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ABSTRACT

A digital divide, a chasm between those with access to technology and training, particularly workplace information technology (IT) skills and those without, threatens the economic prosperity of American workers and America's competitiveness. The most effective way to reduce digital disparities is to improve the education and training of the existing workforce. In response to challenges to America's continuing competitiveness, productivity, and workforce employability, the Digital Economic Opportunity Committee (DEOC) was formed to expand the digital workforce by identifying ways to broaden the base of workers with technical skills and to raise the technical skills of the existing workforce. DEOC defined IT workers and found that, in effect, virtually every worker in the new economy is an IT worker or an IT-enabled worker (uses computers to perform job functions). It viewed the issue as a skills gap, not a worker shortage. DEOC believed the appropriate response to this skills gap is two-fold. The first was upgrading existing worker skills through training. Issues were basic training needs, capacity, funding, and responsibility for training. DEOC's solutions for building a digital workforce were to identify skill sets needed for each IT job category, along with principal paths to job entry and for job advancement, and to define a lifelong learning system. (Appendixes include 22 notes and a summary of the Committee's Boston Conference on June 27, 2001.) (YLB)

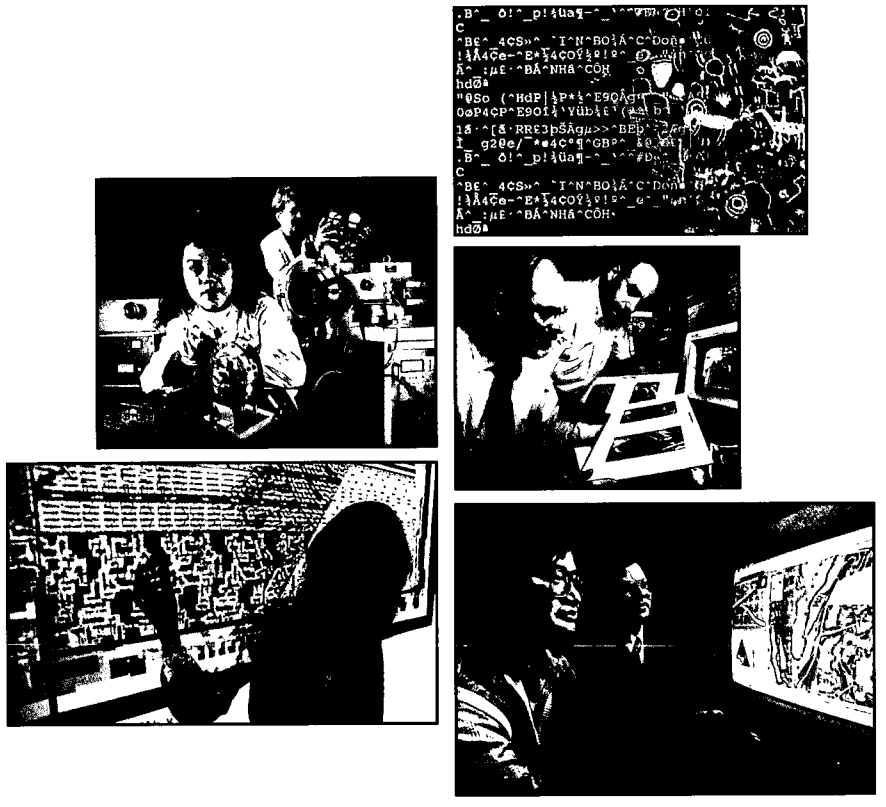
BUILDING DIGITAL WORKFORCE

PART 1: RAISING TECHNOLOGICAL SKILLS

ISSUED BY THE
NATIONAL POLICY ASSOCIATION
DIGITAL ECONOMIC OPPORTUNITY COMMITTEE
NOVEMBER 2001

BUILDING A DIGITAL WORKFORCE

Part 1: Raising Technological Skills



Issued by the
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November 2001

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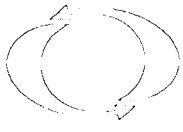

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Contents

Foreword

New information and communication technologies are converging on the workplace so dramatically that the "old economy" is truly transforming into a "new economy." According to the International Labour Organization (ILO), these changes are transforming the world of work. "The creation and loss of jobs, the content and quality of work, the location of work, the nature of the employment contract, the skills required and how they can be obtained, the organization of work, and the functioning and effectiveness of worker and employer organizations all are affected by the emerging era of digital globalization."[1]

The diffusion of these new technologies, however, must be balanced so as not to widen the current division between digital "haves" and "have-nots" in an increasingly small world. If people are unable to navigate in cyberspace, the information gap will continue to grow, and new chasms of unequal opportunities will further divide an already alienated world. Increasing the participation in information technology (IT) skills training of underrepresented groups, such as low income people, minorities, older workers, and women, requires increasing linkages with these groups, encouraging them to seek technical education, and developing support networks.

Without education and skills training, these digital have-nots will be left behind in the developing knowledge economy that increasingly relies on knowledge workers, or "knowledge technologists" as Peter Drucker calls them. These knowledge technologists (e.g., computer technicians, software designers, analysts in clinical labs, manufacturing technicians, paralegals) "usually spend far more time working with their hands than with their brains" but their "work is based on a substantial amount of theoretical knowledge which can be acquired only through formal education, not through an apprenticeship."[2]

However, there is a limit, set deep in our education and training systems, to the speed with which new skills can be acquired and old ones abandoned, the pace at which new technologies can be absorbed and applied efficiently. This speed can be increased with systems that reeducate, retrain, and do all that is possible to avoid the obsolescence and underutilization of human resources. However, to put such systems in place and administer them properly, labor, business, and government must work together. Education and training at all levels and at all stages of life must become a priority for all of society.

Responding to the challenges of this new era, the National Policy Association (NPA) initiated a workforce development project called "Crossing the Digital Divide to Digital Economic Opportunity." The project will identify ways to raise the technical skills of the workforce, from those in the higher end IT sector to those in the lower skills segment. To accomplish this, NPA formed the Digital Economic Opportunity Committee (DEOC), a business, labor, and education group comprising 15 members.

The committee currently includes the National Alliance of Business; General Electric Company; Verizon Communications; 3M; Lucent Technologies; ExxonMobil; Department for Professional Employees, AFL-CIO; Communications Workers of America (CWA); United Food and Commercial Workers International Union; American Federation of Teachers; International Federation of Professional and Technological Engineers; the Writers Guild of America, East; the National Education Association; Montgomery College (Maryland); and the Graduate School, U.S. Department of Agriculture (USDA). Technical support and advice are also provided by the American Society for Training and Development and the Federal Reserve Bank of Kansas City's Center for the Study of Rural America. These organizations have approximately 10 million employees and/or union members.

The first step for this business-labor-education partnership is to define and assess the scope of the issue clearly. Some claim that the digital divide is projected to close this decade; others dispute these findings. A priority task for the DEOC is to reach consensus on the true state of the divide.

Second, the DEOC must clarify the specific skills and knowledge that workers will require in a rapidly changing business and technological environment. Simply providing workers with access to the Internet and training them to be comfortable on it will not adequately prepare them for the digital age. While the skills that industry needs can be produced through short-term, intensive training programs, such programs may not provide workers with essential technological knowledge or with problem-solving skills. Without such a foundation, workers' specific technical skills will quickly become obsolete.

The committee will then extend its review beyond basic Internet usage. Planning for the development of technical skills requires greater awareness of the future direction of technology. This is a particularly challenging proposition given the short product life cycles in IT.

After validating the facts, the DEOC will determine the social, political, corporate, and labor-management initiatives that are needed to address the problem and will publish its recommendations. The challenge will be to create awareness and a sense of urgency within labor-management-education communities so that they will initiate prompt action to solve the problems of workforce development and technical training to ensure a skilled, competitive workforce.

NPA and the DEOC wish to thank the Federal Mediation and Conciliation Service for providing partial funding to support this effort.

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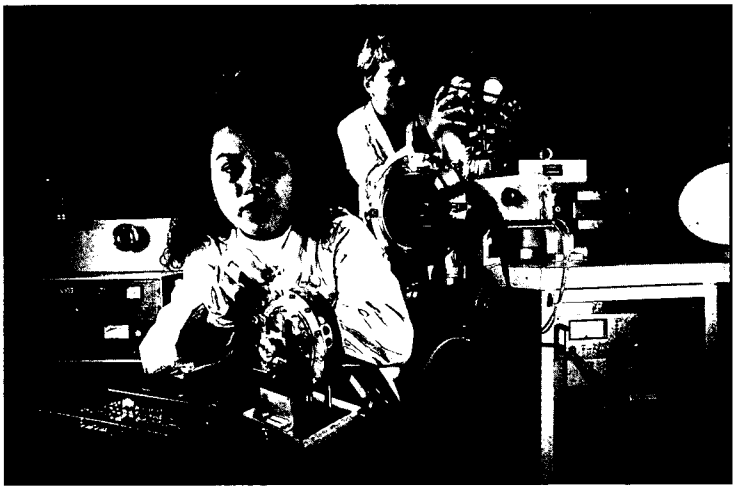
Introduction

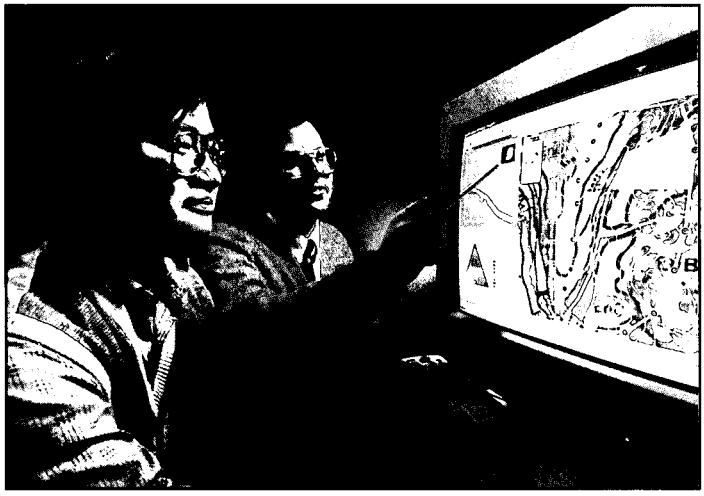
In the emerging information society, what we earn depends on what we learn. Access to technology and training in the skills to use it are thus critical components of economic survival. However, there is a digital divide—defined as a chasm between those with access to technology and training, particularly workplace information technology (IT) skills, and those without—that threatens the economic prosperity of U.S. workers and the competitiveness of the United States. Closing this gap in access to technology and training is a problem that businesses, unions, government, and communities must tackle together.



The ability to go online, search for information, use word processing and spreadsheet programs, and communicate electronically is a prerequisite for many jobs. With employers increasingly seeking these skills, the next generation of workers will be seriously disadvantaged if they are not experienced IT users. If left unattended, this digital divide in technical skills will become an impenetrable barrier, not only to quality jobs but also to educational opportunities and to information that all Americans will need to be successful in the workplace.

Digitization

Like past major waves of technological innovation, today's IT revolution is changing the nature of virtually all economic activities. While we have endured the problems of change in the past, this revolution has brought on a new intensity of change unlike any others. The pervasive use of digital technologies will be a driving force for productivity and efficiency increases as well as wage growth in the new economy, particularly in the low technology sector. "Digitization" in the 21st century promises economic benefits of the magnitude brought by mechanization in the 20th century. Thus, fostering the growth of the digital economy needs to be one of the foundations of economic policy for the new millennium. New visions are needed for this new era.



Americans must have the necessary skills for employability in a society that increasingly relies on computers and the Internet to deliver information and enhance communication. The U.S. economy demands highly skilled, well-educated workers. Ensuring that workers have access to digital technology tools is vital to produce a technology-literate labor force that will enable the United States to continue to lead in the global economy.

The Digital Divide

Computer ownership and Internet access in this country are growing, with almost half of U.S. households now owning computers and most of those having Internet access. Nevertheless, even though more and more Americans are connected to the World Wide Web, there is evidence that the digital divide between certain racial and ethnic groups and between regions of the country persists and in many cases is widening. For example, as a group, all is not well for African

Americans, Hispanics, and persons with disabilities or for members of lower income households in rural and inner city communities.

There is much discussion about bridging this digital divide by increasing access to computers and the Internet; however, the concern in this report is with another digital disparity. Our concern is with the gap in technology skills required by workers to be successful in the workplace.

Upgrading Information Technology Skills

The most effective way to reduce digital disparities is to improve the education and training of the existing workforce. Concerns about the high cost of employee turnover, skill shortages, and the growing numbers of baby boomer retirees have catalyzed an increasing number of those with a stake in workforce development efforts (business, labor, education, government, and community). Because of the acute need for skilled workers, people previously overlooked are being trained to be IT workers.

According to the AFL-CIO's Economic Policy Paper, *The Internet and Labor—Riding the Wave!*, bridging the digital divide between information "haves" and "have-nots" requires "more than putting computers and the Internet into schools and libraries, or even into people's homes. It is essential that we give adults the skills they need to use IT and compete for good jobs in the Internet economy. Achieving this goal, in the end, may be our most difficult challenge."[3]

Mark Drabenstott, Vice President and Director of the Center for the Study of Rural America, Federal Reserve Bank of Kansas City, states: "To tap new digital economies will be a good starting point to meet the challenges of rural America because such technologies offer the best hope of closing the distances that have historically left rural communities behind in the nation's economic race."[4] But, according to Drabenstott, whether rural communities can capture more of the digital age in the 21st century is a big wildcard in rural America's future. "Digital technology clearly has the potential to open up new vistas in rural places, but making that dream a reality will not be easy."

In this era, any discussion of how to upgrade IT skills for the entire

workforce must address the skills gap issue. *Into the Future* is a report prepared for the American Society for Training and Development and National Governors Association (ASTD/NGA) Commission on Technology and Adult Learning. The report states: "We all have a skills gap, all the time."[5] As "new knowledge is created at a rate faster than workers can learn it, a shortage results, no matter what the subject matter. The skills gap is a ubiquitous characteristic of life in the future we envision because everyone will have needs for new technology (and other) skills. Creating support for lifelong learning in a variety of forms is imperative to successfully addressing this fact."

NPA's Response to the Challenges

In response to these challenges to America's continuing competitiveness, productivity, and workforce employability, the National Policy Association (NPA) formed the Digital Economic Opportunity Committee (DEOC). This joint business-labor-education group comprises organizations that have approximately 10 million employees and/or union members. A list of members is included at the end of this report. The DEOC's purpose is to help expand the digital workforce by identifying ways to broaden the base of workers with technical skills and also to raise the technical skills of the existing workforce, including those in the higher end IT sector as well as those with lower level skills.[6]

The DEOC's Goals

Through committee meetings, conferences, and publications over an 18-month period, the DEOC will make recommendations on mechanisms for businesses and unions, acting alone or in partnership with education systems, governments, and other stakeholders, to:

1. Assess workforce training needs involving information technologies, develop curricula, train current or prospective employees, and help employees gain experience in applying the technical skills they have acquired through training.
2. Expand resources for employees to participate in training programs through scholarships, low interest loans, or time off for

employees who are participating in training.

3. Tap into nontraditional labor pools, including older workers, minorities, women, and recent college graduates trained in non-IT disciplines.
4. Fund and support programs to relieve pressure on postsecondary workforce development teaching infrastructures. This would include the development of strategies to recruit faculty, retain them, and maintain their current skills.
5. Encourage technical workers to become involved in local school systems by providing time off during working hours to teach, mentor, or work with students.
6. Increase on-the-job training (OJT) and form industry-union-education-community partnerships to expand workforce development and training at all levels.
7. Join together to help underrepresented groups, especially in low income and rural communities, to overcome entry barriers to good paying jobs, including those in IT labor markets.

If the gap in access to technology, including workplace IT skills, is not closed, the hope that the Information Age will bring general economic advancement and broad-based social progress will give way to a future in which social and economic divisions grow deeper. Realizing the promise of new technology will take a concerted effort at all levels, from Washington to the grassroots. The DEOC intends to make a significant contribution in turning the digital divide into digital economic opportunity for:

- Current workers who lack required skills to do today's jobs
- Prospective workers who have not been included traditionally or have been underrepresented in the IT workforce
- Future workers who come directly from the educational system

The 21st Century Labor Problem

U.S. Secretary of Labor Elaine L. Chao has described America's 21st century labor problem as one in which yesterday's skills will not fuel tomorrow's economy. "The American workforce needs to keep up, to move faster, to introduce new 'nontraditional' employees into the workforce, and to meet this challenge head-on."[7]

> Yesterday's skills will not fuel tomorrow's economy.
>
> —*Secretary of Labor Chao*

The challenge of keeping up, moving faster, and tapping nontraditional employees is made more difficult because many of these current and potential employees are also members of the information have-nots who have been left on the other side of the digital divide. They do not own or know how to use computers and do not have access to the vast information resources of the Internet. Because of this technology gap, they require the most attention and effort to be prepared for new economy jobs.

Who Are Today's Information Have-Nots

To fully appreciate the dimensions of the IT skills gap, it is useful to understand who are today's information have-nots. The U.S. Department of Commerce's National Telecommunications and Information Administration (NTIA) has been documenting the digital divide in America since the mid–1990s. In its October 2000 report, *Falling Through the Net: Toward Digital Inclusion*, NTIA updated its earlier examination of the digital divide by looking at households and individuals with computers and Internet connections.[8] In this report, NTIA for the first time also included persons with disabilities.

> Digital inclusion has increased rapidly since 1998.
>
> —*NTIA*

The good news is that, as of August 2000, the level of digital inclusion has increased rapidly since last reported in December 1998. About one-half of all households now own computers, and most of these have access to the Internet. Regardless of income, education,

race or ethnicity, location, age, or gender, groups that have traditionally been digital have-nots are now making dramatic gains. The U.S. Department of Education reported more good news: 98 percent of all public schools in the United States were connected to the Internet by Fall 2000. In addition, there were virtually no differences in access by school characteristics (e.g., size, income level, location).[9]

The bad news, according to the NTIA report, is that the digital divide remains or has expanded slightly in some cases. The report points out that "noticeable divides still exist between those with different levels of income and education, different racial and ethnic groups, old and young, single- and dual-parent families, and those with and without disabilities."

Within the context of this digital divide, the DEOC's challenge is to look at the Information Age skills gap cited by Secretary Chao, determine its extent, and recommend how best to close it.

Information Technology Workers Defined

The DEOC first had to determine who is an "IT worker." To develop a definition, the DEOC drew upon the findings of other organizations.

The 21st Century Workforce Commission[10] and the Information Technology Association of America (ITAA)[11] have adopted the eight IT career clusters defined by the NorthWest Center for Emerging Technologies (NWCET) to categorize an IT worker. These clusters, which were established following extensive industry review and validation by NWCET, identify what IT professionals do in these categories:

- Database development and administration
- Digital media
- Enterprise systems analysis and integration

- Network design and administration
- Programming/software engineering
- Technical support
- Technical writing
- Web development and administration

The chart on page 17 describes the skills needed for each of these job categories.

Beyond this definition, the Workforce Commission also noted that there are workers whose jobs are "IT-enabled." That is, they are workers who use computers to perform their job functions, such as word processing, surfing the Internet for information, or diagnosing a machine malfunction.

The view that all work requires IT skills at some level was presented by Joyce Malyn-Smith of the Education Development Center (EDC) at the Committee's June 27 conference in Boston, Massachusetts.[12] The EDC Pathway Pipeline learning model describes a hierarchy of IT knowledge needed for living, learning, and work, with the NWCET-defined IT clusters resting on top. The model identifies the IT skills needed to perform all work, leading to the notion that all work has an IT component.

Because the employees and union members represented by the DEOC encompass both groups of IT workers, this report has adopted a broad definition of an IT worker. The DEOC's definition of an IT worker encompasses both the IT professional as defined by NWCET and the less technical IT-enabled worker, who might be called a knowledge worker or knowledge technologist. In effect, virtually every worker in the new economy is an IT worker.

> Virtually every worker in the new economy is an IT worker.

IT Skills Gap

Whether there is a shortage of IT workers has prompted considerable discussion as well as continuing debate about whether there is a need to import more foreign IT workers through the federal government's H1-B visa program. DEOC members, however, view the issue as a

There is a skills shortage, not a worker shortage.

skills gap, not a worker shortage. What we lack is enough workers with the right skills.

The Committee believes the appropriate response to this skills gap, to be discussed later, is two-fold:

- Upgrading existing worker skills through training
- Expanding the number of skilled workers by improving the education system and by seeking workers from labor pools not traditionally found in the IT workforce (women, minorities, people with disabilities, and seniors) and from underrepresented communities (rural, inner city, and low income)

Training Existing Workers

In this and two future publications, the DEOC will address a number of issues plaguing the adult education system that make it difficult to fully meet the lifelong learning needs of adult workers. This publication, however, focuses primarily on the system to upgrade existing worker skills, including basic training needs, capacity, funding, and responsibility for training. The DEOC's second planned publication will explore expanding the workforce by tapping nontraditional labor pools and underrepresented communities.

Many adult workers who need to develop or upgrade their IT skills to succeed in the new economy have a fundamental problem: they lack adequate literacy. Because today's knowledge workers must rely more on their brains as well as their hands, the 21st Century Workforce Commission found that workers need a "21st Century Literacy" to successfully compete. This literacy is defined as the ability to read, write, and compute with competence; to think analytically; to adapt to change; to work in teams; and to use technology.

The magnitude of the literacy problem is illustrated in a study issued by the Massachusetts Institute for a New Commonwealth (MassINC) in January 2001.[13] It found that 1.1 million of the 3.2 million adults in the Massachusetts labor force lacked the basic reading, writing, math, language, and analytical abilities necessary in the typical modern workplace.

The American Management Association (AMA) conducted a national survey on workforce testing of its members and client companies in January 2001 and had similar findings.[14] Slightly more than one third of job applicants (34.1 percent) nationally who were tested in basic skills lacked sufficient skills for the positions they sought. AMA's survey defined basic skills as "functional workplace literacy, i.e., the ability to read instructions, write reports, and/or do arithmetic at a level adequate to perform common workplace tasks."

> One third of job applicants lack necessary basic skills.
>
> —*AMA*

The MassINC report highlights a related problem. The Massachusetts Department of Education's Adult Basic Education (ABE) system in place today does not adequately meet adult workers' needs. (ABE provides basic literacy, General Equivalency Diploma high school credentials, and English for Speakers of Other Languages.) According to the report, ABE is meeting language and education credential challenges, but the system is overwhelmed. Less than six percent of those adults whose skills deficits could be addressed are being reached. Of course, the ABE system only serves those adults who are candidates for ABE instruction. It does not serve those who need to upgrade skills to meet the new literacy challenge.

Another important issue is the uncertain nature of investment and financing for training programs. Many training efforts are funded as discrete programs with specific funding levels and time frames to address targeted needs. Once the funding is consumed and the purposes met, the program ends. There also is the uncertainty that comes with pursuing competitively awarded funds. The Department of Labor's H1-B technical skills training grant program is a good example. In fact, the H1-B notice that announced the availability of funds carries the caveat that "grant awards will be made only to the extent that funds are available." Another problem is that some resources are easily subject to change in focus and budgets. For example, many private philanthropic foundations changed their focus for donations in the aftermath of the September 11, 2001, terrorist attacks to reflect the new needs and reduced revenues. Company-sponsored training programs, where commitments are reduced when revenues decline, are yet another example.

Changing Commitments to Training

Many adult information have-nots lack the opportunities and skills to fully participate in the new economy and will be left even further behind without concerted action. Many lack fundamental information age skills, ranging from basic literacy to basic computer and Internet skills. The DEOC believes that the adult learning systems in place today are inadequate to meet the need for skilled workers. Because of rapid changes in technology, the need for skilled workers, and the inability to access training, there is both a requirement and a joint responsibility for every sector of the economy to address this problem in a new fashion.

Old economy approaches to workforce training are not working as well for the new economy.

It is becoming clear that old economy approaches to workforce training are not working as well in the new economy. The degree to which workers spend their entire careers in one company has diminished considerably. The growth of small and mid-sized companies has led to an increasing number of firms that cannot, or do not, train in-house due to limited financial, institutional, and informational capacity. According to the Progressive Policy Institute, firms are too busy with operations to develop training systems, especially for new or dislocated workers, and often firms lack information about their employee training needs. The result is that in times of skilled worker shortages, there is increased competition among companies for skilled workers. With today's high workforce mobility, there is growing reluctance on the part of companies to invest in training workers who may well leave for a competitor. [15]

Spending on employer-provided training fell from 2 percent of payroll in 1998 to 1.8 percent in 1999.
—*ASTD*

In its *2001 State of the Industry Report*, ASTD found that spending on employer-provided training fell from 2 percent of payroll in 1998 to 1.8 percent in 1999.[16] General cost cutting, plus an inability to show the value of training investment, resulted in the decline in some cases. In others, the decrease was due to cost savings from a reduction in outsourcing. There was also a drop in training hours per employee.

In addition, growing numbers of workers are self-employed or work for companies on a contract/contingent basis. Here again, firms are reluctant to fund training for this type of worker. Complicating these changing realities is the fact that the rapid advances in technology may make what a worker learns today useless tomorrow, so that training dollars spent may have only limited benefits. These issues

point to the need for new approaches to workforce development and worker training.

The responsibility for workforce development in the new economy now rests upon a larger group of stakeholders. The players include not only the business and labor community but also government, educational, and nonprofit institutions. The 21st Century Workforce Commission concluded that to be successful, today's workforce development programs need working partnerships and local leadership.

The next section presents the DEOC's preliminary vision and recommendations for change to meet the IT workforce skill needs of the new economy.

Solutions for Building a Digital Workforce

To assess the skills gap and develop possible solutions, the DEOC has convened a series of meetings and regional conferences. These have provided discussion forums where the DEOC members identified and examined relevant issues and developed potential solutions in the form of recommendations.

The first of three one-day regional DEOC conferences, held in Boston, Massachusetts, on June 27, 2001, was designed to explore the hurdles and challenges to upgrading the IT skills of incumbent workers and to identify examples of successful IT workforce development programs. The conference included a keynote address and four panel discussions, which are summarized in an appendix to this report.

From that conference and DEOC meetings to date, the DEOC has begun to shape its vision of a new era where lifelong learning becomes a routine part of life. To date, the recommendations focus on ways to improve the adult learning system and the need for training and education in basic literacy skills.

What Skills Are Needed

Before addressing methods for workers to acquire IT skills, the DEOC first explored the skills workers need to perform in the new Information Age economy. The DEOC views the skills gap issue from two perspectives. At one level are current workers who have been performing old economy jobs and who need to acquire basic workplace literacy skills to perform even IT-enabled jobs. These include the ability to read, write, and compute with competence;

think analytically; adapt to change; work in teams; and use technology. There is a subset of this group of workers that also needs basic language skills and educational credentials (i.e., high school diploma or equivalent).

At another level is the gap in skills needed by workers to perform technical and professional IT jobs. The ITAA study of the IT workforce, *When Can You Start?*, points out that skills make the difference in IT employment and that there are numerous paths to an IT job. The study found that while 4-year college degrees were still preferred for most job categories, there are alternate paths for some jobs. Prior experience is a pathway to job entry for many IT jobs. While this appears contradictory, the study says that it is not. This is because many of the skills needed are transferable from other work experiences and education. For example, prior experience in jobs that involve problem solving and customer interface can provide the skills needed to enter the technical support field. Experience to enter an enterprise systems integration position may be obtained from a broad background in areas like banking, telecommunications, or defense, while people with commercial art or filmmaking experience may be able to enter the digital media field. The training required for advancement can vary from OJT to advanced degrees.

The following chart, developed from information in the study, summarizes the skill sets needed for each IT job category. The chart also lists the principal paths to job entry and for job advancement.

IT Job Skills Needs

NWCET IT Job Categories	Skills Needed	Paths to Job Entry	Paths to Job Advancement
Technical Support	■ Troubleshooting ■ Requirements analysis ■ Customer service ■ Installation & configuration ■ Systems monitoring ■ Diagnostics ■ Testing ■ Documentation	■ Prior experience	■ Informal, formal & OJT training ■ Technical school
Database Development & Administration	■ Needs analysis ■ Database design & modeling ■ User interface development ■ Object creation & related implementation ■ Monitoring & testing ■ Security & maintenance	■ Prior experience ■ 4-year college	■ OJT ■ 4-year college ■ Informal training ■ Technical school
Programming/ Software Engineering	■ Architecture & design creation ■ Customer requirements analysis ■ Program writing ■ Testing	■ Prior experience ■ 4-year college	■ OJT ■ 4-year college
Web Development or Administration	■ Customer requirements analysis ■ Site architecture development ■ Screen layout & design ■ Application development & maintenance ■ Quality assurance	■ Prior experience ■ Community college	■ OJT ■ Technical school
Network Design/ Administration	■ Requirements analysis ■ Network design ■ Process ■ Protocol & hardware planning & integration ■ Performance evaluation & load balancing ■ Information security planning & implementation ■ System monitoring & reporting ■ Maintenance	■ Prior experience ■ Technical school ■ Certification	■ OJT ■ Technical school
Technical Writing	■ Writing, editing & publishing technical documents	■ 4-year college ■ Prior experience	■ 4-year college ■ Community college ■ OJT
Enterprise Systems Integration	■ Requirements & business model analysis ■ Product assessment ■ Cost-benefit analysis ■ Development of technology modernization plans ■ Program management	■ Prior general experience ■ Informal training ■ 4-year college	■ OJT ■ Informal training
Digital Media	■ Customer requirements analysis ■ Prototype & simulation development ■ Script & content building ■ Testing ■ Documentation	■ Prior general experience ■ Technical school ■ 4-year college	■ Technical school ■ OJT

Defining a Lifelong Learning System

"...life is no longer segmented into hours or years allocated for school and work."
—21st Century Workforce Commission

The 21st Century Workforce Commission sums up the current lifelong learning environment well when it says "life is no longer segmented into hours or years allocated for school and work. Those distinctions are now blurred—schooling continues in the workplace and beyond."[17] Because of this phenomenon, stakeholders must find and put in place improved ways of providing lifelong learning.

In its final publication, the DEOC will define its vision of an ideal lifelong learning system and identify examples of existing workforce development systems and efforts, including many business and labor partnerships, that it considers worthy of replication. For now, it has identified the following characteristics of an ideal lifelong learning system.

1. **The ideal system needs to have permanency, continuity, and financial sustainability.** It needs to have long-term financial support that is free from the vagaries of short-term government and corporate budgets and policy changes. As a report by the Jobs for the Future for Workforce Innovation Networks points out, a major challenge with "the publicly funded system for finding employees and for training potential

Alliance for Employee Growth and Development, Inc.

This highly successful national labor-management training and development effort began in 1986 and has served more than 150,000 participants. Its mission is to support individual worker efforts to develop career and personal growth and enhance employability through continuous learning. CWA, International Brotherhood of Electrical Workers, AT&T, Avaya, and Lucent Technologies all jointly support the Alliance. It provides for both on- and off-time training, has union participation in training design and planning, and allows laid-off employees to participate. Resources for the Alliance are provided through the collective bargaining agreements.

and existing workers is its inflexibility, the 'politics' and Byzantine rules that govern it."[18]

Two good examples of labor-management workforce development partnerships are the Alliance for Employee Growth and Development, Inc., a national cooperative labor-management venture, and the Canadian United Food and Commercial Workers Training Centre. Both have been in existence for more than 15 years and are funded through the collective bargaining process.

UFCW Training Centre in Winnipeg, Canada

This union-sponsored training center, begun in 1986, is funded by the Training Trust Fund, which is supported by worker wages and through collective bargaining. A partnership of 55 companies, colleges, and government is involved with the center. The center also benefits smaller companies that cannot afford to have in-house training programs.

Another long-term example is the Graduate School, U.S. Department of Agriculture (USDA), which trains 150,000 students per year on a budget funded only through tuition and fees. While it is associated with the USDA, it does not receive any appropriated federal funds.

The Graduate School, USDA

The Graduate School, USDA, was established in 1921 by the Secretary of Agriculture to provide career advancement opportunities for working adults in the public service sector. Annually it offers more than 1,500 courses nationwide to 150,000 students. It is a self-sustaining, independent organization that funds its entire budget (currently $60 million/year) from tuition and fees.

2. Recognizing that adult learners have unique issues and road-blocks to learning, such as the fear of failure and limited time available, a variety of training methods need to be used, including e-learning, to maximize adult learning.

   E-learning today is much more than web-based instruction and distance learning. In its recent report ("A Vision of E-Learning for America's Workforce"), the ASTD-NGA Commission on Technology and Adult Learning defines e-learning broadly as "instructional content or learning experiences delivered or enabled by electronic technology." It includes computer-based CD-ROM instruction, videoconferencing, satellite downlinks, interactive TV lectures, virtual educational networks and more. The authors also believe "that e-learning will play a vitally important role in equipping workers with the skills they need to succeed in the 21st-century digital economy."[19]

3. With employees now taking more direct responsibility for their lifelong learning needs, a variety of resources should be made available to help employees obtain the training they need. These could include direct or indirect assistance such as paid time off and tuition grants. For example, the State of New Hampshire provides training accounts of $6,250 to individual workers as a component of its federally funded high tech workforce development program.

4. Skill standards are critical for identifying skills needs that are to be addressed in a workforce development program, whether it targets lower or higher skilled IT workers. This is because the rapid growth in technology will continuously create a skills gap for all workers. Organizations such as the EDC and NWCET have developed standards that can be useful to such efforts.

   EDC's Pathway Pipeline Model identifies 16 separate skill and knowledge standards that need to be learned in the K-12 education system for students to be IT-functional in the work-

place. These standards include understanding technology in society, using a computer and basic software programs, performing basic hardware installations and configurations, and soft skills (self-management, teamwork, and communication skills).[20] Many of today's workers, particularly the baby boomers, completed the K-12 system before these subjects became commonplace and now find themselves at a disadvantage because they haven't learned them. This is just as fundamental a problem as the need for basic literacy skills.

NWCET has developed skill standards for its eight IT professional career clusters. In NWCET's words, these nationally recognized "skill standards establish the agreed-upon, industry-identified knowledge, skills, and abilities required to succeed in the workplace. Skill standards provide benchmarks of skill and performance attainment that are behavioral and measurable."[21]

NWCET identifies several ways in which using competency-based skill standards can help to close the skills gap.

- They serve as a means of communicating workplace performance expectations among businesses, workers, educators, students, and government.
- They can help educators align education programs to workplace needs and provide certifying credentials that ensure employability. National recognition of the standards provides for common acceptance of the certifications and thus portability.
- They can link industry expectations with education offered to students. Students know what they must be able to do to meet the qualifications of the industry they wish to pursue.

Skill standards have important benefits:

- Communicate performance expectations.
- Align education programs to workplace needs.
- Link industry expectations and students.

5. The workforce development programs that were presented and discussed at the Boston conference shared many of the preceding characteristics, but all made clear that **partnerships are essential to the effective planning and implementation of any program.** Partnerships that are successful in implementing their strategies and programs have gathered and involved all of the necessary stakeholders (business, labor, education, government, community) and have established positive relationships and communications. In a research article published in the June 2001 *Monthly Labor Review*, Margaret Hilton of the National Academy of Sciences suggests forming regional training consortia among businesses, workers, unions, and educational institutions. Such efforts would provide a cost-effective means of sharing training costs among firms to overcome disincentives to invest in training. She cites a number of successful examples in various industries and geographical areas to support her views.[22]

The DEOC developed the recommendations presented here from its assessment of successful workforce development programs, Committee member experiences, and review of recent studies concerning similar workforce issues. Further refinement and elaboration of the Committee's vision will occur in the next report. The DEOC's agenda for the remainder of the project is set out in the next section.

Project Status and Schedule

Where We Are

The DEOC's goal is to address the seven project objectives described in the Introduction, through three publications.

The DEOC's objectives include:

- Assessing workforce IT training and educational needs
- Increasing and improving IT education, training, and instruction
- Expanding resources for employee training
- Attracting and training women, minorities, and other nontraditional groups to IT fields
- Involving IT workers in teaching, mentoring, and working with students in local school systems
- Partnering among business, labor, education, and community to address IT training and educational needs
- Removing barriers to IT jobs for members of underrepresented groups, especially low income and rural communities

The digital divide addressed in this report is one defined by the IT skills gap—between those who have the skills and those who do not—and the opportunity to gain the skills to successfully compete for good jobs in the new economy. Many of those without the needed skills also have been left behind in the informational digital divide and thus must first become IT-literate.

The DEOC's assessment of workforce IT training and educational needs makes clear that the issue of the IT skills gap is multifaceted. The DEOC has recognized that many, if not most, of the new economy jobs have technology components. Therefore, there is a broader need for IT literacy training, especially for workers who have been in the workforce for some time. Younger workers, for the most part, have the advantage of having become IT-literate through their formal education, though they may not have learned all of the skills they need. The last facet is that there are still many existing and potential workers who need basic literacy training in reading, writing, and math to successfully compete in the new economy.

The current system for adult training needs to be expanded and improved to meet the training needs of the new economy. A lessening training investment by companies and greater workforce mobility are necessitating new approaches to training. For the stakeholders in workforce development, the DEOC recommendations for improving the lifelong learning system include: providing for permanency and financial sustainability, using various adult training methods (including e-learning), and analyzing training needs using skill standards, both for individuals and for programs.

Because workers are taking more direct responsibility for their own training, the DEOC recommends supporting workers with resources. Examples of support could include direct payments for tuition and indirect assistance through paid time-off programs.

There was virtual unanimity among the panelists at the DEOC's Boston conference that a key ingredient of successful workforce development projects is the development of partnerships. There is a growing understanding that the skill level of the local workforce has impact on the greater community. Thus business, labor, education, government, and nonprofit institutions all have a stake in workforce development. Beyond this, there are also potential cost advantages for firms to collaborate in training efforts.

The Next Steps

The DEOC is examining issues of the IT workforce skills gap through a series of committee meetings, regional conferences, and publications. Between December 2001 and the conclusion of the project in June 2002, the DEOC plans to hold four more committee meetings, host two more regional conferences, and issue two more reports.

Additional information about this research project and past and upcoming activities is available at NPA's website (www.npa1.org).

December 2001

The DEOC regional conference and committee meeting in Kansas City, Missouri, in December 2001 will examine overcoming barriers to recruiting and training members of nontraditional labor pools and underrepresented communities for the IT workforce.

February 2002

The DEOC will hold a committee meeting to discuss the second report's draft final findings and recommendations in preparation for the third regional conference.

April 2002

The second DEOC report, to be published in April 2002, will provide additional findings and recommendations. The report will focus on issues and solutions for overcoming barriers to recruiting and training members of nontraditional labor pools and underrepresented communities to be participants in the new economy. It will also present draft final DEOC findings and recommendations for consideration at the final conference.

The final conference and a committee meeting are planned for April 2002 in San Francisco. They will provide a forum for the presentation and discussion of the DEOC's draft final recommendations.

June 2002

The final committee meeting will be held in June prior to release of the final recommendations. The third DEOC report with final findings and recommendations, as well as best practices, will then be issued.

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Boston Conference Summary

Crossing the Digital Divide to Digital Economic Opportunity—Upgrading Today's Workers for Tomorrow's IT Work

June 27, 2001
Sheraton Boston Hotel
Boston, MA

Overview and Purpose of the Project Conferences

The National Policy Association (NPA) will be presenting three "Crossing the Digital Divide to Digital Economic Opportunity" conferences as part of a research project that is examining workforce development issues in the emerging "information society." The conferences will assess the information technology (IT) skills gap and training needed by workers to access and use technology to gain better job opportunities. Efforts being made by businesses, unions, educators, and governments to close this current gap and adequately

prepare the workforce of tomorrow will also be highlighted.

The first conference, held in Boston on June 27, 2001, examined the skills upgrading and training needed by existing workers, including those currently in the IT workforce. The conference began with a keynote address to set the stage for the day. Following the address, four panel discussions examined different aspects of the problem and presented examples of successful workforce development programs.

The next conference, to be held in Kansas City, MO, on December 12, will address accessing and training members of nontraditional labor pools and underrepresented communities by examining the barriers to good-paying IT jobs, ways to overcome such barriers, and the skills and training needed. The final conference will be held in San Francisco in April 2002 to present and discuss the project's findings and recommendations.

Boston Conference—June 27, 2001

Keynote Address

Jonathon Levy, Vice President of e-Learning Programs at Harvard Business School Publishing, began the Boston conference with a provocative look into the future to see where we are going with adult worker education. In his remarks, entitled "Upgrading Today's Knowledge Workers to Meet Tomorrow's Need for Knowledge Warriors," Dr. Levy examined how, in the Information Age, education has become a prime focus of the new employment relationship and how technology has created a revolution in education. During this period of rapid change, old models of education are being replaced with new ones, such as e-learning. Technology has enabled learning systems to provide learner-specific content needed to reach specific competencies without forcing learners to review material they already know or do not need to know. Dr. Levy concluded with his vision of an educational model that joins corporate investment capital and education's intellectual capital in a new jointly owned academy for the knowledge warrior of tomorrow.

Jonathon Levy, Vice President at Harvard Business School Publishing, presented the keynote address.

Panel #1: "Upgrading Existing IT Worker Skills— Issues and Challenges"

The first panel explored the issues and challenges in upgrading the skills of workers already in IT jobs.

Tracy Maynard, Human Resources Manager at RSA Security, Inc., related her company's views on skills development issues. RSA helps organizations build secure, trusted foundations for e-business. An important thing RSA has learned is that they have to train workers in both technical and soft skills to be competitive. Ms. Maynard highlighted a list of training-related challenges being faced by high tech companies like hers, including making training a part of the company culture. RSA uses a combination of methods to train its workforce, including: in-house and off-site training, tuition reimbursement programs, and formal mentoring programs. The company has created an employee development program called the LEADERS program to help RSA workers develop skills in areas that will enable them to advance in the company. Ms. Maynard emphasized that even in periods of economic downturn, companies need to recognize the value of training and continue to budget for it.

Thomas Hubbard, Vice President for Technology Development and Analysis at the Massachusetts Technology Collaborative (MTC) spoke more globally about the Massachusetts workforce in the new economy. Citing MTC's Index of the Massachusetts Innovation Economy Report that is issued to gauge the health of the new economy, he reported

Thomas Hubbard, Vice President for Technology Development and Analysis, Massachusetts Technology Collaborative, speaks at the conference panel on Upgrading Existing IT Worker Skills. Other panelists, from left, are Jim Auerbach, NPA; Tracy Maynard, RSA Security; and Ralph Maly, Communications Workers of America and DEOC member.

John T. Dunlop, former U.S. Secretary of Labor and NPA Board Member, makes a point at the conference.

that overall, the innovation economy continues to remain strong and produce positive results for the Commonwealth despite a skilled workforce shortage. To deal with the shortage, he said the report recommends certain actions that could be taken to build the needed skills:

- Raise student awareness of scientific, engineering, and IT careers.
- Create closer relationships between universities and employers.
- Train incumbent workers for skill upgrades.
- Encourage the Commonwealth's college graduates to work in-state.
- Provide incentives for older workers to remain in the workforce.

Ralph Maly, Vice President for Communications & Technology, Communications Workers of America (CWA) outlined CWA's response to the challenge of providing its union workers with the right skills to remain competitive in the 21st Century. One innovative response has been the win-win partnership CWA and Cisco Systems formed to develop the Workforce Transition Project. This is a state-of-the-art training program designed to close the skills gap of CWA members and transitioning military personnel to meet the workforce needs of Cisco Systems. Under the joint effort, Cisco provides training and certification, and CWA recruits participants and offers job placement. Two additional partners include the U.S. Department of Labor (DOL), which helped expand the program to include military personnel, and Stanly Community College, which provides the infrastructure, educators, and accreditation.

Panel #2: "Programs to Upgrade Existing IT Worker Skills"

The second set of panelists discussed examples of successful workforce development projects involved with upgrading existing IT worker skills.

Harneen Chernow, Education and Training Director at the Massachusetts AFL-CIO, presented the Northeast H-1B Skills Training Project, a business-labor partnership among the University of Massachusetts Labor Extension, CWA, Massachusetts AFL-CIO, Lucent Technologies, Ametek Aerospace, and Metro North WIB. The project enables semi-skilled incumbent workers to obtain higher-level skills and to move into unfilled higher skilled technology positions at Lucent and Ametek. To address the skills shortage, a three-level "H-1B Skills Ladder" has been developed for union members, with three levels of training: Preparatory Skills Program (math, reading, writing, study skills), Tester/Technician Training Program and Technician Apprenticeship Program, and Computer/Electronics Associate Degree. A key element of the program is that the training is transferable. This project is funded through a DOL H-1B grant with matching contributions from Lucent and Ametek.

Karen Richards, Senior Associate Director for the Alliance for Employee Growth and Development, spoke about the Alliance Program. This highly successful national labor-management training and development effort began in 1986 and has served over 150,000 participants. The Alliance's mission is to support individual worker efforts to develop career and personal growth and enhance employability through continuous learning. The program provides training and educational opportunities to CWA and International Brotherhood of Electrical Workers (IBEW) union employees at AT&T, Avaya, and Lucent Technologies, all of which have joined together to support the Alliance. Ms. Richards described it as a win-win program for both unions and companies that is voluntary, provides for both on- and off-time training, has union participation in training design

and planning, and allows laid-off employees to participate. Resources for the Alliance are funded through the collective bargaining agreements.

Peg Ryan, Director of Entrepreneurial Training Services at the Commonwealth Corporation, was unable to attend. However, she submitted materials to NPA regarding the Berkshire County Regional Employment Board's (BCREB) H1-B project.

Panel #3: "Developing IT Skills in Other Workers—Issues and Challenges"

This panel assessed issues about upgrading skills in all adult workers to enable them to fully participate in the new digital economy.

Dana Ansel, Research Director at the Massachusetts Institute for a New Commonwealth (MassINC) elaborated on the findings from MassINC's report, "New Skills for a New Economy." She raised three key questions: 1) what are the 21st century skills needs, 2) how best to improve the adult basic education (ABE) system, and 3) how best to serve those who need to upgrade skills but are not candidates for traditional ABE instruction. The problem identified in the report is that 1.1 million Massachusetts workers are not prepared for the new economy, with 17 percent needing language skills, 25 percent needing an education credential, and 58 percent needing new literacy skills. Ms. Ansel said that while the ABE system is meeting the demand for language and education credentials, it is an overwhelmed system much in need of improvement. To meet the new literacy challenge, the report recommends expanding developmental education through community colleges and employer partnerships. It concludes that arriving at an integrated, lifelong adult learning system will require involvement of government, business, labor, nonprofits, and foundations.

Joyce Malyn-Smith, Director of Health and Human Development Programs for the Education Development Center (EDC) explained EDC's integrated Pathway Pipeline Model of lifelong learning. EDC is a leading nonprofit education and health organization. The model is a response to the current disconnected and fragmented educational system of learning that fails to meet the needs of the IT world. The Pathway Model recognizes that there are basic, core IT skills that all must learn to be IT-literate for living, learning, and working in all fields. There are other higher level IT technical skills for IT-industry-specific jobs for which specialized training is needed (for example software engineer). Successful implementation of the model for adult workers/ learners requires a system that recognizes issues related to adult learning, such as fear of failure, and that uses proper environments and training methods to maximize adult learning, such as learning by doing.

Nat LaCour, Executive Vice President of the American Federation of Teachers and DEOC Member, contributes to the conference panel on Developing IT Skills in Other Workers.

Nat LaCour, Executive Vice President for the American Federation of Teachers (AFT) provided his perspectives on upgrading workforce IT skills by discussing AFT's efforts to improve the IT skills of its 400-member national workforce. AFT has established internal training and support programs that include the use of release time and a computer technology center to help AFT employees gain the skills they need to remain productive.

Panel #4: "Programs to Develop IT Skills in Other Workers"

The final panel offered examples of successful workforce development programs that provide adult workers with IT skills they need to perform new economy jobs.

Carmon Cunningham, Vice President for Technology & Communications at Jobs for the Future showed how a business mission and a social purpose have been brought together in a new national workforce development venture called Origin, LLC. The venture's objective is to train lower income workers for IT-related jobs that do not require college degrees. Job commitments are secured up front from partner companies, and training is then customized to meet the needs of particular jobs. Origin has formed partnerships for training client and business services to carry out the program. By leveraging public sector funding, Origin is able to fulfill its business mission and still meet its social purpose, which is to provide a quality workforce development program at substantially lower cost than other commercial providers. Origin is starting in seven cities but ultimately expects to work with employers in 30 cities.

John M. Griffin Jr., Region I Director of the Bureau of Apprenticeship Training, U.S. Department of Labor/Employment and Training Administration, discussed the Federal Registered Apprenticeship program as an example of a successful federal training effort. He pointed out that despite a loss of jobs in the northeast, there has been a growth in apprenticeship participation rates. The program is designed to prepare workers for high skill jobs with good wages, including high tech jobs. He described this on-the-job training approach as an "earn while you learn" program. As is the case with other training partnerships, the apprenticeship program benefits both the employee and the employer. Employees benefit from a progressive wage scale, skill portability, skill-specific training and a nationally recognized credential. Employers benefit from rapid skills development, lowered absenteeism, longer retention, and training flexibility.

Duncan Phillips, Business Workforce Director for the Workforce Opportunity Council in New Hampshire explained that state's use of grants and individual training accounts in its high tech workforce development program. The goal is to foster a highly skilled and flexible workforce and to help the underemployed develop skills that lead to self-sufficiency. The program is doing so by using a technical skills feeder system for high technology firms. The Council's program features two approaches: 1) It awards $40,000 matching grants to smaller companies to establish training programs to serve a group of employees, and 2) the program also provides $6,250 training accounts for use by individual workers. The focus areas for the training are in high tech IT, electrical and mechanical engineering, and precision manufacturing. Funding for this effort is from the federal H-1B grant program.

Panel moderator Paul Almeida, President of the Department for Professional Employees, AFL-CIO, and DEOC member, introduces his panelists.

Robert D. Ziegler, Secretary-Treasurer for the United Food & Commercial Workers International Union (UFCW), Local 832, elaborated on the UFCW Training Centre in Winnipeg, Canada, a union-sponsored training center that began in 1986. The center is funded by the Training Trust Fund, which is primarily supported by worker wages and through collective bargaining. A partnership of 55 companies, government, and colleges is involved with the center. Training is provided in GED and foundation skills, as well as basic computer skills and skills for specific occupations. Mr. Ziegler cited a number of positive aspects about the center, including: worker input into training planning, promotion of continuous learning, higher employee participation and completion rates, and schedule flexibility. The center also benefits smaller companies that cannot afford to have in-house training programs. He also pointed out that because the center is not highly dependent on government funding, its programs and operation are less subject to changing government budgets and policies.

What Was Learned from the Conference?

As a result of the Boston conference, the DEOC has begun to understand the issues related to training incumbent workers. Adult workers who need to develop or upgrade their IT skills to compete successfully in the new economy do not necessarily have access to appropriate lifelong learning systems. Many workers need fundamental knowledge and skills before they can begin developing IT skills. Successful workforce development efforts tend to occur when all of the stakeholders in the process (government, labor, business, education, and community) work together in partnership. Success is also achieved when programs exhibit the following elements:

- Address fundamentals as well as core and higher level IT skills.
- Use recognized skill standards to assess training needs.
- Are permanent and financially sustainable.
- Use various training methodologies geared to adults.
- Are user-friendly and flexible for the worker.

National Policy Association

The National Policy Association was founded in 1934 by distinguished business and labor leaders who believed that the private sector should actively participate in the formulation of public policy. Since that time, NPA has been one of the nation's leading nonpartisan, nonprofit organizations promoting informed dialogue and independent research on critical economic and social problems facing the United States. NPA brings together influential business, labor, agricultural, and academic leaders to seek common ground on effective and innovative strategies that address issues vital to the prosperity of America. Through its committees, seminars, and conferences, NPA provides a broad-based arena for differing viewpoints and new insights on issues of national and international importance.

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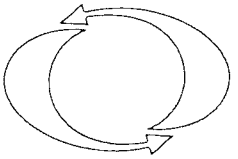

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