivery system, conferencing sets up an *electronic classroom* combining computers and telecommunications. It is commonly used for student-teacher and student-student communication. Students meet with the instructor online; course information can be presented, along with questions, tests, assignments, and individual responses to questions or discussion items. The

Learning Technology in the Federal Workforce

References and Resources

role of the instructor is similar to teaching in a classroom but the contact is electronic rather than face to face. This format may be referred to as *asynchronous computer conferencing*. Virtually any computer terminal can be used with telecommunications.

Courseware The term is used to describe courses developed for educational technology applications. It indicates a learning or training tool for delivered through a computer.

Distance Learning Human resources (learners, experts, teachers, others) come together with material resources (text, audio, and visual databases; predesigned packaged learning environments) to learn. It is more than simply the physical or electronic delivery of local training to another location. It is an interactive phenomena. Examples of distance learning delivery methods include television and satellite, computer, and video conferencing technologies.

Electronic Bulletin Board Systems (BBS) A computer system is used to allow users to leave, read, and exchange messages with other users. Electronic bulletin boards provide access to data files, and permit on-line, real-time conferences between two or more users. The three major functions of a BBS are messaging, data access, and conferencing. The system can be used for support and teaching purposes.

Some of the advantages of using bulletin boards include:

- Wide and almost immediate access to a broad base of expertise
- Timely notices regarding system changes, new services, important announcements
- User involvement and user-to-user support
- Customization of on-line help with the combined immediacy and individuality of phone support and the convenience of on-line help
- Efficiency for support providers who gain a degree of control over their time, eliminate telephone tag, and provide public responses to common questions and problems

Learning Technology in the Federal Workforce

References and Resources

Disadvantages include:

- Security problems with dial-in access to internal networks
- Limited appeal to some users who are uncomfortable with electronic communications and want face to face support
- Lack of enforcement to get users to read messages when policy or procedure changes are broadcast
- Costs and/or access for connect time from long-distance participants and for appropriate hardware

Electronic Performance Support (Also referred to as Performance Support Systems or PSS) An electronic performance support system provides a worker with immediate guidance, advice, assistance, and tools to perform a job with a minimum of support from other people. The concept incorporates old as well as new tools, combining them to create powerful new systems to support jobs rather than individual tasks. The technologies being combined in creative ways include mass storage, increased desktop power, on-board video and audio, artificial intelligence, relational database management, networking, dynamic data linking, and uniform interfaces.

Embedded Training When training is delivered by the same computer a person uses for work as the work is performed, it is referred to as embedded training. The training material is located within the application software, or as a shell around it to provide immediate guidance as the individual works. When the training material resides in its own program which parallels the application software, it is called *concurrent training*. Embedded training can range from simple help functions to full blown tutorials, simulations, or context-sensitive help on a specific topic. It can be used to walk a user through the actual use of the software, providing the appropriate level of support to enable the user to perform tasks while simultaneously learning how to use the tools.

Expert Systems An expert system is an advice giving system used to help make decisions or solve problems. It uses techniques developed in the field of artificial intelligence to represent knowledge and make inferences. It consists of a knowledge base (a set of rules and decisions that make up the expert's knowledge), an inference engine (the method used to access and apply the knowledge), and an interface

Learning Technology in the Federal Workforce References and Resources

with the user (usually the keyboard and program which makes it easy to interact with the expert as naturally as possible).

Hypertext/Hypermedia Hypertext is a way of organizing, storing and retrieving textual information using a series of cross references referred to as nodes and links. Hypermedia extends the hypertext concept to include pictures, graphics, sound, and/or motion video in addition to text.

Hypertext A common definition of hypertext is a database that has active cross references and that allows the user to jump to other parts of the database as desired, making the reading (and writing) process non-sequential. The requirement for active cross references makes a computer necessary to implement hypertext. The database can be conceptualized as a network of nodes (documents) and links (cross references). Articles or documents can be shared across multiple locations/machines and allow collaboration in both reading and writing.

Hypermedia When documents are multimedia in nature, the term hypermedia is often used. Multimedia links can be made not only among text documents, but also among pictures, audio, video sequences, or whatever media are available in the machine environment being used. Videodisc and CD-ROM are commonly used media devices.

Learning Stations The interactive learning station can combine a number of tools to provide *embedded training* (training material or assistance is delivered as the person at the workstation works). Training is integrated with the work itself to allow the person to move freely from work to training, then back to work. The training material may be an actual part of the applications software (embedded training) or may be running in a separate program at the same time (concurrent training).

Multimedia The addition of graphic, sound, and motion video (multiple media) is used to create computer-based applications. Multimedia is commonly delivered via video disc (analog) and CD-ROM (digital); new video graphics and sound boards in computers, along with high speed modems are making it possible to transmit multimedia available over the Internet and other data communication systems.

Learning Technology in the Federal Workforce

References and Resources

Videodisc A videodisc player employs a laser to access video images stored on the 54,000 frames available on a single side of the disc. Two independent sound tracks may be recorded, with additional audio storage available by using some of the video frame space (referred to as the disc's real estate).

Most videodiscs used in the more sophisticated instructional applications are controlled by a computer (referred to as a *Level III* videodisc application). Level III applications use the computer to access frames, motion sequences and audio, while overlaying computer-generated text and graphics for maximum instructional utility. The user interface can be touch screen, light pen, mouse, keyboard, voice recognition, or any or all of the these methods, or some other device that represents, for example, a control panel, welding station, or simply the top of a table or desk.

The data on a videodisc is not stored in a digital format as it is on a hard disk or CD-ROM disc; it is stored in analog form. The image or sound itself cannot be altered since it is not in a form the computer can recognize.

Videoconferencing Similar to computer conferencing, videoconferencing, or **video-teleconferencing**, uses broadcast-quality video with a voice link. The analog signal provides one-way video with two-way audio bridges similar to a conference call. For wide distribution, the signal is usually broadcast via satellite. Video networks are evolving to deliver prepackaged programming to business sites equipped with downlinks for capturing satellite transmissions. Subject matter experts and instructors can be made available to a large audience while reducing travel-related costs. The technology serves to extend the traditional classroom more than replace it.

APPENDIX B. TABLE OF TYPICAL EDUCATIONAL TECHNOLOGY APPLICATIONS BY AGENCY AND TECHNOLOGY

AGENCY/DEPT	TECHNOLOGY	APPLICATIONS
General Accounting Office Training Institute	Video Conferencing CBT IVD	
General Services Administration		
Environmental Protection Agency	Video IVD CD-ROM (under development) CBT Satellite	computer-related courses, management, literacy, health and safety training, technical training (subject matter for scientific, technical, administrative, legal & support staffs)
Customs Service	CBT - mainframe and PC systems	
Internal Revenue Service	CBT	
U.S. Postal Service		
Federal Aviation Administration	EPSS	
USDA Soil Conservation Service		
Social Security Administration		
Office of Personnel Management		
Dept of Education Horace Mann Skill Center	IVD, CBT	
DoD Army Navy Air Force Marines	CBT Satellite Simulation (including computer simulation) IVD Audio conferencing Teletraining	

AGENCY/DEPT	TECHNOLOGY	APPLICATIONS
Federal Language Training Lab (Federal Laboratory Consortium for Technology Transfer)	Multimedia workstations, Teletraining	Foreign language learning; computer testing
Dept of Energy (Sandia Lab)		
National Library of Medicine - Lister Hill Center	CBT IVD	
USDA Extension Service	Satellite CD-ROM IVD CBT Teletraining	
National Security Agency National Cryptologic School	Simulations (including computer simulation)	Executive and project manager learning
Department of Justice	IVD Computer gaming	Attorney trial advocacy skills Ethics training

Audio Audio Tapes
 AudioCon Audio Conference
 CBT Computer-Based Training (see glossary
 for related terms)
 CD-ROM Compact Disc-Read Only Memory
 Comcon Computer Conference
 EPSS Electronic Performance Support System

IVD Interactive Video Disc
 TeleTr Teletraining
 Video Video Tapes
 VideoCon Video Conference

Appendix C. Technology Transfer Act

Public Law 99-502
99th Congress

An Act

To amend the Stevenson-Wydler Technology Innovation Act of 1980 to promote technology transfer by authorizing Government-operated laboratories to enter into cooperative research agreements and by establishing a Federal Laboratory Consortium for Technology Transfer within the National Bureau of Standards, and for other purposes.

Oct. 20, 1986
(H. R. 3770)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Federal Technology Transfer Act of 1986".

SEC. 2. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS.

The Stevenson-Wydler Technology Innovation Act of 1980 is amended by redesignating sections 12 through 15 as sections 16 through 19, and by inserting immediately after section 11 the following:

"SEC. 12. COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENTS.

"(a) GENERAL AUTHORITY.—Each Federal agency may permit the director of any of its Government-operated Federal laboratories—

"(1) to enter into cooperative research and development agreements on behalf of such agency (subject to subsection (c) of this section) with other Federal agencies; units of State or local government; industrial organizations (including corporations, partnerships, and limited partnerships, and industrial development organizations); public and private foundations; nonprofit organizations (including universities); or other persons (including licensees of inventions owned by the Federal agency); and

"(2) to negotiate licensing agreements under section 207 of title 35, United States Code, or under other authorities for Government-owned inventions made at the laboratory and other inventions of Federal employees that may be voluntarily assigned to the Government.

"(b) ENUMERATED AUTHORITY.—Under agreements entered into pursuant to subsection (a)(1), a Government-operated Federal laboratory may (subject to subsection (c) of this section)—

"(1) accept, retain, and use funds, personnel, services, and property from collaborating parties and provide personnel, services, and property to collaborating parties;

"(2) grant or agree to grant in advance, to a collaborating party, patent licenses or assignments, or options thereto, in any invention made in whole or in part by a Federal employee under the agreement, retaining a nonexclusive, nontransferrable, irrevocable, paid-up license to practice the invention or have the invention practiced throughout the world by or on behalf of the Government and such other rights as the Federal laboratory deems appropriate; and

Federal
Technology
Transfer Act of
1986
Commerce and
trade
Government
organization and
employees
15 USC 3701
note
15 USC 3701
note
15 USC
3711-3714
15 USC 370a

State and local
government
Business and
industry
Schools and
colleges

Patents and
trademarks

Appendix D. Demonstration Centers, Laboratories and Resource Centers

National Demonstration Laboratory for Interactive Information Technologies - Academy for Educational Development

National Technical Information Service - Department of Commerce

National AudioVisual Center - Department of Commerce

Technology Resources Center - Department of Education, Office of Educational Research and Improvement

Pentagon Skill Assessment Center

Horace Mann Skill Center - Department of Education

CD-ROM Information Resources Center (CIRC) and Special Interest Group on CD-ROM Applications and Technology (SIGCAT)

US Department of Education OERI
Technology Resources Center

What is the Technology Resources Center?

- The Center is a demonstration site for the application of technology to all levels of Education.
- Introduction to new technology. Examination of new programs and new products.
- Lectures and demonstrations designed for specific needs.

Demonstrations of:

- Satellite downlink and US ED "Star Schools" programs.
- Interactive videodisks on: AIDS, Art Galleries, Geography, History, Math, Music, Science, Social Studies, and World Affairs.
- CD ROM discs including: Compton's, Grolier, Encarta and World Book encyclopedias, Art, Books in print, Children's stories, Current events, Federal grants locator, Foreign languages, Graphics, History, Medical data, and Reference tools.
- Philips CD I and Kodak Photo CD
- IBM EduQuest MultiMedia system, DOS 5.0 and Windows 3.1
- Macintosh System 7, HyperCard, Quick Time, and Video capture board. Apple IIE and Apple II GS.
- Software on display is made available by vendors and/or is chosen from programs listed by ASCD's, "Only the Best" and EPIE, "The Educational Software Selector Guide."

Visitors To The Technology Resources Center

- Classroom teachers use our software library to see what is new, or to research how various programs teach the same subject. The Center is a convenient and immediate source of demonstration for a wide variety of primary and secondary school subjects.
- Education administrators, supervisors, and national leaders visit the Center. We are able to provide them with a personalized demonstration of computers, videodisk, and CD ROM. While many are aware of some of this technology, few have had a chance to have hands-on contact with specific products.
- Foreign visitors from over 75 different countries have come to see the Center. Visitors have come individually or as class size groups. Many have unique and specialized problems, and all are concerned with teacher training.
- Program developers and hardware vendors demonstrate their new products and materials. The Center, through regular meetings and demonstrations, has become a place for developers and educators to meet each other and exchange ideas.
- Directors of educational institutions use the facility to look at various configurations of hardware so that they may make their own decisions on equipment.
- Other Government Agencies come to see specific software and new technologies. The Center has a large collection of CD ROM discs produced by or for government agencies.

Equipment demonstrated in the Center is on loan from vendors. The Technology Resources Center does not recommend, evaluate, endorse, or loan products. The Center is open daily from 9:00 AM to 4:00 PM. Appointments are requested. Phone 202 219 1699 or fax 202 219 1696. Presentations can be customized to individual or group needs. The Center is located within the Education Research Library, at Capitol Place, 80 F Street, NW., two blocks from Metro at Union Station. The mailing address is: Technology Resources Center 555 New Jersey Ave N. W., Washington, D.C. 20208 -5725

CD-ROM INFORMATION RESOURCES CENTER (CIRC) QUESTIONNAIRE

SIGCAT is in the process of establishing a CD-ROM Information Resources Center (CIRC). This facility, which will be co-located in Reston with the SIGCAT Technical Educational Center, will provide members of the CIRC with the opportunity to evaluate hardware and software products. The concept of the CIRC emerged from the apparent need for a single, organized environment in which the many CD-ROM products now available could be assessed.

Our initial focus will be on authoring software. Those who join the CIRC as users will have the opportunity to access these products on a network. In addition, the CIRC will contain a wide variety of CD-ROM reference discs produced by the federal government and private publishers, which users can evaluate. Members would visit the CIRC by appointment. An **Individual Membership** would provide 10 hours on the network; a **Group Membership**, appropriate for government and private organizations, would provide 125 hours of network time; and a **Consulting Membership** would provide 600 hours of network time. Each level of membership would include additional time on a standalone machine to use the evaluation discs and unlimited time using such resources as trade publications and other reference materials.

Please return the questionnaire to Jerry McFaul during one of our breaks, or, if more convenient, mail to SIGCAT, P.O. Box 3706, Reston, VA 22090. We appreciate your taking the time to provide your response to the CIRC, and we welcome your suggestions.

I would be interested in (please check one):

- ☐ Individual Membership (\$75)
- ☐ Group Membership (\$500)
- ☐ Consulting Membership (\$1200)

Name _____ Title _____

Address _____

City _____ State _____ Zip _____ Phone _____

Comments _____

Appendix E. EPA NPR Initiative: 3% for Training

**NPR
INITIATIVE:**

3% FOR TRAINING



SUBMITTED SEPTEMBER, 1994

by:

**Jeuli Bartenstein
Patty Bettencourt
Lori Inglis
Julius Jimeno
Zandra Kern
Judy King
Delia Scott
Dwight Welch
Barbara White
Richard White
Steve Vineski, Facilitator**

NPR INITIATIVE: 3% FOR TRAINING

Introduction -- The NPR Recommendation

In December of 1993, the EPA National Performance Review Steering Committee issued its report with 52 recommendations. Recommendation #10 called for the Agency to devote the equivalent of 3% of PC&B to training and professional development. The Steering Committee directed OARM, and OHRM in turn, to develop recommendations for implementation. A workgroup was formed which was composed of representatives from the regions, AFGE, NFFE, program offices, and OARM, with expertise in budget and finance, workforce development, and learning systems. This report represents the findings and recommendations of the workgroup.

The 3% goal for training was referred to in two different NPR reports: explicitly recommended in the Management and Executive Development Report, and implicitly in the Workforce Capacity Report. The intent of the NPR workgroups was to increase, from a static base, the amount of money spent on training and development, not to raise the base by changing the accounting mechanism. The goal refers only to in-service employee training and development, not to the training and education we do for the States, for industry, or community outreach via contracts and grants.

The SLC accepted the recommendation of the Management and Executive Development Workgroup for implementation, but broadened it to include training and development for all employees, not only managers and supervisors.

Background and History of "3%"

What does "3% for training" mean?

A standard industry measure for employee training investment is stated as percentage of payroll. A goal of "3%" is calculated by totaling organizational costs for personnel compensation and benefits and multiplying by three percent. Common corporate practice measures progress towards this goal by accounting for all direct training costs. Indirect costs, such as employee salaries while taking training, are not normally included. If salaries are included, the goal doubles.

Three percent of actual expenditures on employee training is considered a corporate minimum for workforce capacity investment. For example, Texas Instruments spends 3.5%; General Motors spends 5%; Xerox and IBM spend up to 10% of their payroll equivalent.

History of Three Percent at EPA

The EPA Institute has been tracking Agency-wide expenditures for training since FY 1990, using the IFMS and ten training-related object classes.

The FY 1992 budget call letter, issued in 1990, required each AA and RA to address the "Agency-wide goal of 3% of PC&B costs for training and development." The goal applied to "...T&D expenses for all supervisory and non-supervisory EPA staff and includes, but is not limited to, in-house training, mandatory training, commercial and University training, participation in professional organizations, developmental programs and details, and travel related thereto."

The "3% for training" language in the budget call letter made no significant difference in the rate of expenditures, using the same object class measures in FY's 91, 92, and 93. The Agency consistently spends about 1% of PC&B for training and development. This amounts to a little over \$10 million across all AA's and Regions. Based on the FY 1994 budget, a three-percent goal means \$30 million spent on EPA workforce development and training.

Current State of Training Investment at EPA

Management of Training Process

Our culture views training as a cost rather than an investment, and that is manifested in the way we spend our money. Currently, our training and development budgets are an afterthought and are dependent on what was budgeted in the prior year, or what is "left over" at the end of the fiscal year. Virtually all training expenditures are top-down (not cross-organizational), with accountability residing with immediate supervisors. Systems are not in place to fund Agency priorities or cross-organizational needs. Workforce development costs are neither strategically planned, nor are there any accountability systems in place to ensure effective spending. Even statutorily mandated training, such as Health and Safety, is not fully supported. Agency requirements for training in contracts or supervisory/management are not completely met.

Delivery of Training

Virtually all training which we develop or attend in this Agency is for the classroom. We have over-used the Train-the-Trainer model to the point of exhausting the system, and diminishing the quality. We send people out to training vendors for cost- and time-intensive classroom experience, but do not measure or reinforce behavioral change. Though according to the literature, return on training investment is both impossible and

impractical to calculate accurately, we do not have any systems in place to examine long-range effectiveness.

Training data

Very little training data is available or collected. There is no central data collection system, other than IFMS, which can only collect cost data by training object class codes. There is no current system which can collect data about what training money is spent on and how effective that training is. Headquarters programs and Regions collect different data differently, using dissimilar definitions and a variety of tracking software.

ORD Case Study

Our study of ORD's training expenditures is a clear example of the current state of training data at EPA. In order to capture training expense data, a central call letter, including a format for data collection, went out from the program management office to all ORD program operations offices. It took close to two months to get all responses back and data aggregated. All information had to be collected manually. Depending upon definitions of "training expense", ORD spends either 1% (IFMS data); 2% (including travel and training-related contracts, rent agency and cooperative agreements); 3% (including salaries for in-house or internal training initiatives) or 5% (including employee salaries while engaged in training activities). The report provided ORD with a better picture of their development expenses.

Obstacles to Implementation

Currently, we view the following as obstacles to full implementation of the 3% recommendations:

Administrative ceiling and conflicting mandates -- training allocations must compete against a myriad of other expense needs; existing commitments (e.g. OIRM) predetermine some expenditures and reduce spending discretion.

The Agency sends a mixed message about the value and support for training and development. For example, each new initiative is accompanied by a training requirement, but unaccompanied by the resources needed to ensure adequate learning.

The budgetary distinction between "administrative" and "programmatic", as applied to training, works against building the competencies required by reinvention (e.g. team skills, engineering, customer service skills, etc.)

Continually changing priorities diminish the likelihood of long term commitment to competency building.

Desired State for Training Investment at EPA

Our vision for the future is that organizations, groups, and self-directed individuals are responsible for meeting both organizational and individual development needs within a strategic framework. Whatever the amount of money spent (e.g., 3%, 10%), it is important that it is focused and targeted to build the capacity of our workforce to carry out the strategic mission of the Agency. Our recommendations focus on better management of the training planning process, better delivery of the training product, and better data to account for our efforts.

Better Management--Align Training with Strategic Direction

We need to develop a system to translate our strategic plans and program budgets into developing the capacity of our workforce--the only means through which our work is done. When budgets are formulated for programs and Regions two years in advance, workforce development needs must be reflected in the planning. In order to better focus our diminishing financial and human resources, we need to invest in the future skills of our workforce. Senior executives must routinely link workforce capacity with organizational goals; they must continually assess development needs, and reflect this in their planning and budgeting processes.

The National Human Resources Council has endorsed a "Framework for Workforce Training and Career Development". It is a comprehensive model, addressing virtually all of the 31 workgroup's general suggestions, in far greater detail, for more targeted spending (addressing a more inclusive IDP process, organizational as well as individual needs, national as well as local needs, and mandatory training requirements).

Better Delivery--Focus on Results

We need a transformation in training delivery. Effective use of our 3% requires reengineering our training development and delivery to produce better, more effective, learning programs for EPA's workforce; lower the overall cost to the Agency; and better meet our customer's learning needs. We need to look to technology-based delivery to lower cost, speed delivery, and improve access. We need to create an easy and effective mechanism for feedback on, and evaluation of, learning experiences and develop longer term evaluation systems which link investment to behavioral change.

Technology based delivery is an important part of both reducing our cost and more effectively helping our employees learn. People generally underestimate the cost of classroom training (as pointed out by ORD data). Only "known" costs are accounted for, not hidden costs. IFMS reports known costs: development, instructor, classroom, supplies and materials,

equipment, instructor's travel and per diem. Indirect or hidden costs include learners' travel and per diem, learners' time away from job, costs of lost productivity when training is delayed. Hidden costs, especially for a large, geographically dispersed audience or a training with a long lifecycle, are frequently an order of magnitude above the known cost.

The benefits of technology-based training are manifold: on-site, on demand; responsive to a variety of learning styles; reduced training time -- typically by 40%; higher retention rates -- typically 25% greater.

Better Data--Information Helps Decisionmaking

Cost of training is a significant dimension in assessing training and development investment, but it is not by itself a measure of training effectiveness. There are several other key indicators which, when viewed holistically, reflect on the state of "health" in an organization: time spent in training, whether cost or no-cost; people trained, by series and job type; type of training, an appropriate mix of technical and general; mission competencies, the skills our workforce needs to accomplish Agency goals. Our current data systems do not collect this kind of information, nor even complete training cost information in a useful way.

RECOMMENDATIONS for IMPLEMENTATION

DEFINITION OF INVESTMENTS INCLUDED IN 3%

All direct costs for training and development should be included in calculations towards the 3% goal, for example, tuition, books, travel, technology-based courseware, training videos, etc. Indirect costs, such as salaries and administrative overhead, are not to be included.

BETTER MANAGEMENT OF THE PROCESS

Conduct workforce strategic planning beginning with the FY97 budget process -- senior executives must strategically link workforce capacity with organizational goals by assessing competency requirements and development needs, and reflecting this in their planning and budgeting processes.

The required March 1995 streamlining plans from all AA's and RA's should include a 3% spending proposal for workforce and organization development.

All new initiatives, programs, or priorities must include a human resources impact plan and the budgeted resources to meet competency development needs of the workforce.

The Comptroller should include training and development and associated travel targets in the budget process for each budget cycle and include this as a requirement in the Agency's technical all letter.

We endorse the National Human Resources Council's "Framework for Workforce Training and Career Development" as a model for targeted spending.

We recommend specific training and development "set-asides" in some or all of the following areas:

- Set-asides at the AA and RA level for all four quadrants of the Framework (mentioned above).
- Set-asides at the AA/RA level with accountability for expending dollars solely with the organization's line managers.
- Set-asides (other than top-down) for "recognized" cross-cutting or special focus Agency groups for specialized career development (e.g., Secretarial and Administrative Support Advisory Council, Women in Science and Engineering, unions, special Presidential or Administrator initiatives).

Increase the Agency's Professional Training Fund by 300% to be used for building an Agency-wide learning "infrastructure" (e.g., learning, information, and performance support systems; development of computer-based learning programs; competency-based models for learning; etc.).

BETTER DELIVERY OF THE PRODUCT

Reengineer our training development and delivery to produce more effective learning programs for EPA's workforce.

Emphasize technology-based delivery for learning which lowers cost, speeds delivery, improves access, and increases retention.

Minimize the focus on the classroom for training design and delivery, as the costs are enormous, and generally underestimated.

Create an easy and effective mechanism for feedback on, and evaluation of, learning experiences. Also, longer term evaluation systems which link investment to behavioral change.

BETTER DATA COLLECTION

Establish a data base system to better aggregate training data, with agreed upon standards, definitions, and reporting needs.

Expand budget sub-object classes to better capture "type" of training

Revise Agency forms to better collect data (e.g., travel for training, simpler or automated training forms, etc.)

Compare actual training expenditures, by AA and RA, with strategic budget plan for training.

Conduct pilot study to obtain clear data and a better picture of how and where development dollars are spent.

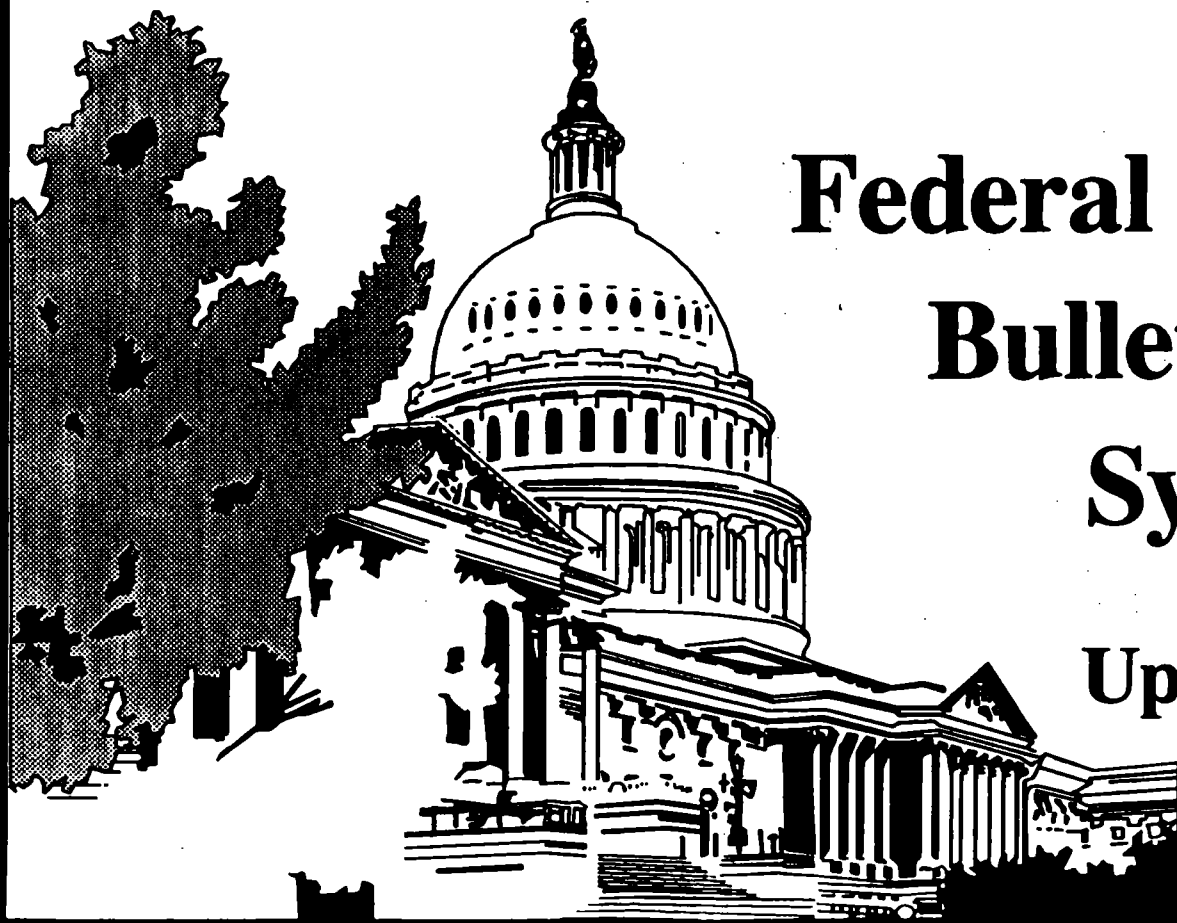
Appendix F. Interagency Resource Sharing Panel - Federal
Government Bulletin Board Systems

Interagency Resource Sharing Panel



Federal Government Bulletin Board Systems

Updated: October 1994



Agency	BBS	Data	Sp	Voice	Access
Agricultural Library	A tural Lit Forum	301-504-6510; 301-504-	9,600; 2,400	301-504-5113	Public
Agriculture Department	Biological Impact Assessment	703- - 800- -2723	2,400; 2,400	703-231-3747	Public
Agriculture Department	Commercial Information Delivery Service	Must subscribe	9,600; 2,400	202-720-5505	Public
Agriculture Department	Economic Research Service	800-821-6229	9,600	202-219-304	Public
Agriculture Department	Human Nutrition Information Service	301-436-5078	2,400	301-436-8491	Public
Air Force	Air Force Small Business BBS	800-636-6369 type SIGNUP	2,400	800-636-6636	Contractors (fee)
Air Force	Small Computer Support Center	406-731-2503	9,600	406-731-4612	Public
Air Force Engineering Installation	ULANA BBS	405-736-0928	2,400	405-734-0928	Air Force, DLA
Air Force Engineering Installation	ULANA II	405-741-0824	9,600	405-734-0928	Contractors
Air Force Space Command	Competition Advocate	Call voice first	2,400	719-554-5325	Public
Air Force Standard Systems Center	Standard Systems Center	205-416-5651	9,600	205-416-5771	Public
Argonne National Laboratory	Newton	708-252-8241	9,600	708-252-6941	Public
Army	Integration & Analysis Center (IMA)	703-285-6400; 6401	9,600	703-285-6105	Public
Army Corps of Engineers	Automated Specification Criteria	916-557-7697; 800-445-6644	9,600; 2,400	916-557-7670	Public
Army Engineering and Housing Support Center	Data Distribution System	703-355-2185	9,600	703-355-0073	Army
Army Military District of Washington	Morale, Welfare and Recreation	202-475-7543	2,400	202-475-2513	Public
Army Software Center	Software Engineering Support BBS	703-285-9637	2,400	703-285-9654	Public
Bureau of Mines	Mines-Data	202-501-0373	9,600	202-501-0406	Public
Bureau of Prisons	Office of Information Systems	202-514-6102	9,600	202-307-3104	Federal employees
Census Bureau	Census BEA Electronic Forum	301-763-7554	9,600	301-763-1580	Public
Census Bureau	Census Personnel BBS	301-763-4574	2,400	301-763-4951	Public
Coast Guard	Coast Guard On-Line Magazine & News	202-267-4644	9,600	202-267-0928	Public
Coast Guard	Global Positioning System BBS	703-666-3664; 703-313-5910	9,600; 2,400	703-313-5900	Public
Commerce Dept. - NTIA	NTIA/NI BBS	202-482-1199	14,400	202-482-3999	Public
Commerce Dept. - Office of Business Analysis	Economic Bulletin Board	202-482-3670; 202-482-2584	2,400; 9,600	202-482-1966	Public (fee)
Commerce Dept. - Office of Planning & Budget	Planning and Budget BBS	202-482-1423	2,400	202-482-2949	Public
Customs Service	Customs Electronic BBS	703-440-6155	9,600	703-440-6236	Public
DC Government	DC Government Information	202-727-6668	2,400		
Defense Department	Ada Information Clearinghouse	703-614-0215	2,400	703-685-1427	Public
Defense Department	Export License I	703-697-6109	2,400	703-693-1097	Public
Defense Information Systems Agency	DISA Acquisition BBS	618-256-9200	9,600	618-256-8380	Public
Defense Information Systems Agency	Information Technology Acquisition	618-744-8787	9,600	618-256-9691	Public
Defense Logistics Agency	DASC-ZE BBS	703-274-5883	2,400	703-617-0452	Public
Defense Mapping Agency	Navinfoat	301-227-4424	9,600	301-227-3296	Public
Defense Technology Security Administration	Elisa I	703-697-6109	2,400	703-693-1096	Exporters
Department of State	Passport Info/Travel Alerts	202-647-9225	9,600		
Education Department	ED Board	202-290-9950	2,400; 9600	202-708-6775	Public
Education Department	Educational Research and Improvement	202-219-2011	2,400	202-219-2012	
Education Department	Able Inform	301-589-3563	2,400	301-589-3563	Public
Education Office of Research and Improvement	National Education BBS	800-222-4922; 202-219-1511	2,400; 2,400	202-219-1526	Public
Energy Department	Megawatts	202-586-0739	9,600	Leave message on	Public
Energy Department	Civilian Radioactive Waste Mgmt. Infolink	Call voice first	9,600	800-225-6972	Public
Energy Information Administration	BA BBS	202-586-2557	2,400	202-586-6800	Public
Energy Office of Fossil Energy	FE Telenews	202-586-6496	9,600	202-586-6503	Public
Energy Office of Minority Economic Impact	Minority Impact BBS	800-543-2325; 202-586-1561	9,600	202-586-7898	Public
Environmental Protection Agency	EPA Region 4	404-347-1767	2,400	404-347-3633	Public
Environmental Protection Agency (ATTIC)	Alternative Treatment Tech Info Center	703-908-2136	9,600; 14,400	703-908-2137	Public
Environmental Protection Agency	Wetlands, Oceans & Watersheds	301-589-0205	9,600	301-589-5318	Public
Environmental Protection Agency	Pesticide Information Network	703-305-5919	2,400	703-305-7499	Public
Environmental Protection Agency	Pollution Prevention BBS	703-506-1025	2,400; 2,400	703-821-4800	Public
Environmental Protection Agency	Research and Development BBS	513-569-7610; 800-256-9805	9,600	513-569-7272	Public
Environmental Protection Agency	Technology Transfer Network	919-541-1447; 919-541-5742	9,600; 2,400	919-541-5384	Public
Environmental Protection Agency	Cleanup Information	301-589-6366	2,400	301-589-6366	Public
Environmental Protection Agency and SWANA	Solid Waste Management	800-544-1936	2,400	800-624-8301	Public
Environmental Protection Agency and NOAA	Gulflink	800-235-4662; 601-688-2677	9,600; 9,600	601-688-1065	Public
EPA Ocean & Coastal Protection Division	CoastNet	202-260-8482	2,400	202-260-9082	Call for user ID
Export-Import Bank	Eximbank BBS	202-566-4699	9,600	202-566-4400	Public (fee)
Federal Aviation Administration	Air Traffic Operations Service	202-267-5331	2,400	202-267-9229	Public
Federal Aviation Administration	Air Transport Division	202-267-5231	2,400	202-267-3764	Public
Federal Aviation Administration	FAA Airports	202-267-5205	14,400(2 nodes)	202-267-7699	Public
Federal Aviation Administration	FAA Headquarters BBS	202-267-5697	9,600	202-267-3332	Public
Federal Aviation Administration	Navigation and Landing	202-627-6547	2,400	202-267-6543	Public
Federal Aviation Administration	FAA Office of Environment & Energy	202-267-6647	9,600	202-267-3559	Public
Federal Aviation Administration	FAA Safety Exchange	800-426-3614	2,400	616-426-3580	Public
Federal Aviation Administration	Orlando Flight Service District Office	407-646-6366	9,600	407-646-6640	Public
Federal Aviation Administration	Pilot Examiner	405-684-4530; 406-954-4530	2,400	405-954-4753	Public
					Library bulletin
					Biological Assessments
					Developments/statistics
					Agricultural statistics
					Data on food composition
					Procurement
					Computer support
					ULANA network contract
					ULANA II procurement
					Procurement
					Defense contracts
					Science education
					Defense publications
					Military engineering specs
					Housing information
					Activities
					Military micros, minis
					Minerals production
					Microcomputer support
					Census CD-ROM shareware
					Job vacancies
					Coast guard news
					Global positioning
					Telecommunication/NIH issues
					Economics and trade promotion
					Budget
					Currency conversion rates
					Ada information
					Export license applicants
					Procurement
					Procurement
					Microcomputer support
					Marine advisories
					Export license status
					Grant/Contract information
					Disability support
					Statistics, classroom software
					Shareware
					Radioactive waste disposal
					Energy production, survey prices
					Coal, oil, gas reserves
					Procurement, education in DOE labs
					Wastewater management
					Environmental engineering
					Source pollution information
					Pesticide monitoring & regulatory info.
					Pollution control
					Water, biotechnology
					Air pollutants, more BBSs
					Hazardous waste removal
					Wastewater treatment
					Gulf states environment
					E-mail
					Export-import programs
					Aviation information manual
					Transport aircraft
					Airport Design/operations standards
					Civil penalty notices, conferences
					Instrument landing systems
					Noise models
					Amateur-built and ultralight aircraft
					Minimum equipment test
					Aviation

Agency	S	Data	Sp	Voice	Access	Note	
Aviation Administration	Link	Portland Master Minimum Equipment List	207-780-3297	9,600	207-780-	Public	Minimum equipment list
Communications Commission		FCC daily digest & carrier stats/reports	202--	14,000	202-418-0940	Public	Carrier statistics, daily digest
Communications Commission		Public Access Link	301-725-1072	1,200	301-725-1585	Vendors	FCC license applications
Deficit Reduction		Report US Government waste fraud & abuse	202-225-5527				
Emergency Management Agency		Hazardous Materials	708-972-3275	2,400	800-752-6387	Public	Emergency response planning
Emergency Management Agency		State/Local Emergency Mgmt.	202-646-2887	9,600	202-646-3158	Public	Emergency response
Energy Regulatory Commission		Commission Issuance Posting System	202-208-1397	9,600; 2,400	202-208-2474	Public	Commission agenda, filings, findings
Government		Govt Printing Office & Files distribution	202-512-1397	9,600			
Highway Administration		FEEBS	202-366-3764	9,600	202-366-9022	Public	FHWA programs, tech support
Information Exchange		FEDIX	800-232-4879; 301-258-0953	2,400; 2,400	301-975-0103	Public	Research, educational opportunities
Reserve Bank of Dallas		Federal Reserve Economic Data	214-922-5199	9,600	214-922-5173	Public	Banking, regional economic data
Reserve Bank of Minneapolis		Electronic Database	612-340-2489	2,400	612-340-2443	Public	Banking, regional economic data
Reserve Bank of St. Louis		Federal Reserve Economic Data	314-621-1824	2,400	314-444-8562	Public	Banking, interests rates
Supply Service		Automated Product Listing Service	703-305-6570	9,600	703-305-6023	Public	Federal Supply Schedule products
Fish and Wildlife Service		National Ecology Research Center	303-226-9365	2,400	303-226-9335	Public	Habitat simulation programs
Food and Drug Administration		PMA, IDE, 510K & guidance documents					
Food and Drug Administration		Devices and Radiological Health	301-443-7498	2,400	301-443-7003	Public	Meetings, research
Geological Survey		Quick Epicenter Determination	800-358-2663	1,200	303-236-1500	Public	Seismological and geomagnetic data
Geological Survey		Geological Survey BBS/CD-ROM Info	703-648-4168	9,600	703-648-7300	Public	CD-ROM technology
Government Printing Office		Federal Bulletin Board	202-512-1387	9,600	202-512-1530	Public (fee)	Government publications
GPS		Global positioning	703-666-3890	9,600			
GSA		Cooperative Administrative Support Program	202-653-7516	9,600	202-653-7000	Public	Administrative support
GSA		Consumer Information Center	202-206-7679	9,600	202-501-1794	Public	Consumer information catalog
GSA Federal Supply Service		Mituse File for Interagency News	202-205-3890	9,600	703-305-7200	Government	Surplus property, requisitions
GSA IFM Service		GSA Schedule BBS	202-501-7254	9,600	202-501-1404	Public	GSA schedule contracts
GSA Office of IFM		OFIRM	202-206-7484	9,600	202-501-4409	Public	Governmentwide contracts
Start Online-BBS		Head Start Online BBS (Region II)					
Health and Human Services		Health Care Financing ADM	410-597-3351	9,600	410-597-5215	Public	Medicare and Medicaid
Health and Human Services		Administration for Children and Families	202-401-5800	2,400	202-401-5682	Public	Administrative support
Health and Human Services		National Institute on Alcohol Abuse	202-289-4112	2,400	202-289-2992	Public	Alcohol use statistics
Health and Human Services		Office of the Assistant Secretary of Health	202-690-5423	2,400	202-690-6248	Public	AIDS-related reports
Health and Human Services		FDA Center for Radiological Health	301-443-7498		301-443-7004	Public	Procedures for medical devices
House of Representatives		Federal Deficit Reduction (Whistleblower)	202-225-5527	2,400	202-225-3471	Public	Federal waste, fraud and abuse
Housing Urban Development		HUD News & Events BB. Press Releases	202-706-3563	9,600			
Human Nutrition Information Service		Nutrient Data Bank	301-436-5078	2,400	301-436-8491	Public	Food composition
Indian Health Service		IHS Division of Environmental Health	301-443-9517	2,400	301-443-1048	Public	Environmental health
Interior Department		Geological Survey	703-648-4168	9,600	703-648-7300	Public	Mapping & earth science information
Interior Department		Office of Environmental Affairs	202-206-7119	2,400	202-206-6304	Public	Environmental reports
Interior Department		Offshore Statistics & Information	703-787-1225	9,600	703-787-1043	Public	Offshore oil and gas data
Internal Revenue Service		ISM Support Information System	202-219-9977	9,600	202-501-5173	Public	Microcomputer support
Internal Revenue Service		Statistics of Income Division	202-874-9574	9,600	202-874-0408	Public	Tax return statistics
Martinsburg Computer Center		Information Reporting Project	304-263-2749	9,600	304-263-8700	Public	Electronic filing
Justice Department		Amer. With Disabilities Act Info					
Justice Office of Justice Programs		Criminal Justice Reference Service	301-738-8895	2,400	301-251-5289	Public	Civil rights enforcement
Labor Department		Board of Wage & Service Contract Appeal					
Labor Department		Labor News	202-219-4784	9,600	202-219-7343	Public	Consumer price index, earnings reports
Labor Office of Public Affairs		Labor News	202-523-4784	2,400	202-523-7343	Public	Consumer Price index, earnings reports
Library of Congress		Library of Congress News Service	202-707-3854	2,400	703-385-8631	Public	Exhibit news, jobs
Library of Congress		Automated Library Information	202-707-4888	2,400	202-707-4800	Public	Federal agency libraries
NIH		AIDS Information & Reports	202-690-5423	9,600			
NASA		The NASA NODIS Locator System					
NASA/Goddard		NASA SpaceLink	205-895-0028	2,400	205-544-6360	Public	Scientific and educational programs
NASA Johnson Space Flight Center		Fed. Register Electronic News Delivery	202-275-0920	2,400	202-523-3447	Public	Federal register on line
National Archives (FREND #1)		Fed. Register Electronic News Delivery					
National Archives (FREND #2)		National Institute of Dental Research					
National Institute of Dental Research Online		Building Fire Research	301-990-2272	2,400	301-975-6862	Public	Fire simulation programs
National Institute of Standards and Technology		Computer Security BBS	301-948-5140; 301-948-5717	9,600; 2,400	301-975-3359	Public	Emergency response team advisories
National Institute of Standards and Technology		Data Management Information	301-948-2056; 301-948-2048	1,200; 1,200	301-975-3272	Public	Data standards reports
National Institute of Standards and Technology		Automated Computer Time	303-494-4774	1,200	303-497-3261	Public	Synchronizes computer clocks
National Institute of Standards and Technology		North American ISDN Users Forum	301-809-7261	2,400	301-975-2937	Public	ISDN activities
National Institutes of Health		Information Center BBS	301-480-5144; 800-644-2271	14,400	301-488-6810	Public	Health information
National Institutes of Health		National Institute of Health Grant Line					
National Institutes of Health		PC Bull	301-480-8400	2,400	301-488-2262	Agency	Microcomputers
National Oceanic and Atmospheric Administration		Space Environment Lab	303-497-9399	2,400	303-497-3997	Public	Geomagnetic and solar forecasts
National Oceanic and Atmospheric Administration		Marine Data Computer	301-713-6373	9,600	301-713-7853	Public	Marine information
National Oceanic and Atmospheric Administration		Environmental Services Data Directory	703-608-4888	9,600	702-608-2012	Public	Environmental sciences
National Oceanic and Atmospheric Administration		NOAA L	303-497-3848	2,400	303-497-3271	Public	Shareware, public-domain software

Agency		Data	Sp	Voice	Access	Note
National Oceanic and Atmospheric Administration	Bibliographic Ca j	301-713-4544; 800-352-7281	9,600	301-713- 0	Public	Note User ID =
National Science Foundation	National Science Foundation	202-634-1764	2,400			
onal Technical Information Service	FedWorld	Telnet fedworld.gov ; 703-321-8029	9,600	703-487-4608	Public	Gov't Info/Gateway
National Tele. & Info Admin.	NTIA/NII	202-482-1199	14,400	202-482-3999	Public	Telecomm/NII
National Weather Service	Climate Dial-Up Service	301-899-0827	2,400	301-763-4670	Public (fee)	Worldwide climate conditions
Naval Computer and Telecommunications Station	Navy IRM College Recruitment BBS	804-445-2104; 804-843-4093	9,600; 38.4K	804-444-8487	Public	Entry-level IRM employment
Computer and Telecommunications Station	Online Automated System	804-445-1627	2,400	804-444-8487	Government	Micro contracts, DOD software
Computer and Telecommunications Station	ADA Technical Support BBS	804-444-7841	2,400	804-444-1231	Public	Ada technical assistance
Gun Weapon System BBS	Naval Gun Weapon System					
Research Force HQ	Naval Reserve Force BBS	504-254-7776	2,400	504-254-7947	Government	Reserve force training
/ Marine Corps Appellate Review	JAGnet	703-325-0748	2,400	202-325-2924	Public	Microcomputers
Navy	NAVAIRES Alameda					
Navy	Naval Health Sci Edu & Training Command					
Navy	NAVCOMTELSTA Washington DC					
Navy BUPERS Access	Nav Computer & Telecom Station					
Office of Government Ethics BBS	Navy Personnel Information					
Office of Personnel Management - WASHNET	Office of Government Ethics	202-523-1186	9,600			
Office of Personnel Management - WASHNET	Government Groups and Organizations	202-606-1113; Call voice/password	2,400	202-606-1848	Government	SES openings, weekly job updates
Office of Personnel Management	Mainstreet	202-606-4800	2,400	202-376-3747	Public	Weekly federal job openings
Office of Personnel Management	Federal Quality Institute	301-937-0722	2,400	800-766-8737	Government	Total quality management
Office of Personnel Management	Policy Operations and Staffing BBS	912-757-3100	9,600; 2,400	202-606-0980	Government	Policies
Office of Personnel Management/Corpus Christi, TX	Federal Jobs	512-850-8255	9,600	512-850-8905	Public	Jobs
Office of Personnel Management/Dallas, TX	Federal Jobs	214-767-0565	9,600	214-767-0310	Public	Jobs
Office of Personnel Management/Detroit, MI	Midwest FederalJobs	313-226-4423	2,400	313-226-2095	Public	Jobs
Office of Personnel Management/Macon, GA	Midwest FederalJobs	912-757-3100	2,400	912-744-2139	Public	Jobs
PayPerNet #1	Fed. Pay & Performance Management BBS					
PayPerNet #2	Fed. Pay & Performance Management					
Press Release - Online	Some Cong. Committee Press Release					
& Technology Information System	Science & Technology Information System	202-357-0359	9,600			
Small Business Administration: SBA ONLINE	SBA BBS DC Metro Full Service	202-401-9600	9,600	202-205-6400	Public	Small Business Information
Small Business Administration: SBA ONLINE	SBA BBS 800 Limited Service	800-697-INFO	9,600	202-205-6400	Public	Small Bus. Info. (No Mail/Gateway)
S Business Administration: SBA ONLINE	SBA BBS 800 Full Service	900-463-INFO	9,600	202-205-6400	Public	Small Business Information
S Business Administration	Small Business Admin. Internal BBS	202-205-6269	9,600	202-205-6400	Government	Small Business Information
State Department	Automated License Status System	703-875-7350		703-875-7391	Public	Monitoring of export license applications
Department	Consular Affairs	202-647-9225	1,200	202-647-1486	Public	Passport Info, Travel alerts
State Department	Federal Bulletin Board	202-512-1387	2,400; 9,600	202-647-6681	Public	Foreign Affairs
State Department	PerManNet	703-715-9606	9,600	703-715-9832	Public	International Affairs
Treasury Financial Management Service	FMS Inventory Line	202-267-0767	2,400	202-874-7115	Government	Financial rates
Treasury Financial Management Service	Surety Bond Circular 570	202-267-1295; 202-874-7214	2,400	202-874-6850	Government	Federal bond approvals
U.S. Courts/4th Circuit Court of Appeals	Access to Court Records	804-771-8084	2,400	202-633-6393	Public	Cases, court dockets
U.S. Courts/6th Circuit Court of Appeals	Appellate Court Electronic Services	513-684-2842	2,400	202-633-6393	Public	Opinions, oral argument calendars
U.S. Courts/7th Circuit Court of Appeals	Access to Court Records	312-435-5560	9,600	312-453-5584	Public	Cases, court documents
U.S. Courts/9th Circuit Court of Appeals	Electronic Opinions	415-744-9022	9,600	415-744-9530	Public	Court opinions
U.S. Department of Transportation	The MARlinespike BBS	202-366-8505	9,600; 14,400	202-366-5534	Public	Maritime Admin. U.S. -Flag Shipping
U.S. Department of Transportation	*IRMA* BBS	202-366-3373	9,600; 14,400	202-366-5534	Public	U.S. DOT, Office of the Sec., IRM
Veterans Affairs Information Technology Center	Information Technology Center BBS	202-523-7339	9,600	202-535-8923	Government	Shareware
Veterans Affairs Department/Regional Offices	Foreclosed Property	Call voice		202-233-2741	Public	Lists property foreclosures
Veterans Affairs	Vendor BBS	1-800-735-5282	9,600	202-833-7320	Public	R.F.P.S.

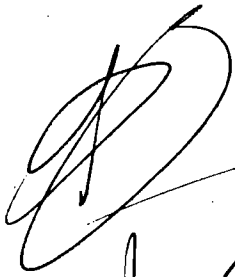
For modifications or updates, please contact (202) 205-6400 or (202) 205-6241.

Appendix G. Contributors

DRAFT

The Federal Workforce:
Surviving or Thriving in the 21st Century?

A White Paper on the Federal Government's Use of
Learning Technologies in Education and Training
for the Federal Workforce



Ted Thompson

Submitted by the
Human Resources Development Council

November 4, 1994

Learning Technology in the Federal Workforce

"While traditional organizations require management systems that control people's behavior, learning organizations invest in improving the quality of thinking, the capacity for reflection and team learning, and the ability to develop shared visions and shared understandings of complex business issues."

Peter Senge
The Fifth Discipline

The Human Resources Development Council is a recently constituted body that serves as the principal advisory board on federal training and development policy and practices. It is composed of the chief training officers of the major federal departments and agencies and provides guidance and direction to OPM's Human Resources Development Group on human resource development matters. In addition, it serves as a coordinating mechanism across federal agencies as well as a forum for the consideration and approval of new initiatives in training and development for the federal civil service.

This White Paper focuses on the relationship of learning and the use of educational technology on workforce productivity in the Federal government. It looks at how learning technologies are being utilized, including factors that support success and others that create barriers. The Council makes recommendations for actions that will support federal training and learning through improved applications of technology.

John Kenneth Galbraith described technology as "... the systematic application of scientific or other organized knowledge to practical tasks."¹ Technology is also defined as "... the tools, process, material resources, and creative human intelligence applied to the solution of practical problems."² Technology is used to describe *both the tools and the processes that facilitate the establishment of learning systems*, rather than just the tools (microcomputers, videodisc players, hypermedia, expert systems, etc.). The process of technology is a systems approach, using a dynamic, iterative process to forge the tools into technologies for addressing the challenges of training and learning, and finding the solutions to practical problems.

¹Galbraith, John Kenneth, *The New Industrial State*, Boston: Houghton Mifflin, 1967.

²Barbee, David and Gabriel Ofiesh, *A Report on the Nationwide 'State of the Art' of Instructional Technology*, Washington D.C.: Institute for Technological Solutions, 1990.

The HRDC is looking at how learning technologies are being used to help train the federal workforce. We want to ensure that we are not merely creating more technology, but are creating the "tools, processes, material resources and creative human intelligence" to enable the federal worker to grow into the Agile Learner³ capable of meeting the challenges of the 21st century.

Increasing the role of educational technology in federal training, even if it results in improved training, is not an end in itself. As Vice-president Al Gore wrote in Earth in the Balance,*

"We now face a crisis entirely of our own making: we are drowning in information. We have generated more data, statistics, words, formulas, images, documents and declarations than we can possibly absorb. And rather than create new ways to understand and assimilate the information we already have, we simply create more, at an increasingly rapid pace."

Educational technology will not bring overall changes and desired long term improvements if we do not make the transformation from a culture focused on teaching (training) to one that is focused on learning. The move toward competency-based training and outcomes is reflected in the work of many organizations within government, industry and academia.

We have begun reviewing the what and how of using technology for training and learning in the federal work place, including the factors that lead to successes, and what the barriers are. We have also reviewed some of the "failures" experienced in attempting to implement technology solutions to meet training requirements.

References → *Glossary*
The most common category of training incorporating computer or non-classroom/lecture delivery is computer and systems training. Almost across the board, agencies have turned to computer-assisted instruction⁴ of some sort for helping to deliver training on how to use the computers and software required on the job. Much of the computer training is still delivered as hands-on training in formal classrooms with an

³ The agile learner is a concept developed by the National Learning Foundation, Paul Messier, Ph.D., President. According to Messier, the agile learner is a strong individual in a self-governing system -- one who is not a sponge for information, but rather one who has sovereignty over information and is capable of reflection and choice.

* *Earth in the Balance*
⁴ See Glossary in Appendix A for definitions and related terms.

instructor. More self-paced learning opportunities are being introduced, ranging from video tapes and video disc courseware to online systems with huge libraries of courses that are fully managed electronically. (Examples include Customs Service and SSA?) Computer-based training has been in use since the early 60's and continues to have a major role in federal training delivery.

to support
In the early 80's, information centers--technology support organizations usually founded by the Information Resource Management/Information Technology organizations--were established throughout the federal government. The growth of multimedia (computer plus graphics, audio, and video in an interactive mode) has provided additional drivers to the movement toward more and better use of educational technology applications. Today the use of various technologies is widespread across the government in both types of technology employed *and* types of applications. (See table in Appendix B.)

Technological advances are transforming the workplace, and demographic trends are changing the nature of work. The HRDC focus is on identifying and supporting actions that will enable the Federal Government to develop the workforce learning necessary to meet the demands of a rapidly changing workplace.

Appropriate use caveat

Barriers to Implementing Educational Technology Solutions

Government personnel often are not adequately trained in how to apply educational technologies to meet their training needs. They often lack basic knowledge and access to learning about the potential of technologies as well as how-to knowledge to begin incorporating the new approaches into the existing framework for training. Some of the types of information human resource managers and trainers need include:

Knowledge about technology:

- Role of various technologies
- Applications
- Interest among various departments and agencies
- Means of introducing or producing products
- Availability
- Off-the-Shelf, adapted courseware (developed by another Agency), Custom Courseware
- Timetable for introducing
- Justification
- Cost Analysis
- Traditional cost/benefit analysis does not measure outcomes

Procurement Issues

- How, where, how much, etc.
- Restrictions

- RFP process
- Lag-time for procurement
RFP process can take months to years to complete,
making the purchase obsolete before the award is even
made)

Technical Feasibility

- Compatibility of systems
- Evaluating the competition
- Potential problems
- Adequate support (contractor or in-house)

Management/Administration Issues

Evaluation

- Evaluation of methodologies, determining best methods
- Evaluation of outcomes

Financial:

- Tight budgets
- Decentralized training functions within Agencies
- Funding constraints
(e.g.: restrictions on purchase of computers and/or
software because they are not seen as learning systems
and educational materials)

Accountability

- Training is often delivered without being linked to
competencies or outcomes.
- Technology gatekeepers do not understand training and
learning needs and are often unresponsive when asked
for help in planning and implementing technology
solutions for training and learning, especially for
non-systems (computer) related training.
- Lack of baseline information on traditional training
prevents development of realistic comparisons or
standards to help evaluate alternative methods.

I. Recommendations

Today's technologies provide the keys to unlock future productivity. Their appropriate application can serve to extend the opportunities for learning in real-world situations, expand our abilities to think and learn, improve accountability, and establish and manage learning environments where people work.

The Human Resource Development Council has endeavored to make recommendations which will lead to improving individual, team and organizational performance across the federal workforce. The following recommendations are designed to provide incentives, access to resources including capital and expertise, rewards and protection to the federal learning entrepreneurs and innovators

in our agencies. These individuals and leaders have vision and are willing to step out of traditional approaches to training, trying new methods, incorporating appropriate technologies, and building learning systems in their organizations.

The recommendations present solutions on several levels:

- Incentives for individual and organizational entrepreneurs to develop innovative solutions to training and workforce development and the institutional structure to support lifelong learning.
- Clearer vision of the role of technology to support learning, workforce competency and productivity improvements in the Federal workplace.
- Learning opportunities for management and human resource personnel to acquire the understanding and skills to make the transformations in their own agencies and departments.
- Relationships between federal government, private industry, universities and others to allow the government to most effectively leverage its people, knowledge and resources.

1. **Create a Learning Fund** -- a working capital fund or revolving fund -- to support innovative learning ventures within the federal sector from single program offices up to entire agencies. The fund would support efforts similar to the reinvention labs developed out of the NPR.

- Use the Federal Technology Transfer Act as a model to encourage collaboration among public, private and academic sectors.*
- Research parks dot the US where Technology Transfer Act efforts have been successful.
- Allow "profits" from ventures to accrue to the government (back to the Learning Fund) to support additional projects, research and educational activities.
- Operate the Learning Fund through an existing lead agency or organization capable of coordinating a national program.

- For example, the National Library of Medicine operates a Learning Center for Interactive Technology that has been functioning as a "magnet center" for over ten years. It also houses the National Coordination

* See Appendix C

Virtual Consortium

Office for High Performance Computing and Communication (HPCC) that coordinates the efforts of several agencies with contracts in these areas to avoid duplication and leverage resources.

- Other possible agencies include the Office of Personnel Management, National Science Foundation, and Naval Research Lab among others. *(NTIS)*

- Facilitate joint ventures for new development and research projects.

1 to 2
Link together
2. **Utilize existing magnet learning centers** that provide working environments for learning, experimenting, innovation, and change. Examples include: CD-ROM Information Resources Center (CIRC); the National Demonstration Lab (Academy for Educational Development); USGeological Survey Centers for Learning. *GAO*

- Operate these magnet facilities as centers of excellence for education and learning (Excellence Center for Education and Learning (EXCEL)²). Results from research and development efforts would be shared through the EXCEL network.
- Use existing centers as models for transforming training operations into learning centers within other federal agencies.
- The HRDC will ask each agency to nominate centers of excellence and will coordinate improving access to information-sharing through existing Bulletin Board Systems (BBS) and/or Internet access. *NTIS IN AVE*

3. **Develop incentives** for people to take risks, trying innovative and new approaches to meet learning and training requirements.

- Create a Vice Presidential award for significant accomplishments in learning and the innovative application of technology to improve workforce training. Recognize individuals and organizations for best practices and innovation in learning.
 - The HRDC will work to develop criteria similar to Quality awards for outstanding accomplishments.
 - The Council will work with other Agencies to identify best practices across the federal government.

- Agencies will submit nominees to the OPM and/or the HRDC annually, with the finalists being forwarded to the Vice President's office for an annual recognition and award ceremony.

- Encourage the use of existing mechanisms to reward human resource entrepreneurs with money, recognition, academic or other exchange time, and other career enhancing and developmental opportunities (e.g., Intergovernmental Personnel Assignment (IPA) process, developmental details and rotational assignments, and sabbaticals for academic and research work).
4. **Include planning for workforce learning** as key component in all Reinvention efforts such as Business Process Re-engineering (BPR), Work Process Reengineering, and TQM. Plans should include evaluating role of educational technology and incorporating alternatives to traditional classroom training.
5. ~~Provide vision for learning~~ ^{Admin} *Include Federal WF in Vision for Learning* from highest levels--the White House and agency leadership.

"In moving toward the 21st Century, we must, above all, become an 'education nation' -- and support public sector leaders at all levels who will make training and education their unmistakable top priority (policy and dollars).

Tom Peters
Liberation Management

Set **Learning** as a national priority

Sponsor a research initiative by the White House Domestic Policy Council and/or Office of Science and Technology Policy to bring new learning theories and learning technologies into the mainstream for workforce development, productivity and quality improvement, and achieving national and international competitiveness in government and business.

Sponsorship should also be shared by lead agencies such as the Office of Personnel Management, Departments of Labor, Health and Human Services, Education, and Commerce. Research findings would apply to issues of competitiveness, education reform, school-to-work transition, and related areas.

- Annual recognition of best practices (see Recommendation 2) will continue to reinforce the vision and commitment to this national priority.

The Federal Government should place more emphasis on technology transfer and training as an integral part of human resource development and management.

(6) **Identify best practices in performance measurements** for the transfer of learning and training to the workplace. Focus on evaluation of learning technologies and transfer of learning to job performance.

- who should do?
DoL office & Am workplace?
- Focus on how to demonstrate the impact of human resource, organizational development, and learning programs on business performance.
 - Identify tools, models and metrics necessary to design, implement, and evaluate impacts of training and organizational development efforts.
 - Host a conference on evaluation and performance measurements which brings together participants from government, academia, educational associations, and business to share knowledge and experience. Findings should be published and distributed (electronically) by OPM through the Human Resource Development Group.

? (7) Legislative and Executive Orders which include training provisions should leave delivery decisions to the discretion of the learning experts, not mandate delivery details.

The following two recommendations address the need to focus on the planners and implementers, to help them acquire a strategic view of learning and training for the organization while also learning how to adapt learning programs and integrate technologies appropriately:

will OPM do this

Incorporate technology into the basics for training, especially for senior management (SES and political managers). E.g.: give managers a laptop at check-in for their four week stint at the Federal Executive Institute, along with help to learn to use the software, email, etc. Set up programs for paperless (almost) work with the products delivered by the Institute participants coming out in electronic form. Set up node on Internet for FEI and perhaps a listserv to promote continued collaboration and sharing of learning, etc.

- SES executives need programs that will help them to understand the role of learning as a strategic part of mission

- Non-Technical SES career officials need training and learning opportunities about information and learning technology.
- The HRDC can provide guidance and subject matter expertise in helping to develop a learning program through the FEI which incorporates strategic planning and learning with technology.

Develop learning excellence with Federal HR Learning Institute equivalent to FEI or Federal Quality Institute to help HR leaders develop knowledge and skills to move federal training to a learning culture which measures competency and develops training based on learning outcomes, applies best practices and continuous learning to methodologies. (Where do HR practitioners learn about learning and get necessary support for change?) Staff College on Learning and Technology (CSAP) -- members of learning teams teaching and learning simultaneously, with roles of facilitator and learner interchangeable.

who would do this?
any existing places where
this could occur?

References and Resources

Appendix A: TECHNOLOGY DEFINITIONS AND DESCRIPTIONS

The following descriptions of the tools available for human resource development include machines, software, and complete systems. The categories are arbitrary, but the tools they represent are real; they hold substantial promise for providing solutions to practical problems.

A. THE TOOLS AND PROCESSES

Microcomputer At the heart of the new technologies lies the microcomputer. It has made possible the creation, delivery, and management of learning environments that provide textual, audio, video, and graphical stimuli, as well as control, to the learner. Simulation, tutorials, practice, sophisticated branching, manipulation of data and information are available in highly interactive modes.

The computer is more than just another tool. It can program and manage a CD-ROM, videodisc player, expert system, or other tool, functioning as part of a *learning technology*. When used in this way, computer-based systems not only deliver training, but also act as *tools of learning* that can help humans gather and manipulate relevant information, and even create intelligence. Computer systems hold the promise of creating more ideal instructional systems. (Barbee and Ofiesh, 1990)

Electronic Bulletin Board Systems (BBS) A computer system is used to allow users to leave, read, and exchange messages with other users. Electronic bulletin boards provide access to data files, and permit on-line, real-time conferences between two or more users. The three major functions of a BBS are messaging, data access, and conferencing. The system can be used for support and teaching purposes.

Some of the advantages of using bulletin boards include:

- Wide and almost immediate access to a broad base of expertise
- Timely notices regarding system changes, new services, important announcements
- User involvement and user-to-user support
- Customization of on-line help with the combined immediacy and individuality of phone support and the convenience of on-line help

Appendix B. Table of Typical Educational Technology Applications by Agency and Technology

AGENCY/DEPT	TECHNOLOGY	APPLICATIONS
General Accounting Office		
General Services Administration		
Environmental Protection Agency	Video IVD CD-ROM (under development) CBT	computer-related courses, management, literacy, health and safety training, technical training (subject matter for scientific, technical, administrative, legal & support staffs)
Customs Service	CBT	
Internal Revenue Service	CBT	
U.S. Postal Service		
Federal Aviation Administration	EPSS	
USDA Soil Conservation Service		
Social Security Administration		
Office of Personnel Management		

AGENCY/DEPT	TECHNOLOGY	APPLICATIONS
Dept of Education Horace Mann Skill Center		
DoD Army Navy Air Force Marines		
Federal Language Training Lab (Federal Laboratory Consortium for Technology Transfer)	Multimedia workstations, Teletraining	Foreign language learning; computer testing
Dept of Energy (Sandia Lab)		
National Library of Medicine - Lister Hill Center		
USDA Extension Service		

Audio Audio Tapes
 AudioCon Audio Conference
 CBT Computer-Based Training (see glossary for related terms)
 CD-ROM Compact Disc-Read Only Memory
 Comcon Computer Conference
 EPSS Electronic Performance Support System
 IVD Interactive Video Disc
 TeleTr Teletraining

Video	Video Tapes
VideoCon	Video Conference
Other	Audiographics

Appendix C. Technology Transfer Act

Appendix D. Contributors