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Corporate Training
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*from "A Technical Guide to Teleconferencing and
Distance Learning," 3rd edition*

Contents

Introduction

At an annual TeleCon conference, we presented training via distance learning as the critical component in our nation's economic recovery. In a dramatic departure from its traditional format, the TeleCon conference, opened with a significant message about video teleconferencing's role in the retraining of America's workforce. TeleCon proposed business television as the key to the education and retraining of 50 million American workers.

Dr. Anthony Carnevale, the chief economist of the American Society for Training and Development (ASTD), presented the economic justification for this massive training effort to equip America's workforce to be productive and competitive in the new world economy. Dr. Carnevale is the author of "America and the New Economy," a study by ASTD and the U.S. Department of Labor. This report is described in detail later in this chapter. The primary finding of this study was that the characteristics of this new world marketplace are dramatically different. Increased worldwide competition requires a workforce trained in different skills than our current workforce. Dr. Carnevale's conclusion is that we must undertake a massive retraining effort in this country if we are to remain competitive. According to the study's finding, the criteria for economic success is no longer simply measured in terms of productivity. While productivity will still be an important quality, variety, customization, convenience and timeliness have grown in importance.

The workforce required to carry out repetitive tasks on a traditional production level is not the same as the kind of workers we need today. Customization, for example, may require adjustments in equipment, technical and math skills the average American high school graduate lacks. The increased concern for quality and worker involvement for continual improvement of products and services requires new supervisory and teamwork skills that were not a part of the experience or training of most of today's workers.

The traditional way America has tried to recover from recession is to reduce interest rates to encourage investment in new plants and equipment. Now there is a growing awareness that far greater results can be obtained by investing in improvements to the workforce. America has the lowest percentage of spending on training compared to all the nations we are required to compete with in the European Economic Community or Japan.

The TeleCon presentation took this recognized and documented requirement and proposed a solution based upon video teleconferencing and satellite communications.

Electronically mediated instruction, or distance learning technology, is the only feasible way to train this vast number of people by the year 2000. There are just not enough overhead projectors, trainers and meeting rooms to do the job with traditional training techniques.

Two specific success stories prove the cost effectiveness of distance learning by satellite.

Hewlett-Packard's use of business television and response terminals to deliver corporate training was presented by Willem Roelandts, vice president and general manager of Hewlett-Packard's Networked Systems Group. In his presentations, he showed how Hewlett-Packard recovered its entire investment in its training network in its first training session. We have included more information on H-P's program in this chapter.

What sets Hewlett-Packard apart from other business TV users is how their use of distance learning technology has become such an integral part of their corporate strategy. Essentially, Hewlett-Packard could not introduce products as rapidly as competition requires without satellite training.

The second dramatic example was presented by Dr. Lionel Baldwin, the president of the National Technological University, (NTU).

NTU provides graduate and continuing education for engineers directly into the workplace from over 40 universities throughout the United States. NTU uses the latest state-of-the-art in digital compressed satellite communications to deliver multiple channels of video over a single satellite transponder. Over 2000 courses are delivered to students who might otherwise be unable to continue their engineering education.

The significance of this presentation by three of the nation's leading spokesmen for high tech delivery of corporate training led TeleCon to implement something long-suggested by professionals in the teleconferencing field. TeleCon uplinked this significant opening program nationally via satellite including the NTU network. For the first time, it was possible for executives and public policymakers across the nation to join the 2000 people in the San Jose Convention Center to hear this opening session of TeleCon XII.

The TeleCon program began to emphasize education and training as our application of videoconferencing five years ago and, Via Satellite magazine, has been one of the publications recognizing the significance of this application as a new market for satellite communications.

Corporate training is a $33 billion dollar a year market in the United States today! If proposed tax incentives and tax credits for increased corporate training are implemented, the American Society for Training and Development estimates that corporate training expenditures by 1995 would grow to $100 billion a year.

The United States Distance Learning Association, which holds its annual meeting every year in conjunction with TeleCon, has proposed several public policy initiatives to encourage the use of electronically mediated instruction for training. USDLA has endorsed the ASTD proposals for tax credits for corporate training and is actively supporting Dr. Carnevale in his efforts to expand America's retraining effort.

Patrick Portway closed the national broadcast from TeleCon with the conclusion that "Satellite based training may be the key to America's economic success in the future."

Retraining 50 Million Americans: The Electronically Mediated Solution

Corporate America is spending millions of dollars on remedial training of its workers, much of it at the college level. Eighty-five percent of America's work force in the year 2000 is already in the workplace now. Fifty million of those workers will need to be retrained, and 37 million will need to be trained at the entry level.

At the same time, the U.S. is moving to a global, information-based and communications based economy. The U.S. needs knowledge workers; highly educated professionals who use computers and communications systems to dramatically increase productivity. It's no longer enough to master simple office skills, operate a machine, lift objects or follow orders.

According to the National Center on Education and the Economy (NCEE, 1990), at least 70 percent of the jobs in America will not require a college education by the year 2000. These jobs are the backbone of our economy, and the productivity of workers in these jobs will make or break our economic future. No nation has produced a highly qualified technical workforce without providing its workers with a strong general education. "But our children rank at the bottom on most international tests - behind children in Europe and East Asia, even behind children in some newly industrialized countries (NCEE, 1990)."Unlike virtually all of our leading competitors, we have no national system capable of setting high academic standards for the non-college bound or of assessing the achievement against any standards. "America may have the worst school-to-work transition system of any advanced industrial country (NCEE, 1990)."

In the future, more jobs will require at least a college degree and the ability to creatively solve problems in software-defined working environments. The American post-secondary education and training system was never designed to meet the needs of our front-line workers. Without standards set by employers, students can not be sure that there is a market for the courses they pursue. "Education is rarely connected to training, and both are rarely connected to an effective job service function (NCEE, 1990)."The NCEE reports extensive occupational preparation programs in central Europe, combining general education with work site training, which provide foreign employers with high skilled, work ready youth and offer young people a smooth transition from school to working life. Employers, knowing that students who graduate from the system have the skills they seek, are glad to hire them. Students, seeing a direct relationship between school and work, are motivated to learn.

The U.S. graduates 700,000 functionally illiterate students nationwide every year. Another 700,000 drop out. We spend the same amount on each student as Japan does, yet Japan graduates 98 percent of its high school students and the United States has a dropout rate of 20 percent for the 16- to 19-year-old population, and which soars to more than 50 percent in the inner cities. Unlike the central European systems, the Japanese emphasize general education. Although vocational schools are available to Japanese students, the majority complete high school general education programs. Many Japanese companies hire for life, and as a result Japanese employers tend to place greater emphasis on a student's general learning ability and performance in school. Specific job related skills are provided by the company throughout the individual's working life. Substantial training may last for years. Virtually all Japanese

students are handed over from a school family to a work family in a seamless transition requiring little external assistance.

As employers discover basic skills deficiencies in their workers, they need assistance to establish training programs to meet specialized needs. Little practical information has been available on how to set up workplace basic programs. The American Society for Training and Development (ASTD) and the U.S. Department of Labor (DOL) undertook a major project to research this problem which resulted in the "ASTD Best Practices Series: Training for a Changing Work Force."

Through technology, participative management, sophisticated statistical quality controls, customer service, and just-in-time production, the workplace is changing, and so are the skills that employees must have to be able to change it. Many current workers do not have the basic skills which are essential to acquire more sophisticated job-related skills. The shrinking 16-24 year-old age group will force employers to hire less qualified entry-level workers.

This volatile mix of demographic, economic, and technical forces is propelling the U.S. toward a human capital deficit which threatens the competitiveness of economic institutions, and acts as a barrier to individual opportunities.

Electronically mediated instruction can be effectively applied to the massive need to retrain 50 million American workers. New technologies do not become a part of business until a key application is identified. Training is a key application of electronically mediated instruction. Surveys of existing business television networks document training as the primary application of existing networks accounting for 80 percent of their use.

Video compression, audio conferencing and computer conferencing provide low cost training sessions and in many situations will allow delivery of training and education to the desktop. While education and training have traditionally not utilized high-tech solutions, this is changing. Innovative leaders like IBM, Tandem Computer, Hewlett-Packard, and others have proven that technology is an effective means to train employees and customers quickly, cost effectively and with greater access than any other alternative. Technology and distance learning techniques have been perfected to the point where they are ideally positioned to play a critical role in responding to this vital national crisis.

Technology Use in Training

In a 1990 study ASTD forecast major growth in distance learning technologies for training. ASTD conducted a survey of 200 executives from Fortune 500 companies, asking them about technologies they currently use for training. The survey clearly showed that technologies for training were among the fastest growing areas in the training market. While many of the companies used computer and interactive video for training, less than one third of the 153 firms that responded indicated that they use videoconferencing for training.

In 1990, 54 percent of the companies surveyed anticipated using video teleconferencing for training in the future. Chemical/allied products and retail industries reported the least use of teleconferencing, but planned the greatest increase in use. Twelve percent of the panelists in the chemical/allied products industry said they used teleconferencing for training at that time. Fifty-nine percent of the non-users said they expected to begin using this technology over the next one to three years. Nineteen percent of the retail companies reported some current use of teleconferencing and projected an increase to 44 percent.

The 1990 study showed that computer-based training was the most widely used technology for training, but that the use of all technologies was going up (Lane, 1990). The survey found that 81 percent of the respondents used some computer-based training and 93 percent planned to use it during the next one to three years. A majority of the respondents rated computer-based training as the most cost effective technology. The greatest use for computer-based training appeared to be in manufacturing, where 86 percent of the companies reported some use. While retail companies reported the least use at 69 percent, almost all retail companies in the survey said they planned to use computer-based training in the next one to three years. Approximately 50 percent of the companies reported some or substantial current use of interactive video, with public companies showing more use than private companies (57 percent versus 44 percent).

In mid-1991, ASTD released new figures and confirmed that the training of the American workforce is going to have to become a priority in the next ten years if the U.S. is to keep up with the growing world economy.

In the 1991 study, ASTD found that 42 percent of the workforce, or 49.5 million workers needed additional training during the next decade. The number was significantly higher than any released to date, and it included those who will need additional training and will not get it under present practices to keep up with the demands of their jobs.

Of the 49.5 million, there are four categories of workers who will need training.

Technical and Skills Training: Technical workers include scientists, doctors, engineers, technicians and technologists (in both manufacturing and health care), and craft workers (concentrated in the construction trades).

Skilled workers are those who will lose their present jobs with the introduction of technology and need retraining including machine operators, assembly workers,

transportation workers, mechanics, repairers and precision production workers (e.g., tool and die makers).

Sixteen million of the 49.5 are workers who will need skills and technical training.

Executive management and supervisory training employees include the decision makers in the workforce such as executives, managers, and supervisors.

Executive level employees and those who will need management or supervisory training account for 5.5 million of the 49.5.

Customer service training will be needed for those employees who have contact with customers. Often entry-level positions have customer contact including sales occupations, fast food cashiers, retail store workers, receptionists and bank tellers.

Employees needing customer service training add up to 11 million. Basic skills training will be needed for those employees who are typically low paid and low skilled. Skills needed are narrowly defined to be basic reading, writing, and math skills. Job classifications include cooks, maids, taxi-cab drivers, helpers, laborers, handlers, garbage collectors, service station attendants, data entry clerks, and file clerks. Seventeen million employees will need basic skills training such as basic reading, writing and mathematics skills.

These totals do not include the approximately 37 million workers who annually need entry level or qualifying job training.

ASTD predicts a workforce crisis in the United States because more than four out of ten workers who are on the job are not being trained to do the work that today's economy demands.

Training solutions are costly. The estimated cost to close the training gap is $15 billion per year in addition to the $30 billion presently spent yearly on corporate training. It is estimated that $475 billion is spent yearly for capital improvements to plant and equipment, and by comparison the $15 billion for human resource improvement while significant, is relatively modest. ASTD says that it is well documented that the gains in productivity from workplace learning exceed the gains from capital investment by more than two-to- one.

While it is clear that a sizable investment is needed, it is also clear that technology will be a part of that investment, including all forms of electronically mediated instruction.

Video, either one-way with interactive audio or two-way, face-to-face, allows trainers to reach learners with a clear and focused message. New technologies such as digital compression and low bandwidth broadcasts have made video options feasible both in cost and convenience.

Audio interaction also plays a very important role in the process of learning over long distances. Learners call in their questions or answers to a trainer via a phone line.

Computer conferencing can be used for additional questions, sending assignments, and involving others in the discussion.

In 1992, ASTD raised the figures for the cost of training to $33 billion a year. ASTD reported that most of the training is carried out on a face-to-face basis with little more technology than an overhead projector. Because of the changing workforce requirements and the failure of our education system to provide the necessary skills required in the new economy, a massive influx of funding will be required to upgrade the workforce. ASTD has proposed tax credits and tax incentives to increase corporate training. If any of these proposals should be approved by law, expenditures for corporate training could reach $100 billion dollars a year.

All of the surveys by ASTD have found significant increases in the use of teleconferencing, computer aided instruction, interactive laser disks and other technology in corporate training. However, for a number of reasons it still represents a small percentage of the total potential use for training.

New technologies which are making significant inroads in training include multimedia and audiographic systems. Trainers can easily combine graphic and computer data element with their video transmission providing valuable visual for learners in distance locations. In distant classrooms, learners can provide feedback, ask questions, and take tests and quizzes via audience response terminals. Each student is equipped with a numbered terminal and is able to answer questions with coded keys or signal the trainer. Trainers receive a signal on their monitor and know which learner in a specific location has a question or needs help.

Other accessories to video systems such as touch screens and graphics tablets combine with the basic elements to provide better and more understandable presentations. Computer conferencing allows the learner to have access to the trainer 24 hours a dayñeven after the class is completed.

Training at a distance is as effective as training face-to-face according to a number of studies. IBM and NEC jointly developed an Interactive Satellite Education Network (ISEN) in the 1980s. Some of the innovations introduced in this corporate training network (compressed video and response terminals) are only now being widely applied in education. IBM has realized millions of dollars in savings over face-to-face training without any loss in training effectiveness. In a study conducted by IBM over their ISEN video network, multiple classes in several courses were conducted both over the network and in person. In the first course, learners over ISEN had an average grade of 1.5 percent higher than those who took the course in person. For the second course, those who took it in person had a one percent higher average score than ISEN students. But in the final course tested, learners who had taken the course over ISEN, had a seven percent better course average grade than those who had taken it face-to-face. IBM officials are convinced that training employees over video is at least as effective if not more so than training them in person.

Hewlett-Packard's cost savings have been significant, but their move into distance learning was part of a new corporate strategy rather than a cost cutting effort. In order to accelerate the development of new products, the interval between releases of new

products had to be cut dramatically. Field engineering was required to learn more in less time. Learners could no longer come to class, the class had to go to them. Distance learning became an integral part of Hewlett-Packard's new competitive strategy.

Other companies are also convinced that distance learning works including Federal Express, Domino's Pizza, Xerox and General Motors Corporation.

General Motors started the GM Satellite Network in 1984, but network programming has remained ad hoc to fit the need for a wide variety of applications. In 1990 General Motors and the UAW joined forces to establish the UAW-GM Television Network. The network offers 12-15 hours of programming monthly to 300,000 hourly employees in 150 U.S. plants.

With the technology available, American business should be able to meet the rigorous training demands that lie ahead in the next years. However, technology alone will not solve the problem. The answer lies in knowing the content that needs to be taught, when it needs to be taught, and to whom it should be taught. Once these critical questions are answered, the next question involves knowing what technology is available and how to use it best so that it is cost effective. We are still not reaping the benefits of technology as a nation and we are not using technology as effectively as it might be used to train employees.

ASTD/Department of Labor Study

"American companies are lagging behind, struggling to compete with a workforce that is inadequately prepared to do the job demanded by our rapidly changing business and technological environment," according to Anthony Carnevale, Ph.D., ASTD chief economist and principle ASTD/DOL study author. He contends that America's competitors in other countries commit significant resources to building a well trained workforce. "Productivity used to be the only competitive standard, but the new economy introduces a whole new set of standards to add to productivity: quality, customization, variety, timeliness and convenience. America's future ability to compete is dramatically dependent on our ability to prepare our workforce to meet these new standards."

The ASTD/DOL study identified 16 basic skills (Carnevale, 1990) that the workplace of the future would need in the employee of the future. The skills that employers need include reading, writing and computation (mathematics), knowing how to learn, problem solving, personal management, and interpersonal skills as well as the abilities to conceptualize, organize, and verbalize thoughts; resolve conflict; work in teams and share leadership. The research confirmed that there is an undeniable link between work force basics and the competitive life cycle of any new strategy, technology, product or service deficiencies in basic skills undermine the cycle and cause delays, defects, and customer rejections. The research revealed that the most effective methodology to provide training in workplace basics is the applied approach, which links learning outcomes directly to job performance.

Carnevale (1991) conceptualized in his book "America and the New Economy," how America would remain competitive in the New Global Economy. Carnevale makes the case that U.S. companies can leverage an investment in training into a competitive advantage. Human resources emerged as the leading- edge competitive tool because employees had not kept up with the technology required for the global economy. We have reached a stage in which we need a workforce that knows more to be able to do more. Brain power is rapidly becoming a critical resource.

"The standards of competition have changed and work itself is changing as a result, but the way most organizations train people for work has not changed," Carnevale contends. "It is as if they are trying to move from old-fashioned assembly lines to just-in-time production without the benefit of just-in-time learning."

Most reports state that a full one-third of Americans cannot read or write English with the competence of an eighth grader. Computer illiteracy figures are staggering. Mathematics and computational skills are poor. One-half of all 18-year olds have not mastered basic language, mathematics or analytic skills. "We need workers with skills that will allow us to be competitive in the next century," according to Sam Ginn, Pacific Telesis chief executive. Research by ASTD confirms that "it is the lower half of the workforce that is not well prepared and this is where America is losing the competitive race."

The basic tool that could change this situation is an individual's knowledge of learning how to learn. Carnevale's research clearly showed that Americans did not know how to learn, even though it is the foundation skill for all other skills. According to a 10-year

plan for IBM's employee training, "above all, education will be self-directed shifting control of the learning to the student with distance education technology playing a key role in supporting this vision."

A secondary benefit of learning how to learn is that it empowers the learner to become a self-directed learner. The self-directed learner is capable of identifying a deficiency, finding resource materials that will provide the information, and conduct his or her own study based on methods specifically directed at his or her learning style. As the length of learning time is shortened and the act of learning becomes easier, learning becomes less frustrating for the learner. As the frustration decreases, learning becomes less of a burden and can become enjoyable. The self-directed learner can also alleviate the logjam of learners waiting for trainers. Self-directed learners are capable of directing their learning with minimal guidance from an instructor and also benefit greatly from group study that is not facilitated.

The corollary to employees learning how to learn is to train the trainer to facilitate and using learning style methods. Many training programs use people who are content experts as trainers; yet many content experts have no formal training in adult education methods. While it is not suggested that content experts be dropped from any training program, it would be a clear advantage for the students in the class to have an instructor who is a trained adult educator as well as a content expert. It would also be a clear advantage for the training function to have all faculty members trained in adult education methods which value facilitation, learner motivation, and self-directed learning.

As learners move from being dependent learners to independent or self-directed learners, another useful method is collaborative learning. Sometimes called the leaderless group, collaborative group learning is a natural grouping for organizations that are collapsing hierarchy. Group learning lends itself to groups composed of learners who are geographically dispersed but have a need to learn the same material. A training facilitator can guide the group in its work as well. Audio, video, and computer conferencing technologies are well suited for the collaborative learning group. Leaderless group skills also transfer well to the workplace which is based on collaborative teams.

From the employer's perspective, the skill of knowing how to learn is cost-effective because it can mitigate the cost of retraining efforts. When workers use efficient learning strategies, they absorb and apply training more quickly, saving their employers money and time. When properly prepared, employees can use learning-to-learn techniques to distinguish between essential and nonessential information, discern patterns in information, and pinpoint the actions necessary to improve job performance.

Employers, particularly those dealing with rapid technological change, see the learning-to-learn skill as an urgent necessity for their workers. Productivity, innovation, and competitiveness all depend on developing the learning capability of the work force. Machinery and processes are transferable between companies and countries, but it is the application of human resources to technology and systems that provides the competitive edge.

The leaner, smaller work force will heighten the importance of training and adaptability. If present trends continue, the gap between need and capability will expand and will prevent the U.S. from increasing its competitive edge in some industries and retaining it in others. The company that is successful is a very different breed says Harvard University professor, Rosabeth Moss Kanter. It is designed so that "the work force is multi-skilled and multi-trained and can be redeployed quickly as issues change."

The Workforce Challenge

That U.S. business faces a work force crisis has been accepted. The question is what can turn around the problem in the shortest time? Work-based training would meet the challenge of increasing the skills and knowledge of employees and bring with it increased productivity and a respectable position in the global economy.

ASTD points out that for companies that face the following facts, the competitive edge will grow sharper:

- The average 1.4 percent of payroll that U.S. companies invest in training reaches only 10 percent of the work force. Japanese and European-owned companies based in the U.S. spend three to five times more on employee training than American companies.
- The K-12 education system will not be able to help most of the people who will be working in the year 2000. Ninety percent of the people who will be working then are already working now.
- Within the next ten years, 74 percent of Americans working today will need retraining. In manufacturing alone, as many as 15 million jobs will require different skills than those required today.
- The surplus labor force of a few years ago has dwindled to almost nothing. By the year 2000, there will be too few trained and knowledgeable workers to satisfy the nation's economic needs.
- The process of bringing innovations to the marketplace takes too long in the U.S. The Japanese can get a new car to market in 40 months; it takes Americans five years. The United Kingdom is able to get pharmaceuticals to market in half the time it takes American companies. American business has the technology it needs to be more productive, but it cannot afford to wait for the school system to produce a new generation of workers capable of capitalizing on new technology. American business can, and must, afford its human capital investment ... its investment in training.

Work-based training would meet the challenge of increasing the skills and knowledge of employees and bring with it increased productivity and a respectable position in the global economy. Importantly, training directly helps employees to develop the vital skills that are needed ... if the training is based on the foundation skills of learning how to learn. Training directly helps employees develop the needed vital skills ... if the training is based on the foundation skill of learning how to learn.

ASTD reports that "the investment in learning on the job has contributed more than half of all increases in the nation's productive capacity over the last 40 years. That is almost three times more than the investment in machine capital has produced. The most globally competitive companies are already making the employee training investment. Through their investment in human capital and strategic development, these companies have been able to build a work force that can make more effective use of technology, develop collaborative and efficient managers and employees, and are more readily able to solve problems through creative solutions that capture the imagination of the marketplace.

In 1984, IBM restructured its education function, giving it a central role in corporate strategies for growth. Jack Bowsher, then the director of education for IBM, led a two-year study in preparation for the restructuring. He says, "The important question is, does your organization have a training program that's adequate for preparing a competitive workforce? Do you have a workforce with some training or competitive workforce? There is a difference."

The investment in human capital creates an additional educational by-product. Training that is based on the foundation skill of learning how to learn will increase the work force's ability to quickly learn as the job changes. It is the basic tool for lifelong learning. David T. Kearns, deputy secretary, U.S. Department of Education, states: "People have to continue learning new techniques and new ways all the time. Having a well-educated and empowered work force is going to change how companies are run." In recent years, Xerox spent $125 million just on training to achieve its strategic goal of quality. Kearns says that training should integrate the strategy, direction, and vision of the company, and the skills and behavior that people need in order to get the job done.

Training makes a real difference for companies committed to building quality, improving customer service and capturing greater market share, according to ASTD. "To succeed in today's competitive world economy, the U.S. must achieve leadership in technological innovation and leadership," says CEO James E. Burke, Johnson & Johnson. "Key to achievement of these goals is a renewed commitment to a vastly improved education and training system." CEOs in all U.S. companies can do something within their own companies to create positive change for their employees and their businesses.

Just as the bureaucracy of the American educational system has been criticized for producing a poor educational product, the same criticism has been leveled at the corporate commitment to training. Carnevale concludes that most employers' current commitments to training and development are insufficient. While the $33 billion that is spent annually on training (about 1.4 percent of the national payroll) is enormous, the impact has not been. The funding per employee is not enough to conduct the massive retraining to maintain America's competitive position in the global economy past the year 2000.

Employers who are committed to training do substantially more, with training investments averaging anywhere from three to six percent of payroll. To upgrade their skills, only 10 percent of employees receive employer-provided formal training and 14 percent receive informal training from their employers. Research also shows that people who are trained formally in the workplace have a 30 percent higher productivity rate after one year than people who are not formally trained. Formal training is four to five time more productive than informal training and three times more productive when done in-house. Those who receive formal training on-the-job also enjoy an earnings advantage of 30 percent or more over those who do not.

Between 1929 and 1989, learning-on-the-job accounted for more than half the productivity increases in the U.S.; learning was twice as important as technology in boosting productivity and twice as important as formal education.

The U.S. productivity rate is still the world standard, but is increasing much faster among our competitors. If current trends continue, Japan will surpass the U.S. in 2003. The U.S. is already losing the productivity race to Japan in chemicals, steel and other primary metals, electrical machinery, and transportation equipment.

Training is not evenly distributed. The majority of training is limited to white collar, technical elites. Of the nation's 3.8 million companies, only one half of one percent do 90 percent of the training, yet 80 percent believe their employees have adequate skills.

The frequency with which mediated instruction is utilized to train employees is low given the enormous need to retrain millions of employees. Too frequently, the training function is conducted by a content expert who is not an adult education facilitator. Trainers are no more experienced with the selection, use and evaluation of electronically mediated instructor than their educational counterparts. This is particularly true for those who work in training because of their content expertise. Too frequently the class is conducted in the traditional manner and without audio-visual equipment. Too frequently, the concepts of learning style, continuing learning or learning how to learn are not addressed. Too frequently, even the term "distance learning" falls on the ears of trainers who do not understand the term's definition or the efficiency it can bring to the training function. The U.S. work force is not ready to meet the new competitive standards - quality variety, customization, convenience and timeliness. It is not adequately prepared to take advantage of new technology, especially information technology. It has not learned how to achieve results through the work of teams and does not have sufficient skills to leapfrog ahead of its competitors to deliver on the new competitive standards. It has not learned how to shift its focus to the customer, how to engage in partnerships with its competitors, or how to think in terms of global markets. In short, it has a great deal to learn in a hurry.

Electronically Mediated Instruction

One section of the ASTD study demonstrates the important role that distance education will play in solving the problem as it describes the training and education provided through distance education technologies for technical, engineering, scientific and health workers. The enormity of the basic skills problems strongly suggests that a basic skills training network could be used by many corporations to provide the skills. The fifty million Americans who need to be retrained now can be reached through distance learning. One content expert who is also a master facilitator can reach thousands of employees. Distance learning is cost effective for the organization because the cost is spread over many employees rather than just a few. It is efficient because the learner does not have to travel great distances to receive the benefit of learning from an expert. Study guides are written to guide learners through the class with exercises and activities that emphasize content application. Interaction is built into the class through two-way audio, phone lines, or student response keypads. It is an effective way for employees to learn because programs are written by instructional designers who build an instructional package to reach all learning styles - whether the student learns by seeing, hearing, reading, interacting, or doing.

High-technology delivery methods -- such as satellite networks and interactive video -- make it faster and more efficient for employers and providers to work together to train employees. Satellite networks, are being used to aid employers in sharing programs and information with each other and allow universities to send programs easily and directly to employer sites.

As a result of this technology, the National Technological University (NTU) was founded, with courses accessed by employees solely through satellite networks. NTU is a fully accredited, advanced degree awarding institution that delivers its programs by means of satellite delivery systems transmitted from universities; it offers programs leading to ten different master of science degrees. NTU's board of directors is composed of industry representatives who provide consultation on curriculum design and development. The courses are in-depth and focus on the cutting edge of technology. NTU has converted to a digitized format that is transmitted over satellite.

Texas Instruments, a manufacturer of electronics products, including peripheral computer parts, with revenues exceeding $4 billion, and Du Pont, a diversified chemical and energy company with profits exceeding $27 billion, are two companies that offer satellite courses to their employees and to employees of other organizations. Both offer day-long seminars on development in electronic technology to other companies via satellite. Sharing courses through satellite networks makes advancements available to other organizations but also means that the costs of training can be shared as well.

There are a number of high-technology course delivery options that are already in place throughout the U.S. Networks at Federal Express, Xerox, General Motors, Domino's Pizza, and Hewlett-Packard serve as models which can be adapted by others.

America and the New Economy

America's economy was built on mass production systems. The competitive standard was productivity - producing high quantities of goods and services at low prices. We were able to do this faster than anyone else. In the New Global Economy, the U.S. can no longer compete on the basis of mass production alone. Consumers now demand quality, variety, customization, convenience and timely products and services.

Globalization

It is increasingly clear that our ability to stabilize domestic markets is no longer enough (Carnevale, 1991); the New Economy is global and the tendency is for global economic events to affect and impinge on the domestic economy. Other nations face many of the same obstacles, but we move into the New Economy with the additional burden of our past success. Old and once successful habits die hard. The U.S. set the standards in the old economy, but we labor on toward the New Economy dragging the dead weight of our past industrial successes behind us. We cannot ignore the growth of the international competitive market. U.S. corporations now shop the world for labor, resources and business partners. The presence of foreign companies and money in the U.S. will continue to increase. U.S. companies must rise to the needs of this expanded marketñor someone else will.

Technological Advancements

If U.S. education and training is viewed as an intellectual house of cards that has been identified as needing change through gradual incremental processes, it can be seen as collapsing from the weight of real-world competition rather than an assault on the established order. Carnevale states that "the interplay between theory and practice is one factor that sets a deliberate pace for technical change. The state of the technical art is almost always ahead of the technical practice because there is an inevitable hiatus between the acceptance of new ideas and their embodiment in new technology."

Carnevale notes that the role of change agent is also hampered because once invented, "new technologies are not immediately adopted"... as "fear, superstition, vested interest and instability give the past and present a powerful hold on the future. Legislative conservatism is currently preventing the easy adoption of learning technologies for education, but business also has an administrative equivalent which prevents its use of learning technologies. "The inability to swallow the sunken cost in a current technology and its accompanying infrastructure is a persistent cause of the competitive edge lost to those who are willing to push technical frontiers in mature industries," Carnevale warns.

In the most fundamental sense, what distance learning systems try to do is to connect the trainer with the learners when physical face-to-face interaction is not possible. Just as highways move vehicles, telecommunications systems carry instruction, moving information instead of people. The technology at distant locations, including computers, video cassette recorders (VCRs) fax machines, television monitors cameras and the telephone, are critically important. Together, these technologies affect how interaction

takes place, what information resources are used, and how effective a distance learning system is likely to be.

Many technologies are being used to provide education over a distance which include satellite, fiber optics, microwave, the public telephone system, and coaxial cable. Any of these technologies can be interconnected to form "hybrid" systems. No one technology is best for all situations and applications. Different technologies have different capabilities and limitations, and effective implementation will depend on matching technological capabilities to educational and training needs.

The technologies for accessing, storing and manipulating information have more impact on the distance education experience than the technologies for transmitting signals. Personal computers, display technologies, optical memory systems, facsimile (fax) machines and graphics scanners expand the use of information and resources at distant location. Future developments in transmission, processing, and storage technologies promise even greater capabilities and benefits for training at the same or lower costs. Advances in digital compression technology will greatly expand the number of channels that can be sent over any transmission medium, doubling or tripling channel capacity. Telecommunications systems may also enable new and different uses beyond the traditional training setting. Public education systems can also serve the needs of adult learners, continuing education at home or in the workplace and the community. Educational institutions want to build partnerships with business and shared telecommunications systems may be a solution, particularly for small businesses.

The base of telecommunications infrastructure available for distance education is wide and expanding, giving schools an opportunity to utilize existing local resources and forge innovative partnerships. Local, regional, and state distance education efforts can be linked with telecommunications networks operated by colleges and universities, local business, public broadcasting stations and state governments. Increasingly, the private sector, including the telephone and cable companies are becoming active in helping schools expand their teaching and learning opportunities, while helping themselves.

New Entrants into the Labor Force by the Year 2000

Today, the labor pool for entry level employees is shrinking. History has encouraged us to believe that educated and trained workers are abundant, but demographics will play a critical role in dictating the priorities of corporate America. The overall size of the work force will decline especially at the entry-level, as the baby boomers move into older age. The rate of labor force growth will be slower than during the past 12 years. A smaller work force must be more skilled and use more technology simply to maintain output.

There is an increase in work force diversity as we enter the New Economy. Every group from rank- and-file workers to senior management will be more diverse in race, culture, and gender than ever before. To make this multicultural environment productive, managers need to manage differently. Managers and employees need to learn new skills and how to deal with conflict between groups.

The New Competitive Standards

Variety: Consumers demand variety. In the last 10 years, the number of items carried on supermarket shelves rose from 12,000 to 24,000. There are 271 kinds of cereal and 16 kinds of noodle soup. Americans choose among 572 different models of cars, trucks and vans. Consumer banking has expanded from six basic services to over 100.

Customization: American organizations must have the ability to customize products and services for the consumer. Both the Japanese and the Italians are heading toward a system in which a consumer can specify fabric, style and size to receive customized apparel in a matter of weeks. Financial services are also being customized with the help of information technology.

Convenience: More and more consumers are able to afford convenience. Built-in convenience is found in products and services such as automatic teller machines and remote controls. Convenience in the form of successful customer relations can also be a powerful selling tool. Unsuccessful relations, on the other hand, can prove fatal. It is estimated that a dissatisfied customer will relate his or her unhappiness to ten other people.

Timeliness: The United States must respond faster to market needs and dramatically shorten product cycle times. The early bird will get the market share in the New Economy. America still leads in the development of technology, but is being caught by other countries and is often beaten in the commercialization of the technology. Americans take about five years to move from auto design to market. The Japanese take only take three and one-half years. The United States takes four to fives years to design and build a new blast furnace. Japan takes about three years and Korea takes two years. In the apparel industry, it takes most American companies 66 weeks to get from fiber to finished garment. Many European and Asian companies reach the customer in 23 weeks; at least one Japanese manufacturer hopes to reduce the time to a few weeks.

Organizational Requirements of the New Economy

The new competitive standards affect organizational structures, requiring a move away from top- down systems and toward more flexible networks and work teams. Technical changes result in new work processes and procedures. These require constant updating of employer-specific technical knowledge. In a world of rapid change, obsolescence is an interminable danger. As technology replaces more of the hands-on work, more employees will be dedicated to service functions where they will spend more time face-to-face with co-workers and clients.

Organizational formats in the New Economy require more general skills. Interpersonal skills, communications skills and effective leadership skills are required by more and more non-supervisory employees. Managers in the New Economy relinquish control of work processes to work teams and will need to provide integration through leadership and monitoring.

The requirements for basic skills will increase and deepen because of the growing complexity and scale of jobs performed. Emphasis will shift from specialization to a broader range of competencies. In the past, the work force was considered a cost to be controlled. In the New Economy, it is an asset to be developed. Our international competitors have already recognized the value of the work force and the impact of training on economic growth. Sixty percent of German youths get three years of formal apprenticeship training in the workplace. France, Ireland, Sweden, Korea, Japan and others all have national workplace training incentives. Japanese auto workers get 3.5 times as much training as U.S. auto workers.

A whole set of skills and a wider range of knowledge is required in the New Economy; training becomes a critical tool to enable U.S. organizations to survive and compete. Moving an organization toward the new competitive standards requires a work force with solid grounding in hard competencies and job knowledge. "Soft" skills, the ability to interact and influence others, take on great importance. The ability to take responsibility for the organization and its goals will be required. Education and experience become more important in getting and keeping jobs. Workers are valued more for skills and less for organizational time and loyalty.

Training makes a demonstrable difference in the ability to meet the new competitive standards. Its impact can be measured at several levels - the economy, the organization and the individual. The U.S. companies that have made significant investments in their work force have enjoyed increased economic success. ASTD projects that 50 million U.S. employees (42 percent of the workforce) need training right now and are not getting it; 16 million will need skills and technical training; executive level employees and others needing management/supervisory training; 11 million need customer service training; and 17 million need basic skills training (reading, writing and math skills). Annually, an additional 37 million will need entry level or qualifying job training.

The Workforce We Have vs. The Workforce We Need: The New Skills

The ASTD study showed that through technology, the workplace is changing, and so are the skills that employees must have to be able to change with it. The research confirmed that there is an strong link between work force basics and the competitive life cycle of any new strategy, technology, product or service. Deficiencies in basic skills undermine the cycle and cause delays, defects and customer rejections. The research revealed that the most effective methodology to provide training in workplace basics is the applied approach, which links learning outcomes directly to job performance.

Increasingly, employers have been discovering that their work forces needs skills that seem to be in short supply, skills over and above the basic academic triumvirate of reading, writing, and computation. The skills that employers want include problem solving, personal management and interpersonal skills as well as the abilities to conceptualize, organize and verbalize thoughts; to resolve conflict; and to work in teams - all of these skills are critical but often lacking.

Basic workplace skills are of interest because rapid technological change, participative management, just-in-time production, and other workplace innovations have created a demand for more flexibility, adaptability, and a higher base level of skills from all workers, including those at the non- supervisory level. While it is recognized that a percentage of Americas workers have always done well in the workplace despite skills deficiencies, it is apparent that future success will be illusory for many workers if they continue to be ill-equipped in a broad spectrum of basic workplace skills.

Some of the key findings reveal that in addition to reading, writing and computation, the thirteen other skills that employers have identified as basic to success range from learning to learn to shared leadership. There is an undeniable link between work force basics and the competitive life cycle of any new strategy, technology, product, or service. Deficiencies undermine the cycle cause delays and defects, and customer rejections.

The most effective method to provide basics training is the applied approach, which links learning outcomes directly to job performance. Using this approach, employers can fill in employee skill gaps and build individual competence in workplace basics. There are 16 basic skills which employees must have if U.S. companies are to meet the new global competitive standards in the New Economy.

The Sixteen Basic Skills

- Foundation Skill: Learning how to learn
- Reading Competence
- Writing Competence
- Computation (mathematics) Competence
- Communication - Listening (interpersonal skill)
- Communication - Oral (verbalize thoughts) (interpersonal skill)
- Adaptability: Creative Thinking (and conceptualize)
- Adaptability: Problem Solving (and organization)
- Personal Management: Self Esteem

- Personal Management: Goal Setting/Motivation
- Personal Management: Personal/Career Development
- Group Effectiveness: Interpersonal Skills
- Group Effectiveness: Negotiation (resolve conflict)
- Group Effectiveness: Teamwork
- Influence: Organizational Effectiveness
- Influence: Leadership (and shared leadership)

Learning to Learn

Learning is an integral part of everyday life at work. The skill of knowing how to learn is a must for every worker and is the key to acquiring new skills and sharpening the ability to think through problems and to surmount challenges. It opens the door to all other learning and facilitates the acquisition of other skills. It is safe to say that at least 95 percent of Americans do not know what their learning style is or how to address it. What we do know, we learned from watching the "A" students in grade school and high school. The concept of "study smarter - not harder" applies here. Few of us know how to "study smarter" based on our individual learning style. A secondary benefit of learning how to learn is that it empowers the learner to become a self-directed learner capable of identifying a deficiency, finding resource materials, and doing the work based on methods appropriate for his or her learning style.

From the employer's perspective, the skill of knowing how to learn is cost-effective because it can mitigate the cost of retraining efforts. When workers use efficient learning strategies, they absorb and apply training more quickly, saving their employers money and time. When properly prepared, employees can use learning-to-learn techniques to distinguish between essential and nonessential information, discern patterns in information, and pinpoint the actions necessary to improve job performance. Many employers - particularly those dealing with rapid technological change see the learning-to-learn skill as an urgent necessity. Productivity, innovation, and competitiveness all depend on developing the workers' learning capability. Machinery and processes are transferable between companies and countries, but it is the application of human knowledge to technology and systems that provides the competitive edge.

Many workers do not have the basic skills which are essential to acquire more sophisticated job-related skills. The shrinking 16-24 year-old age group will force employers to hire less qualified entry-level workers. This volatile mix of demographic, economic, and technical forces is propelling the U.S. toward a human capital deficit which threatens the competitiveness of economic institutions, and acts as a barrier to individual opportunities.

Because science, medicine or psychology has not yet provided us with the information about how we learn, we are still only guessing at it based on what seems to work. Yet, because there is a keen interest in the process, research is ongoing and there is a growing body of information that is giving us insight into our abilities to memorize, retain, assimilate, and create.

Largely, because we have so little scientific fact, what we do know about how we learn has not been taught as part of the core curriculum in K-12, higher education, or training. During the last several years, it has been taught at the graduate level in some schools of education.

In a learning how to learn class, a learner's learning style is identified through instruments such as the Canfield Learning Style Survey. The learner is given the survey and is guided in the interpretation of the results. Basic and secondary learning styles are identified, and the learning methods that will best support the learning style are pinpointed.

Learners are encouraged to ask their trainers to present information to them using these methods. For example, many people learn most efficiently from visual materials, yet most instruction is delivered verbally. The mismatch leads to confusion for the learner, and a longer learning process. Because the learner has not learned the material, the training dollar was not well used. Learners can self grade the instrument, but it is most helpful in discussing learning styles if the scores for the entire class are shown together so that the learners and the instructor discuss the wide range of styles which can be represented in a group of only six people.

The much discussed concept of interaction as a major component of videoconferencing is also a way of addressing the collaborative learning style in which the learner learns most efficiently when allowed to process the information verbally.

Basic Skills Competence: Reading, Writing and Computation

The inability of large numbers of new workers to meet reading, writing, or computational (simple mathematics) standards is an economic and competitive issue. This forces employers to spend more on these critical competence skills. The majority of workers are literate and numerate but frequently, cannot use these skills effectively because they are rusty when called upon to use mathematical principles they have not used for 20 years, because they must use the skills in a context different from the one in which they originally learned them, or because they do not understand how to expand or apply the skill.

Reading has historically been considered the fundamental vocational skill for a person to get, keep, get ahead, or to change jobs. One educational assessment by Kirsch and Jungeblut in 1986, indicates that there is a large nationwide population of intermediate literates who only have fourth to eighth grade literacy equivalency (but are high school graduates) and who have not obtained a functional or employable literacy level. This group will make up as much as 65 percent of the entry-level work force over the next 15 years. In the ASTD-DOL study, employers generally found the fewest deficiencies in reading. Only in secretarial/clerical and technical positions did a significant portion of the respondents find deficiencies. This is a concern for all employers - either now or in the future.

Writing is consistently ranked among the highest priorities for job applicants and employees. One study states that more than 50 percent of the business respondents

identified writing skill deficiencies in secretarial, skilled, managerial, supervisory, and bookkeeping personnel.

Because of technology, simple mathematical computation is important as employers focus on an employee's ability to compute at higher levels of sophistication. The introduction of sophisticated management and quality control approaches demand higher mathematical skills. Ironically, as occupational skill-level requirements climb, higher educational dropout rates and worsening worker deficiencies in computational skills are appearing (Brock, 1987; Kirsch and Jungeblut, 1986; Semerad, 1987). Employers complain particularly about miscalculations of decimals and fractions, resulting in expensive production errors. Employees must calculate correctly to conduct inventories, complete accurate reports of production levels, measure machine parts or specifications so that medium-to-high levels of mathematics skills are required across job categories. The business effect of math skill deficiencies is bottom line losses.

Communication Skills: Oral Communication and Listening

Formal education in communication has been directed at reading and writing skills that are used least in the workplace. Most have only one or two years in speech related courses and no formal training in listening. Workers who can express their ideas orally and who understands verbal instructions make fewer mistakes, adjust more easily to change, and more readily absorb new ideas than those who do not. Thus career development is enhanced by training in oral communication and listening because these skills contribute to an employee's success in all of the following areas: interviewing, making presentations at or conducting meetings; negotiating and resolving conflict; selling; leading; being assertive; teaching or coaching others; working in a team; giving supervisors feedback about conversations with customers; and retraining. Employees spend most of the day communicating, and the time they spend will increase as robots, computers, an other machines take over mundane, repetitive jobs.

Skill in oral communication is a key element of good customer service. More than 76 million workers are in the service sector and companies that provide excellent service tend to stay far ahead of their competitors. To provide good service, all employees (not just designated sales and marketing employees) must learn how to talk and listen to customers, handle complaints and solve their problems. Only about 33 percent of organizations with 50 or more employees provide listening skill training. Workers spend 55 percent of their time listening, yet listening skills are appalling:

- We use only 25 percent of our listening capacity.
- We use only 10 percent of our memory potential.
- We forget half of what we have heard within eight hours. Eventually, we forget 95 percent of what we have heard unless cued by something later on.
- We distort what little we do remember (Nichols and Stevens, 1957; Barker, 1971).

For an eight hour workday that breaks down as follows:

- We spend about four hours in listening activity.
- We hear for about two hours.

- We actually listen for an hour.
- We understand thirty minutes of that hour.
- We believe only 15 minutes' worth of what we listen to.We remember just under eight minutes worth (Elsea, 1986).

As workers go up the corporate ladder, the listening time increases so that top managers spend as much as 65 percent of their day listening (Keefe, 1971). Because most people have had no training in this critical skill, poor listening habits cost hundreds of millions of dollars each year in productivity lost through misunderstandings and mistakes. At the rate of one $15 mistake per U.S. employee per year, the annual cost of poor listening would be more than a billion dollars.

Adaptability: Creative Thinking and Problem Solving

Problem-solving skills include the ability to recognize and define problems, invent and implement solutions, and track and evaluate results. Creative thinking requires the ability to understand problem-solving techniques but also to transcend logical and sequential thinking and make the leap to innovation.

New approaches to problem-solving, organizational design, and product development all spring from the individual capacity for creative thinking. At work, creative thinking is generally expressed through the process of creative problem solving. Increasingly, companies are identifying creative problem solving as critical to their success and are instituting structured approaches to problem identification, analysis, and resolution.

Unresolved problems create dysfunctional relationships in the workplace. Ultimately, they become impediments to flexibility and to dealing with strategic change in an open-ended and creative way. Creative solutions help the organization to move forward toward strategic goals. Organizational strategy is an example of creative thinking.

Personal Management: Self-Esteem, Motivation/Goal Setting, Employability/Career Development

Another key to effectiveness is good personal management. Self-esteem, motivation/goal setting, and employability/career development skills are critical because they impact individual morale which in turn plays a significant role in an institutions ability to achieve bottom line results.

Employers have felt the pressure to make provisions to address perceived deficiencies in these skill areas because they realize that a work force without such skills is less productive. Conversely, solid personal management skills are often manifested by efficient integration of new technology or processes, creative thinking, high productivity, and a pursuit of skill enhancement. Unfortunately, problems related to these skill areas have increased primarily because entry-level applicants are arriving with deficiencies in personal management skills. On the job, the lack of personal management skills affects hiring and training costs, productivity, quality control, creativity, and ability to develop skills to meet changing needs. This presents a series of roadblocks that slow or halt an organizations progress. An organization with such difficulties cannot plan accurately for

its future to integrate new technology, establish new work structures, or implement new work processes.

Group Effectiveness: Interpersonal Skills, Negotiation, and Teamwork

The move toward participative decision making and problem solving inevitably increases the potential for disagreement, particularly when the primary work unit is a peer team with no supervisor. This puts a premium on developing employees group effectiveness skills.

Interpersonal skills training can help employees recognize and improve their ability to determine appropriate self-behavior, cope with undesirable behavior in others, absorb stress, deal with ambiguity, structure social interaction, share responsibility, and interact more easily with others. Teamwork skills are critical for improving individual task accomplishment because practical innovations and solutions are reached sooner through cooperative behavior.

Negotiation skills are critical for the effective functioning of teams as well as for individual acceptance in an organization. Change strategies are usually dependent upon the ability of employees to pull together and refocus on the new common goal. Carnevale wrote in a previous book that there are two ways to increase productivity. "The first is by increasing the intensity with which we utilize (human) resources (working harder), and the second is by increasing the efficiency with which we mix and use available resources (working smarter)."

Influence: Organizational Effectiveness and Leadership

To be effective, employees need a sense of how the organization works and how the actions of each individual affect organizational and strategic objectives. Skill in determining the forces and factors that interfere with the organizations ability to accomplish its tasks can help the worker become a master problem solver, an innovator, and a team builder.

Organizational effectiveness skills are the building blocks for leadership. A proactive approach toward increasing organizational effectiveness skills through training reflects the commitment to shared leadership concepts operating in the organization. Implementing shared leadership values has a positive impact on productivity. When leadership functions are dispersed, those who perform in leadership roles willingly take on the responsibility for creating and communicating the vision of the organization and what its work groups should accomplish. By their proximity, they are also better able to create and communicate the quality of the work environment necessary to realize that vision.

One approach is the superteam which is defined as a high performing team which produces outstanding achievements. Leaders of superteams spend as much time anticipating the future as they do managing the present by thinking forward to, and talking to others about their goal, for it is this that provides the team with its purpose and direction (Hastings, Bixby, and Chaudhry-Lawton, 1986). Deploying visionary leaders

improves institutional response time to changing and increasingly complex external environment factors that affect the organization's ability to operate effectively.

At its most elementary level, leadership means that one person influences another. An organization that supports the concepts of shared leadership encourages employees at all levels to assume this role where it is appropriate. The function of leadership include stating basic values, announcing goals, organizing resources, reducing tensions between individuals, creating coalitions, coalescing workers, and encouraging better performance. There is a direct correlation between the implementation of shared leadership practice and product improvement, higher morale, and innovative problem solving, which leads to a more hospitable environment for instituting change.

Top management cannot make the system work without employees taking on shared leadership roles. A great many people must be in a state of psychological readiness to take leaderlike action to improve the functioning at their levels. Historically, the roots of business failure can often be traced to inadequate training in and attention to the importance of leadership as a basic workplace skill. Too frequently, companies designate leaders without providing proper evaluation and training to ensure that they are qualified to assume leadership roles.

The Organization and Strategic Role of Training

The ASTD/DOL study (Carnevale, et al, 1990) reported on how training is structured, managed, financed, and coordinated with organizational strategy. It details employer-based training, who gets training, how training funds are spent, and how approaches to training differ. Discussions, facts, and figures explain the economic implications training has for industry and the economy. It explores how training can be used to achieve the organizations strategic goals and examines why and how companies use outside resources to provide training. Practical examples and case studies illustrate the characteristics of learning situations and capture the essence of the training industry's contributions to institutions. It sets forth a comprehensive training and development policy that expands and integrates the roles of government, industry, and educational institutions.

Employers realize that to be competitive, they must accelerate learning and integrate it rapidly. Therefore, designing and implementing training which supports the employer's institutional culture and strategic goals take precedence over broad-based courses unconnected to the employer's central agenda. The employer's ultimate goal in providing workplace learning opportunities is to improve the companys competitive advantage. Employers are driven to identify and use learning approaches that rarely stray from the reality of the workplace and are linked to the employee and the employer's bottom line. More cost-effective than broad-based training, the applied approach provides training that responds to the employer's specific needs and triggers rapid integration of learning with actual job requirements, resulting in higher employee productivity.

Research and experience in adult learning show that linking learning to a worker's job pays off because employees are more likely to retain job-related information because they realize that they will immediately and repeatedly use the new knowledge. Job-related learning is flexible and frequently easier for employees than were their earlier learning experiences. Workplace learning is supported by a powerful motivator; when learning experiences are based on actual job needs, employees frequently work to increase their proficiency in the expectation that they will trigger immediate rewards in terms of achievement, status, and earnings. Thus, employers and employees are jointly motivated to make the workplace learning experience a success. Training delivery trends indicate three dominant scenarios:

- Training design and development is controlled centrally but delivered decentrally to the plant level,
- Executive, management and organizational development training are designed, developed, and delivered centrally but technical and skills training are entirely decentralized, and
- Operational units have the authority to make training decisions and purchases (decentralized) but with the requirement that a central training department participate in the training selection process or approve the selection.

According to the survey, the decision to make-or-buy training is composed of the following criteria.

- Expertise: how specialized the training need is.
- Timeliness: does the staff have time to develop and deliver the program within the time frame.
- Population Size: economies of scale - a large group or training that will be delivered. Frequently leads to in-house development. One-time in-house training for small groups cannot be justified.
- Sensitive or Proprietary (to gain a competitive advantage) Content: likely to be in-house regardless of other factors.
- Cost: secondary to other criteria.
- Employer Conditions: companies may not have a large training department, expertise, resources or time to meet specialized needs.
- Other factors: outside providers can bring new ideas to rejuvenate dull training thus motivating employees to attend and learn.

The research confirmed that the lecture format is still dominant for sales training but that videotaped presentations are popular because of flexibility. It enables training immediately after hiring, introduces new products without bringing all salespersons to one location, and demonstrates products consistently. Custom video is expensive but cost-effective compared with using untrained salespersons in the field.

Organizational Strategies and Training Roles

- Where is the corporation now?
- If no changes are made, where will the corporation be in one year, two years, five years, and ten years? Are the answers acceptable?
- If not acceptable, what specific action should the corporation undertake? What are the risks and payoffs? The gap analysis is essential to strategic planning and while the opportunity may exist to participate, the skill to provide that input may be absent.

Strategic Concepts

The understanding of strategic concepts has become increasingly sophisticated at the top levels of organizations, but that sophistication has not filtered down to managers and workers who implement it. Following are questions to guide trainers in gathering information and begin participating in the strategic process They are organized into two broad groups:

- Common considerations which are relevant to all strategies, and
- Considerations essential to specific strategies.

Common Considerations

- Understand the environment in which the organization operates. Is the industry evolving or stable? What are the growth trends? Who are the main domestic and

foreign competitors and what is the organization's competitive advantage over them? How can the organization capitalize on competitors' strategic vulnerabilities? Is the organization capable of widening the competitive gap in its favor?

- Why has the organization been successful in the past? What strategies has it successfully employed? What was learned during that can be applied under the new strategy? What forces have driven the organization to select a new strategy?
- What technology does the organization plan to use? If new, when will it come on line?
- Are industry innovations anticipated that could change the market? Will these be radical breakthroughs or modifications? What effect would this have on the organization's product and its competitive position?
- What new management philosophies or procedures will be instituted? When?
- What regulatory issues could influence strategic considerations?
- What functional strategies will be employed by the operating units to effect the strategy? Why? How?

Human Resource Issues

- Organization's work place profile. What are the current strengths and weaknesses of the work force? Is the work force technical? Skilled? Flexible? Adaptable? What is the educational background? What do they need to stay current?
- What changes must occur in the job(s), organizational culture, and skill levels of the work force?
- Is the organization's decision to pursue an umbrella strategy likely to result in layoffs or other turnover? How much is anticipated?
- How will union contract agreements be affected? What is the strategic role of the union?
- What human resource development policies should be reviewed/modified for the organization's strategic emphasis?
- What are the training implications of the strategy? Can training help the organization reach strategic goals?
- What training programs are needed? Basic? Technical? Product management? Motivation? In-house training or outside experts?
- How has training been regarded by the workers? By management? How credible are the programs? Trainers? How will these views affect future training efforts?
- What delivery mechanisms are most cost-effective and practical for each training program?
- Do employees have tuition reimbursement? Take advantage of it? How can it be used to enhance worker skills?
- What training evaluation is used? Provides information on return on investment (ROI)?
- Is there a procedure to ascertain if training is appropriate for the new strategy or to identify new training needs?
- Do human resource management functions other than training need to be reviewed? Modified?

When the Strategic Emphasis is on Innovation

- What are the technological, marketing and distribution implications of product development?
- What resources are set aside for R&D? How does R&D staff interact with line managers? Line workers?
- Does the organization create an atmosphere that encourages employees to think innovatively? Is this a safe environment? Is risk taking encouraged? How do supervisors provide feedback? How do they help employees balance ideas? Are employees rewarded for their innovations?
- How does management first react to the new and unfamiliar? How do they differentiate between practical ideas and off-the-wall ideas? Is training needed?
- If an entrepreneurial unit approach is used, how is the remaining work force encouraged to view that team? Is the team accessible? How does it relate to R&D?
- Does the training and development department function as an observer, reactor, or catalyst to innovation? What is the feedback loop?

When the Strategic Emphasis is on Product Development

- What are the technological, marketing and distribution implications of product development?
- How will technical training be provided? Will OEMs assist?
- What creates an atmosphere that nurtures product improvements and spin-offs?
- Will new products fill a niche or break new ground? If new ground, how will sales force get customers to realize they need the new product?
- What training is needed? In-house or outside experts?
- Will subject matter experts need to be identified and trained to assist in the training effort? What are the train-the-trainer considerations (time, cost)?

When the Strategic Emphasis is on Market Development

- Will the organization need to add to its existing work force? Are workers available in the area? What is the supply and demand forecast?
- Will employees take on new responsibilities?
- Can training handle the integration of many new employees?
- Will content experts need to be identified and trained to assist in the training effort? Identify train-the-trainer considerations.
- If physical market expansion such as the construction or purchase of new facilities is planned, are training and development staff involved to offer insights? Will they be on site as new facilities open?
- The sales force is pivotal; what qualifications must new hires have? How will the sales force be trained/retrained?
- If foreign expansion is planned, what are the training and development implications? What and who are the resources? Can in-house trainers handle?

When the Strategic Emphasis is on Turnaround

- How has the contextual picture changed since the organization began retrenchment? What does the organization's industry look like? Stable or evolving? Main competitors?
- How has the organization redefined itself and its goals?
- How will resources be reallocated to support turnaround?
- Does the organization plan to use new technologies or processes?
- Leadership: changed? Implications?
- What shifts in culture, behavioral norms, values, philosophies, or procedures are required?
- Are there any new regulatory considerations?
- What changes must occur in jobs and skill levels?
- Can workers meet the challenges? What training or help is needed?
- Will furloughed workers be recalled?
- What kinds of new hires are needed? Would a different kind of worker be suitable?
- Suggestions for employee orientation of new hires/re-hires?

Trainers must gather quite a bit of information about their organizations before they can credibly advance the notion of integrating training with other strategic considerations. This knowledge base is what top executives mean when they say "You've got to know the business your company is in before you can be a strategic player."The next step is to begin the process of influencing decision-makers by being a trainer and in-house lobbyist.

One approach to lobbying is to build support from the bottom up by establishing visible and measurable links between training and the organization's business goals. This can be done by quantifying return on investment, contribution to productivity, or role in mitigating the costs of integrating new technology and processes. Gather information course by course, write a report and send it to the top decision makers (including accounting).

Seek support in the formal and informal leadership structures. All departments hold opportunity for influence. Create a paper trail by asking other departments about their objectives and what they see as the potential training implications of moving toward those goals. Leadership is more likely to respond to proposals that training be connected to the strategic process if support comes from a variety of sources. In the absence of CEO support, training considerations can only be part of the strategic process when they have a strong institutional underpinning. Sustained integration of training hinges on institutionalized support. In short, a training infrastructure must be built.

Because of the importance of compliance with local, state or federal laws, work to see that training has a direct line with the technical departments that conduct activities regulated by law. Work together to plan for training needs concurrently with on-line and emerging regulatory requirements.

Training the Technical Work Force

"Training the Technical Work Force" (Carnevale, et al. 1990) examines the nature and role of technical training within the competitive and technologically shifting workplace and sets forth specific guidelines for conducting effective technical training programs. The technical work force - includes professionals such as scientists, doctors, and engineers; technicians such as hygienists and draftsmen; and skilled trade or blue-collar workers. Technical workers represent about 18 percent of the American work force and receive about 30 percent of the $210 billion annually spent on training. Technical workers are especially important to competitiveness because they produce the lion's share of internationally traded products and services. They invent and produce technologies that result in the upgrading all workers. The continuous integration of new technologies with more highly skilled labor is widely recognized as the true source of American competitiveness.

Most employers agree that this nation's future prosperity depends on the energy, flexibility, and creativity of a well-trained work force that is knowledgeable, innovative, efficient, and dedicated to quality. However, they are concerned that securing the quality and quantity of technical training required to build the work force is the greatest challenge of all. Ironically, as the workplace becomes more technologically complex, the rising pool of available workers is lacking in many of the simplest and most basic skills, including reading, problem solving, computation, and knowing how to learn.

Technical work requires more education and training than any other work and must be preceded by a grounding in basic skills that prepare workers to understand and acquire the more sophisticated constructs of technical work. This places a premium on the individual who has the basics and is therefore equipped to handle higher-level technical training. Given the demographic picture, building tomorrow's technical worker may mean doing so from the basics up - a costly and time consuming endeavor. All workers tend to receive more training to qualify for their jobs than they do to upgrade their skills. Between 67 and 79 percent of technical professionals and technicians receive more qualifying training than upgrading training. Approximately 50 to 75 percent of technical professionals and technicians participate in upgrading training, but fewer than 50 percent of skilled trade workers participate in skill upgrading.

New, high-technology delivery methods - such as satellite networks and interactive video - make it faster and more efficient for employers and outside providers to work together to train technical employees. The most significant of the high-tech delivery methods, satellite networks, are being used to aid employers in sharing programs and information with each other and allow universities to send programs easily and directly to employer sites.

As a result of this technology, an entire university has been founded, with courses accessed by employees solely through satellite networks. The National Technological University (NTU) is a fully accredited, advanced degree awarding institution that delivers its programs by means of satellite delivery systems transmitted from universities. NTU offers programs leading over ten different master of science degrees. NTU's board of directors is composed of industry representatives who provide consultation on curriculum design and development.

A number of corporations have also joined together to transmit continuing education programs for engineers by satellite. These programs are usually developed internally or with the aid of universities and professional societies. They offer quality, in-depth courses that are on the cutting edge of technology. Course content focuses on current engineering job responsibilities. Technical professionals are among the most highly educated and best trained of the nation's employees. They tend to receive substantial amounts of formal education and employer-provided formal and informal training to qualify for their jobs and upgrade their skills once they are on the job.

Texas Instruments, a manufacturer of electronics products, including peripheral computer parts, with revenues exceeding $4 billion, and Dupont, a diversified chemical and energy company with profits exceeding $27 billion, are two companies that offer satellite courses to their employees and to employees of other organizations. Both offer day-long seminars on development in electronic technology to other companies via satellite. Sharing courses through satellite networks makes technological advancements available to other organizations and encourages the spreading of costs of training and development among organizations.

Health care professionals receive the most upgrading, relying upon schools more than their employers for both qualifying and upgrading training. This suggests that skill needs are not employer-specific and that a stronger bond exists between health care professionals and their professional specialty than between the professional and a specific employer. The Hospital Satellite Network and AREN provide programming in these areas.

Traditionally, companies have played a relatively passive role in training technical professionals, but in recent years competitive pressures have forced companies to integrate the development and design of innovations with production and marketing. This attempt to build more integrated structures is leading employers to play a more active role in the development and delivery of training and human resource development for their technical professionals.

While specific curricula for technical professionals vary widely according to professional discipline and specific application, employer-provided training falls generally into three broad categories:

- New technologies and processes within the specific field of study,
- New applications of existing technologies, and
- New product demonstrations.

The average amount of time spent training technical professionals each year varies by industry with ten days a year reported by industries with very rapidly changing technologies and zero to five days reported by industries with stable technologies. In the survey, the highest average reported was 26 days by a leading manufacturer of semiconductors and microprocessors.

Technicians include employees whose primary expertise lies in a particular technical specialty area and lack the breadth of knowledge in the theoretical aspects of their

specialties that is required of technical professionals. They usually receive training that applies directly to their jobs, with little emphasis on theory. Most technical training is sequential and can be divided into three categories:

- Principles of new technologies (equipment and processing techniques).
- New applications for existing technologies.
- Courses required for licensing and certification or refresher courses required for license renewal or re-certification.

There is a growing consensus among employer organizations that technical training is critical for successful operation within an economic environment characterized by rapidly advancing technology and complexity. Although technical training is considered to be most effective when it is aligned with organizational operations and an integrated part of the corporate strategic planning process, there is no consensus as to the optimal structure and organization for technical training. Disagreements revolve around how to structure training, under which function/discipline it should be organized, what degree of participation it should have in overall planning and what relationship it should have with line operations.

Generally, there are three ways in which employers can structure technical training: centrally, decentrally, or a combination of the two. There is a clear trend toward centralizing control over technical courses. Trainers usually have adult learning or technical backgrounds or are composed of teams with both backgrounds.

ASTD Training Model

The ASTD model (Carnevale, 1990) for a workplace basics training program links three operational components to create a new training model in which the whole performs more efficiently and effectively than its parts. The components include:

- **A plan:** an in-house marketing plan to convince management and union leadership of the need to be active in linking workplace basics training programs to strategic planning and organizational goals.
- **A design:** a modified instructional system design for developing and implementing training programs.
- **A learning method:** a job-specific, performance-oriented learning methodology for training delivery.

Combining these three components results in an applied approach to training in business organizations. The approach takes into account the constraint of resources and the rapid changes in technology and marries them to a state-of-the-art thinking about how to ensure that training is appropriate and relevant, providing the best return on investment.

Carnevale states that research and experience in adult training tell us that an applied approach works best because it:

- Motivates learners by linking learning to improved job performance, which in turn may lead to improvement in learners' careers and earnings.
- Encourages learner retention by requiring immediate and repeated use of newly gained knowledge.
- Improves job performance by creating learning experiences based on actual job needs.

This is a pragmatic, work-based program development and implementation system that can effect positive changes in employees. This practical and systematic training method is the result of two factors: employers' needs for training programs that will consistently improve employee job performance, and emergence of a systematic method for the design, development, and delivery of training.

The recommended approach first proceeds in a step-by-step fashion to measure the gap between job requirements and employee skills. Then human resource professionals create training programs that, when fully operational, are able to translate each job separate duties and tasks into practical learning experiences that successfully reduce or eliminate employee skill deficiencies. The following are brief descriptions of the applied approach activities:

- Investigate in broad, comprehensive terms which jobs and workers need training because of changes in the nature of the work or as a result of emerging workplace problems.
- Advocate (a two-step process) support of a training program to management and senior union officials as an integral part of the strategic planning and goal-setting process.

- Analyze jobs and tasks to determine where the need is and thereby determine what training should focus on.
- Design the program's instructional content, related performance objectives, and criterion-referenced tests. Determine the content's structure and sequence, decide on documentation, and plan for program evaluation.
- Develop objectives that represent the actual learning activities workers need to master and develop documentation and evaluation instruments that measure training's impact on improving an employee's job effectiveness.
- Evaluate the program: first, through program monitoring that provides continuous feedback on how well learners are meeting training objectives on a day-to-day basis; and about three months later, through a program evaluation procedure activated after learners are back on their jobs and have had opportunities to put their newly gained skills into operation.

The following chart graphically displays the applied approach to creating a basic workplace skills training program.

ASTD Blueprint for Success

Step 1. Identify Job Changes or Problems Related to Basic Workplace Skills

- Assess the extent of the need for training because of job changes or problems
- Form a company-wide representative advisory committee
- Perform a job analysis for selected jobs
- Document employee performance deficiencies on the selected jobs
- Identify population to be targeted for training
- Build cooperation with unions

Step 2. Build Support for Training Through Alliances with Management and Unions

- Make the case for skills training in workplace basics
- Build support for skills training in workplace basics

Step 3. Present the Strategy and Action Plan for Approval

- Present the strategy and action plan for training
- Select a training program architect: in-house staff versus external providers

Step 4. Perform a Task Analysis

- Perform a task analysis
- Determine whether to select a quick route through task analysis and determine which process is most appropriate

Step 5. Design the Curriculum

- Design performance-based, functional context instructional program
- Design evaluation system
- Design documentation and record-keeping system
- Obtain final budget approval to implement

Step 6. Develop the Program

- Prepare the instructional format
- Select instructional techniques
- Select facilities site and designate equipment requirements
- Develop evaluation and monitoring instruments

Step 7. Implement the Program

- Select and train the instructional staff
- Develop a learning contract: yes or no?
- Run pilot test (optional)

Step 8. Evaluate and Monitor the Program

- Carry out initial evaluation
- Begin on-going program monitoring
- Advise and consult with management on program status

Adult Learning Concepts

Research into adult learning has identified a number of findings that when utilized, will increase the learner's learning (Knowles, 1987).

Relevance: Adults need to know why they should learn the material. They learn best when they understand how the new knowledge will be immediately useful in their work or personal lives.

Self-Directed: Adults need to be self-directed in their learning. Just as they want to be in charge of their lives and responsible for the decisions they make, they need to have the same power in their continuing learning. They should be encouraged to participate in choosing and planning their own learning activities. Self-Directed learning contracts have been useful to help the learner become self- directed and to help the trainer release his or her traditional authority and turn it over to the learner, thus empowering the learner. Adults will make a voluntary commitment to learn when they experience a real need to know or to be able to do something. They do not respond to an authority figure saying it will be good for them.

Respect: Adults need to have their experience respected and considered as a resource during the learning process. Methods should build upon the experience that the learner already has. Trainers should acknowledge by their speech and action that the learner has other valuable information and that what is about to be Learned will enhance it. There should be emphasis on hands-on techniques that draw on the learner's accumulated skills and knowledge (such as problem solving, case studies, or discussion) or techniques that provide learners with experiences from which they can learn (such as simulation or field experiences).

Problem-Centered: Adults have a task-centered or problem-centered approach to learning. Learning should be organized around real tasks. Rather than teaching writing, the course should be centered around how to write effective business letters and reports.

Motivation: Adults are motivated to learn. They will respond to extrinsic motivates such as higher salaries and promotions, but will respond even more to intrinsic motivation such as the need for recognition, responsibility, achievement and self-esteem.

Process: Adults need to have the process of learning considered carefully. Training should be learner centered. The focus should be on the learner acquiring the learning rather than the instructor transmitting the information. Learning centered learning focuses on transformational learning rather than mimetic (mimicking the instructor). Transformational learning enables the learner to make a change that will have an impact on his/her job or life.

Feedback: Many adults need regular feedback about their learning particular as they embark upon becoming self-directed learning. They want clear learning objectives and want to know regularly the extent to which their objectives have been achieved. As they become self-directed, they will benefit if they have learned how to set the objectives themselves, provide their own feedback through methods which they create which may

or may not involve the trainer providing feedback. Learner centered training fosters the independence of the learner while removing dependence on the trainer.

When new material is introduced, the learner may be dependent. This is because learning that involves new work situations, languages, and some sciences may not be based on content with which the learner is familiar. When the learner has very little prior information, he or she will be more dependent upon the trainer. During this period the learner may need more content structure and feedback until a learning framework is put into place. During this period, the trainer should provide direction in what to study, more external reinforcement and encouragement that the customary amount of learning is taking place and that the student is not "stupid." During this period the trainer may take on the aspect of an expert or authority in the content. The trainer may lecture, demonstrate, assign, grade and test the learner's work.

This is a temporary period of dependency for the learner and the trainer should make every effort to move the learner into the next stage of learning as quickly as possible.

The next stage of learning is marked by collaboration between the learner, other learners, and the trainer. The basis for this stage is that the learner has some knowledge or ideas. By sharing the ideas and working with others, the information can be tested and validated by the learners. The methods that are most useful in this period are interaction, practice, probing of self or others, observation, participation, peer challenge, peer esteem and experimentation. The trainer takes on a peer role and sets an informal learning environment in which the above methods can be utilized. In this stage the trainer can interact, question, provide feedback, coordinate, evaluate, manage and grade the work that is being done.

As the learner's knowledge base increases, the learner will move increasingly toward independence. This stage may also be entered immediately by learners who have previous knowledge or are confident about their ability to learn. The learner will want to continue to search for information on his or her own and may need the ability to experiment with the information, require time to process the information and may require nonjudgmental support from the trainer. Internally, the learner is aware of his or her needs and the process that is being undertaken. It is at this stage that the trainer's role becomes that of a facilitator and provides feedback when it is requested, provides resources and otherwise may act as a consultant by listening, evaluating, delegating or negotiating with the learner.

As an adult educator, one must be able to slip easily between the roles of trainer and facilitator. The temptation always is to remain in the role of trainer and authority figure. This traditional role is easy to maintain because the authority rests with the trainer. It is a hard role to relinquish because it feels good to be in control of the situation and the learners. The hardest role to fulfill and be successful is that of facilitator. Because the trainer/facilitator has been through the training time and again, it is always easier to "tell" the learner what to do rather than to help the learner become a self-directed learner who is capable of telling him or herself what to do. As a facilitator, the trainer has to relinquish authority and control over the situation and the learners in order to empower the learners and to help them become self-directed.

ASTD Policy Recommendations for Employers

- Set overall national targets for employer spending to the levels of human resource development characteristic of successful enterprises. The overall national targets should be increased slowly in two phases:
  - Set an interim target of spending two percent of national payroll (an increase of $14 billion over current expenditures for training and development). This increases total commitments to $44 billion and coverage from the current ten percent of employees to almost 15 percent.
  - Set an ultimate goal of spending four percent of payroll nationwide, (increase of $58 billion over current commitments) or an annual $88 billion increase from the current ten percent to almost 30 percent of employees.
- Integrate HRD into the employer institution; the CEO must make training a priority and make the training and development executive a full member of the senior management team. Make line managers responsible for training and development of subordinates. Make training available to all employees, not just white-collar workers or technical professionals.
- Use an applied approach to developing workplace curricula. Embed learning in work processes.
- Link workplace learning to the performance of individuals, work teams, strategic change processes, and reward systems by communicating work requirements to educators and hiring based on academic performance. Reward employees for learning and contributing new knowledge that results in cost efficiencies, quality improvements, and new applications and innovations.
- Create two learning systems:
  - A training and development structure that teaches employees the required new skills.
  - A training and development system that allows employers to learn from employees to capture cost efficiencies, quality improvements, new applications, and innovations that employees discover during the production, testing, and use of products and services.
- Develop employer strategies and government policies to link employers closely to their networks of suppliers and external education, training, and R&D institutions. Set performance standards linked to learning systems for supplier institutions; require suppliers to provide quality training to customers to ensure effective product/service use; and work with the government to provide resources to conduct R&D on best learning practices that link employers to suppliers and external education and training institutions.
- Communicate new knowledge and changing skill requirements to educators.
- Embed schooling in the career development process by giving more weight to educational attainment and achievement in hiring decisions.
- Work with educators to develop and provide learn/earn curricula that combine academic and applied learning experiences.

ASTD Policy Recommendations for Educators

- Teach future employees how to make decision, solve problems, learn, think a job through from start to finish and work with people to get the job done.
- Link academic subjects to real-world applications.
- Strengthen the link between learning in school and on the job.
- Schools, parents and employers should work together to provide students with opportunities to earn and learn through work experiences structured to complement academic programs.
- The 45 percent of high school students who are tracked into the watered-down general curriculum and the 19 percent who are in vocational courses should have a new curriculum that mixes solid academic basics and applied learning.
- Strengthen the high school vocational system but not in narrow or dead-end job categories, but by preparation leading to further higher education.
- High school vocational education should include a mix of campus learning and carefully structured applied learning at work to accommodate different learning styles and to allow students to learn and earn.
- Bring employers into the education structure by involving them in curriculum development and by providing student records that assess academic performance and behavioral attributes. Bring students into the employer structure by focusing learning and performance evaluation and by de-emphasizing pure reasoning in favor of learning experiences that imitate real-world situations and involve physically manipulating objects and tools.

ASTD Policy Recommendations for Government

- Assign employers a substantial role in planning and oversight of Job Training Partnership Act (JTPA) programs; to emphasize human capital development through work and learning rather than income maintenance; make job performance a key operational component; provide one-stop shopping for clients by coordinating services at the state and local levels.
- Move JTPA away from its "one-size-fits-all" eligibility, treatment, and accountability system. Separate clients, treatments, and evaluative standards into four groups:
  - Target major resources for people who are poor, unemployed and demonstrate significant human capital deficits. Emphasize human development. Base accountability on measured skill changes. Fully fund all services.
  - Transitional services for poor and unemployed people with marginal human capital deficits should include job-search assistance and subsidies, to move them into the workplace. Base accountability on transitions into the workplace. Fully fund all services.
  - Employed workers who need upgrading to keep their jobs should be given retraining jointly funded by public authorities and employers. Programmatic accountability should focus on increased employability.
  - Employers allotted public funds to improve their competitive performance should provide matching funds. Funding should be available for management development supervisory training, and technical training. Disallow funding for executive development or sales training. Base accountability on matching-funds from employers.
- Provide human capital development at resource levels that can improve employability of the disadvantaged; establish eligibility requirements that distinguish between people with developmental deficiencies and those requiring less extensive services; establish programs that offer a sequence of treatments from basic human capital development to transitional services, such as job search assistance and hiring and training incentives for employers: base developmental programs accountability standards on skill acquisition and employability; and base transitional service accountability on job placements and tenure.
- Utilize resources efficiently and provide comprehensive services, by delivering in coherent packages tailored to the needs of individual clients through common intake and eligibility criteria to provide one-stop shopping; base accountability on client progress rather than service delivery.
- Incorporate three principles in crafting training programs for the dislocated: set a higher hitch in the safety net for dislocated employees and help them avoid a free fall from middle-class status into poverty; prior notification, counseling, job search assistance, and out-placement should be encouraged while employees are still on the job. Dislocated employees should receive counseling and job search assistance first and then training when a job prospect is evident or in hand. If possible they should receive training on the job.
- Improve access to training through:
  - A mix of loans and grants for skill improvements paid for by taxes.
  - Use investment incentives to increase the standing of workplace learning.

- o Encourage experimentation and partnerships between employers and government to promote better job-related information and more effective transitions from school into the workplace. d. Encourage experimentation and partnerships between employers and government to promote curricula development that mixes academic and applied learning delivered in class and work; research and development on curriculum and training delivery in particular occupations; collection, evaluation, and dissemination of best practices in training for specific occupations; and development of performance standards for individual occupations. The institutions receiving these grants should be trade and professional associations, unions, schools, and other institutions that represent members of occupations, provide training in occupations, or represent industries with a concentration of employees from particular occupations.
  - o Encourage efficient use of learning institutions through dissemination of model practices and provide incentives for employers to off-load generic training.
- Establish infrastructure to conduct R&D; to inventory, analyze, evaluate and model best practices in job-related learning; and to disseminate results to employers.
- The demand-side approach to improving opportunities for job-related training should be accompanied by a supply-side strategy to increase the capability of suppliers to provide high-quality training to employers and employees.
- Encourage experimentation with training programs intended to upgrade employees in the interest of their own career development and to improve the competitiveness of state and local employers.

Desktop Training and Multimedia

There's a revolution coming for corporate training in the form of multimedia for training. A Department of Defense study on interactive video instruction stated that interactive video instructions improves achievement by an average of 38 percent over more conventional instruction, while reducing time to competency by 31 percent. The study included all instructional setting and applications. The study also found that in almost every case, interactive video was less costly than conventional instruction (Fletcher, 1990).

Low-cost digital video is a reality along with authoring tools that will enable trainers to assemble easy to use desktop training modules for just-in-time training. Desktop videoconferencing products are available which will allow easy access to trainers. The revolution in desktop training is enabled through wideband infrastructure throughout the building and between company sites. Tremendous compression abilities are needed.

Desktop video provides the ability to easily capture audio and video clips, text, still images, graphics, charts and other materials and assemble them into a multimedia piece that can be accessed from the desktop and played when necessary.

Besides the ability to provide training when it is needed at the employee's workstation, multimedia has the very great advantage of providing the training in a mode that is likely to meet the employee's preferred learning style.

Case Study

The IBM Approach to Training Through Distance Learning: A Global Education Network by the Year 2000

For IBM, worldwide pressure to contain costs and provide education when and where it is needed has fueled the move away from traditional classroom delivery to use of technology such as satellite and self-study. IBM spends over a billion dollars on training annually, an average of 10 days per employee. Satellite education accounts for about 10 percent of this total, self-study for about 30 percent and traditional classroom education for the rest.

The company's two educational satellite systems evolved as changing conditions within the company and a highly competitive business environment created pressures to use the most effective teaching strategies. IBM wanted to educate customers and train employees quickly, effectively and at reduced cost.

In 1983, the Interactive Satellite Education Network (ISEN) grew out of the IBM marketing organization as an extension of a local closed-circuit television capability created to handle large classes and broadcast to customers, and branch-office employees. ISEN's success and the need to offer education to IBM plant, lab, and headquarters employees across the country led to the operational version of the Corporate Education Network (CENET) in 1987. ISEN and CENET use different satellite networks, but have a common strategy and management system. Over the last three years, the system and the number of students has doubled in size; the savings in travel and living expenses amounts to over $15 million and represents a return on investment of over 30 percent. The network also generates several million dollars of customer-education revenue for IBM annually.

The network broadcasts 12 concurrent courses to 238 classrooms at 49 locations. Each day, about 100 students view one of nine courses on the networks, with up to three courses offered at each location. Audiences include a full range of employees. The networks use an interactive digital multimedia technology that converts two full-motion analog video signals into compressed digital form, encrypts them, and transmits them to the satellite. At a receive site, the signal is decoded and converted back to an analog TV display. The system includes two one-way, full-motion color video pictures; high-quality two-way audio; and digital keypad response units over a secure network. The compression allows a reduction in satellite bandwidth by a factor of 10 compared to similar analog satellite systems. The system was designed to make it easy for students to ask questions and for instructors to effectively use multimedia in their courses. Due to the network's success, IBM units worldwide have installed education networks. Japan, Australia, the United Kingdom, France, and Germany have networks in place.

All of IBM's successful satellite courses incorporate critical factors in the development process which include effective visuals, interaction that holds the students' attention and reinforces key learning points, all based on instructor and administrator training. They are constantly learning from their satellite efforts and each step takes them closer to their vision of the future for distance learning.

The next decade will allow for a global education network utilizing interactive digital multimedia. Workstation-to-workstation communication may replace studio-to-classroom communication. Education courses will be stored for easy student access, allowing learning to take place where and when it is needed. Education will be more modular in order to focus on a single learning point, accommodating small chunks of education in less than one-hour sessions. As automated knowledge capture and instructional design emerge, the plan is to tie them to student learning history and needs profiles.

IBM has defined its long-range plans for corporate education in "A Vision of IBM Human Resource Performance in the Year 2000." The rationale for the changes reflects the competition of global economy and the multicultural work force. Above all, education will be self-directed shifting control of the learning to the student with distance education technology playing a key role in supporting this vision. The changes that are predicted at IBM will drive the future of IBM internal education:

- Diverse student base -- different ages, cultures.
- Diverse skill base -- varying levels of expertise/experience.
- Changing skill requirements - new technology and changing customer needs.
- Information overload -- pace of technological change.

The critical characteristics of an education system designed to address these drivers are:

- Distributed learning -- takes place when and where needed.
- Modular focus -- on a single skill.
- Multisensory stimulates -- multiple senses in a variety of ways.
- Nonlinear -- fixed sequence of modules.
- Transferable -- easy movement across language/cultures.
- Responsive -- short development cycle.

The prediction of the report is that technology will play a key role in meeting the education needs and that IBM's education system in the year 2000 will include computer managed libraries of digital education modules delivered through the employee workstation. "Because learning activities must be so closely linked to performing, there must be little distinction between systems used for formal education and those used in the execution of work duties. In fact, learning will typically take place as part of the job process by means of embedded advisors, online consultations, or database searched in addition to learning that results from formal education modules." The major characteristics of IBM's Performance/Learning Support Systems are:

- Supports individual and team ability to function internationally.
- Encourages employees to be innovative and creative in their work.
- Makes learning a central and integral aspect of every person's job.
- Supports changing market and organizational priorities.

IBM's goal is to have students involved in classes that meet electronically by way of video/computer conferences. Assignments will be given and completed using electronic mail, and information resources will be the databases available through the network.

Guest instructors (internal or external) will be "patched" into the network for lectures or interaction. Automatic translation tools will facilitate the interaction of students and instructors speaking different languages. At any hour of the day or night, a significant proportion of the IBM work force will be using the Global Education System. The information-handling skills acquired by using the Global Education System will be an "important aspect of learning to `learn' - a key skill in the year 2000."

Case Study

Hewlett-Packard's Distance Learning System Delivers Training at One-Half the Cost of Traditional Classes

"Traditional training methods imply a logjam of manufacturing and logistical delay," according to Tom Wilkins, Distance Learning Systems manager for Hewlett-Packard. "Between completion of course materials and delivery, a critical gap develops, sometimes as long as six months. The longer it lasts, the more likely it is that they will be outdated before they can be delivered to the students." The interactive classes developed for Hewlett-Packard's Information Technology are designed to close that gap and bring the interactive intimacy of classroom training to the field worldwide.

Hewlett-Packard's Information Technology Education Network (ITE-Net) is a pace-setter. In an industry-wide race to master this powerful medium, Wilkins has developed a network that can leverage limited expertise and can greatly reduce the time to retrain a large, geographically diverse population.

At the touch of a button, students from over one hundred classrooms worldwide are in direct contact with their teleclass instructor. The system provides instantaneous two-way voice communications between instructors and students. Instructors also receive immediate feedback from compiled student responses to numeric or multiple choice questions through a student response keypad system.

Spacious field classrooms can accommodate 1200 students in comfortable learning environments. Most major metropolitan areas have a conveniently located Hewlett-Packard office with the capability of receiving interactive instruction. A secure communication channel ensures privacy for marketing, support management, engineering, and customer training. The experienced ITE-Net staff can advise instructors on all aspects of teleclass delivery - from initial course development through to final production. Instructors are free to teach, with all aspects of the television production handled by the ITE-Net crew who view the class through a one-way mirror. Professional graphics are produced by talented technical illustrators and graphic artists.

The ITE-Net Uplink facility, located in Cupertino, CA, is a state-of-the-art system. For the instructor it features a fully integrated system which can be accessed by touching the screen of a video display. This consistent interface with the system enables instructors to easily use and control a vast array of educational tools. which include stored graphics, remote cameras, videotape roll-ins and drawing tablets. The instructor is positioned at a command center console. Through the console, the instructor can link to any of the remote classrooms and can involve students at remote locations, either with voice or data feedback systems. The console empowers the instructor to answer a

question asked a continent away, to immediately display the slide that illustrates the issue, to zoom in on a precise portion of that slide and annotate it, and to prove the point with an online example. Seven television cameras are used to display the activities occurring in the classroom as they happen.

Students have equal access to the system and it gives them the sense of personal involvement that is critical to successful learning. The student response system places students at each reception site in immediate person-to-person communication with the instructor and fellow students through linked microphones embedded in their desks. They can electronically raise their hands, signaling a desire to be heard, ask questions, and enter into discussions at will. Another feature, a data collection ability, enables the instructor to ask questions of groups of students and display the tallied results on screen.

Wilkins feels that the ITE-Net's powerful facility is the "best available in the industry today" and that it places Hewlett-Packard "well ahead of the competitors who are struggling to keep up with the training demands of a dynamic industry." Wilkins says that the ITE-Net can "deliver educational programming for about one-half of the cost per student contact hour compared to centralized training. ITE-Net lets the instructor step out of the past and into the future of technical education, and to gain strides on the competition. Educational technology "presents the only clear answer to the emerging demands of the nineties, to constant, transformational change in products, in customer requirements, and in the skills and knowledge needed by Hewlett-Packard employees to support tomorrow's customers."

After the production of a course, video tapes are prepared for shipment. ITE-Net's lending library was created to make tapes available within two weeks of broadcast. A master set of course materials accompanies each borrowed videotape.

During its first two weeks on the air in 1987, ITE-Net broadcast training to 20 U.S. sites and a simultaneous taped class in Bristol, England for 300 commercial support engineers. Wilkins observes that traditional training classes would have taken 18 months to achieve the same results.

Wilkins believes that in the not-too-distant future, Hewlett-Packard training will be delivered to the employee's workstation. Wilkins designed ITE-Net and his projections of just-in-time learning delivered directly to the user is based on the needs he had for immediate information in his former career as an Hewlett-Packard support engineer. He envisions that a future workstation system would enable employees to access information needed to complete a current task. Through an educational center, the employee would request educational modules to be shown on the workstation monitor. Text or content materials would be printed as needed and tests would be included in the module which could be tracked over time to build up the history of effectiveness of the module as well as track the learning history of the student.

The ITE-Net has changed the way that Hewlett-Packard provides training to its worldwide group of employees. The promise for the future is that it will continue to evolve to meet the demands for just-in-time training delivered to the workstation

enabling its employees to meet the demands of an increasingly competitive global marketplace.

Case Study

NTU digital compressed video an Integral Step Toward On-Demand Delivery of Education at the Workstation

The National Technological University (NTU) made a giant technological leap by replacing analog transmission with digital compressed video delivered via satellite. The conversion is the first of its kind in the U.S. to integrate modern instructional technologies over a large, nationwide system. NTU designed an enhanced and proprietary ITV delivery system using the SpectrumSaver Satellite Based Broadcast Television System developed by Compressed Labs, Inc. (CLI). It is an integral step to on-demand education at the workstation. NTU offers master of science degrees in ten engineering fields. It has 41 participating universities and 385 sites in 130 organizations.

While the primary interest in the conversion has centered on the digital technology, Dr. Lionel Baldwin, NTU president observes that it is an especially powerful example of human networks employing a complex package of technology networks to address a pressing need; the continued advancement of knowledge within the community of technical professionals and managers."Enormous forces have been "buffeting even the most established and respected institutions," Baldwin states. "Because of these conditions, new ideas and new ways of doing things are not only acceptable, they are being sought out by public and private leaders." Because NTU is a relatively new idea and a new way of doing things for many organizations, it "continues to grow `in spite of' and also `because of' today's tough environment."

The NTU digital satellite network is an ideal testbed for advanced instructional technology. Its human networks and technology networks form an infrastructure of outstanding instructors supported by technical staffs and state-of-the-art ITV facilities and, in many instances, workstation and computer networks. The NTU digital satellite network links these resources to a distributed learning environment.

Several NTU sponsors share a vision of an interactive, on-demand delivery of enhanced educational services nationwide by the year 2000, and will support the movement of NTU toward this goal with expert advice, operational personnel resources and special equipment. They see it as education to compete in the new global economy. "As the technological network goes all digital, as our human networks increase and improve, as our member universities become regional NTU distributors, and as NTU becomes a strategic partner with its corporate counterparts, NTU will become an increasingly significant force for strengthening U.S. engineering, management and technology in the global economic competition," according to Thomas L. Martin, Jr., former chairman of the NTU Board of Directors.

Martin said that collectively, the trustees, staff and member organizations have begun to have a new vision for NTU as a "transnational university, a significant force promoting U.S. technological competitiveness in the global economic system through strategic partnering with the transnational corporations which are NTU's principal clients. To this

end, international initiatives accelerated in Italy, Canada, Mexico, Australia, Japan, Korea, Turkey and Austria. Baldwin says that their goal is to "provide a two-way linkage so that U.S. technical professionals can have ready access to best practices abroad."

Marvin Patterson, director of Engineering, Hewlett-Packard and an NTU trustee, says that the goal of strategic partnering is to achieve "just in time" delivery of information by knowing what information is needed, when it is needed and getting it there on time in the most convenient and accessible form.

For this to occur, Martin said, NTU member companies must "include key NTU officers, program directors and faculty in their strategic planning processes so that the University can focus its resources along congruent and intersecting paths."Corporate officers must seriously regard NTU "as another critical asset at their disposal in achieving corporate objectives and must deploy that important asset constructively in their strategic plans. Parochial shackles limiting transfer of graduate course credits between NTU universities will have to go. NTU universities that are regional ITV operators should become regional NTU distributors so that all regions of the country can have full access to the entire range of program offerings available through NTU, both for degree credit and for professional development."Martin feels that the conversion may "pull the regional ITV systems into compatible digital systems. The resulting national digital delivery system with video, audio, data, facsimile and computer compatibility would provide an unparalleled national resource for the career-long education of engineers and managers" and a testing ground for new educational technology applications.

Gerald D. Prothro, assistant general manager of IBM U.S. Education, points out that: "As a customer, I want the best education, broadcast signal quality, educational delivery and education content, all at the lowest possible cost. NTU is working on these objectives Prothro said, "and the network digital upgrade promises to improve their capabilities ever further. NTU is today, and will be tomorrow, a vital adjunct to our own educational offerings."Prothro added that "since NTU and its member associated schools are the only university system which meets or is planning to meet these requirements, IBM strongly supports NTU and their efforts."

"Because of the very large financial investment and some potential technical uncertainties, this is an enormous, ëbet the company' kind of decision," Martin said, but they are convinced the potential benefits outweigh the risks.

NTU will become an increasingly significant force for strengthening U.S. engineering, management and technology in the global economic competition."The CLI system provides breakthrough economics in satellite based broadcast television and promises to revolutionize opportunities for NTU and other distance learning organizations which want to offer a broader curriculum more efficiently, flexibly and cost effectively.

NTU converted to digital because its future growth was being impacted by the technical and economic constraints caused by a lack of satellite transponder time. NTU has been a pace-setter for institutions delivering instructional television via satellite and will continue this role as a compressed video "testbed." A pioneer of the half-transponder format in distance learning, NTU has been broadcasting four channels of programming simultaneously over two satellite transponders which was not enough and led to course

exclusions and tape-delayed classes, explained Tom McCall, director of the NTU Satellite Network. "Initially, we will support four channels," McCall says, "but by next summer we plan to move all night time and weekend broadcasts into weekday-daytime hours ó all on one satellite transponder."

"The elimination of NTU's second transponder will cut its transmission costs in half, saving more than $1 million annually, "according to McCall. By tripling the network's capacity, NTU can broadcast all credit courses live, and provide faculty-student interaction over telephone lines during the program. "This frees the evening hours for a greater variety of seminars on demand, helping us do a better job of meeting the needs of our large numbers of continuing education students."

The NTU System

Baldwin said that the goal "is to convert NTU transmission to a state-of the-art digital system. We will use this breakthrough to improve the quality and timeliness of NTU service."He expressed confidence in the hardware NTU has selected and said he believes that although the technology is rapidly evolving, the NTU system is robust and will serve as a standard until long after a more powerful satellite comes on line for NTU in 1995. The technology will assure the continued technical vitality of the NTU network and create opportunities to expand and improve service. The total cost of the project is expected to exceed $5 million. NTU was awarded a $1.5 million grant by the Defense Advanced Research Projects Agency (DARPA) as matching funds for the installation of a state-of-the-art, high-bandwidth, digital compressed video and data system at NTU government sites and member universities.

NTU receive sites acquired a four-channel integrated receiver/decoder (IRD) from NTU. The unit was dubbed the NTU subscriber unit ó NSU. In most cases, all other components in their downlink system will remain the same. Each NTU uplink will install an encoder to complete the network conversion.

The SpectrumSaver Encoder digitizes and compresses the video so it can be transmitted in just over 2 MHz of transponder bandwidth, a fraction of that required for analog video. Reducing the bandwidth also reduces the transmission costs. This will allow NTU to fit as many as 15 channels on a single satellite transponder (systems can be configured with up to 18 digitized channels as compared to a maximum of one to two analog channels). The NSU gets its input signal from the satellite antenna which contains the digital data stream that the IRDs convert to analog television with associated audio. The system control channel, an NTU proprietary feature, enables the transmission of facsimiles, VCR commands, and computer data. NTU has designed into the system a capability to set and control receive frequencies of all NSUs from NTU headquarters in Fort Collins, CO. All of these value-added features are delivered via satellite.

The 60 pound NSU is portable and uses 110 volt, 60 cycle power. It requires no special environmental temperature or humidity controls. It costs just under $9,000, but the cash purchase price to an NTU site is $8,500. The receiver cost per channel has dropped by a factor of 15 to about $2,000 per channel.

The enabling technology was created in early 1990, when U.S. innovators developed three new VLSI chips that make it possible to transmit video in an enhanced compressed digital format which provides a much clearer video image that is immune to ghosting, drop-outs, color smearing, and "snow" associated with standard analog broadcast techniques and older digital compression technologies. The new VLSI chip design employs greatly improved discrete cosine transform processes and, with better motion compression algorithms, it is now possible to produce compressed digital video that is equivalent to existing consumer analog video. The new compressed video format is a very robust, noise free, high-quality, full motion medium. Intensive tests have been conducted and McCall says the quality of the video images received at the downlink sites have been "consistently superior" to the corresponding analog signals, even under varying atmospheric conditions.

Each receiver is uniquely addressable via the satellite, with 32 discrete, changeable program keys that allow unlimited, highly secure cross-networking. A conditional access system with digital encryption, controls which programs are received at a network site (any combination of video, audio and data). A number of independent networks can be simultaneously supported. Programming can be uplinked from many different locations simultaneously through a common transponder, then downlinked to any SpectrumSaver receive site. By placing multiple channels on a single transponder, programmers will find it easier to implement cross network applications. Other system features include simultaneous facsimile transmission and a 19.5 Kbs data transmission line. System development and tests began in January, 1991.

NTU trustee Marvin L. Patterson, director of corporate engineering, Hewlett-Packard sees NTU as the underpinning for the just-in-time education work station and paving the way for education on demand. "A way of wrapping the reasons behind my endorsement for this transition can be best expressed in the form of a vision. Imagine, say, five years from now, an engineer is working on a project. Suddenly, one afternoon, he discovers that he needs knowledge about a new design technique and also the standards related to that new design technique - information he's never worked with before in his career, but it's absolutely in the critical path to his project. He puts in a request to NTU for all of the courses that relate to this area of information. A library search occurs on his behalf, and the information is downloaded, either via satellite or some other communications mechanism, but in digital compressed form, and directed right to the engineer's workstation. The engineer happens to be away at the time, but the workstation automatically stores the courseware on local optical storage. On his way to the airport, the engineer swings by his office, picks up the CD that has been created with this courseware on it, and then on the airplane en route to his destination he reviews these courses and gets the information he needs using his laptop computer. This might sound a little bit farfetched, but the shift to digital compressed video that NTU is currently undertaking is an underpinning that could enable all of the things that I've described."

The goal of NTU's strategic partnering is to achieve "just in time" delivery of information and knowledge by NTU to its industrial partners. Knowing `what' information and knowledge are needed, `when' they are needed and getting them there on time in the most convenient and accessible form is the objective of NTU strategic partnering.

Case Study

Pacific Bell

Cyril Tunis, Pacific Bell's executive director of Education and Training, has revitalized training and education by adding distance learning to the methods used by the telephone company. He combined open customer communications with cutting-edge technology. It has been a success despite budgets cuts and downsizing.

Now, there are over 100 classes and each has an average attendance of 100 students. This equates with 10-15 percent of Pacific Bell's total training hours now and it may rise to 30 percent in the future. With distance learning, students can learn at any of the company's 16 classroom sites. Everyone can have the training when it is offered on the first day; new training can be put into effect immediately across the state and employees don't have to wait for the instructor to get to their site. Essentially, the courses are the same ones that were taught by traveling instructors. Some hands-on training did not adapt to the medium, but most courses adapted readily and were redesigned for television.

According to Tunis, It's better for the instructor to stay in one place and interact with 100 people than to go around to 10 places and talk to 10 people at a time because 100 people get to interchange their experiences with one another. "We're finding that we are, in a sense, building a technical communications link. Each broadcast is more than a course because we can solve problems in the course. For example, ... we were giving a course on a new product that had some installation problems. The group talking the course was able to discuss those technical problems and broaden everybody's understanding of how to repair and avoid the trouble. It was like a 100-way telephone call."

Without the distance learning program, instructors would be required to go to the students throughout the state and talk with a groups that average ten or fewer students. Tunis reports that distance learning is much more cost effective.

The courses are transmitted via the company's fiber network. Classes are one way video and two way audio. Students can see and hear their instructor, as well as talk with him or her. Most programs are two to four hours. Full-day programs tend not to hold students' attention.

Tunis evaluates the programming according to the program's importance to key business strategies. Courses that pertain directly to business priorities are rated for return on investment (ROI). Others are rated on attendee reaction, attendee skill and knowledge and applicability. Tunis believes that this has helped build acceptance for the program.

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