Chapter 7

Adult Education and Displaced Workers

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software) can help adults learn faster and better than they typically do in conventional classes. In some controlled studies of adult basic education and technical training, CAI has been found to reduce instruction time by 25 percent or more, compared to conventional classroom instruction, Also, the adults in these CAI classes did somewhat better on tests than the adults in the control groups.

Several factors in addition to the computer have contributed to the success of CAI basic education projects, Some of these projects benefited from closer attention to project design, greater efforts to encourage participation, and more training of volunteers than is typical in most adult education classes. In CAI projects, the computer rarely stands alone. Rather, it is used in conjunction with classroom instruction, or tutorial assistance from a teacher or trained volunteer. The quality of the human contribution has a substantial effect on the outcome.

More evaluation of such projects is needed to determine how these success stories can be replicated dependably by others. So far, few adult basic education projects use CAI, and most of the controlled studies of CAI in adult education are a decade or more old. Initial information from more recent CAI projects suggests that many of these projects also have been successful; however, few formal or independent evaluations of the projects exist, and consistent, comparable measurements of learning gains are not available. Many new courseware products are being introduced, but few of these were specifically developed for adults, and some are of questionable quality. Evaluations would help new users in applying CAI effectively and in determining which courseware products work best.

Instructional technologies can make an important contribution to vocational skills training and retraining programs for adults, and to efforts by U.S. business firms to maintain and upgrade the skill level of their work forces. The potential of instructional technology to reduce training time makes them especially attractive to industry.

Applications for interactive videodisk systems seem highly promising for a wide variety of vocational skills training applications. Initial use of these systems has been in highly specialized training by the military or industry. Although few evaluations have been done outside of these specialized applications, the characteristics of this technology—its ability to engage the student, to present high-quality visual images, and to offer large flexibility in branching–are well suited for use in industrial skills training. Some vendors of industrial training products and services are beginning to offer generic skills lessons (e.g., for electronics theory and repair) on interactive videodisk systems. Interactive videodisk systems also hold distinct promise for use in adult basic education, provided more work is done to develop courseware that makes full use of the advantages presented by the medium. Courseware also needs to be developed for the mature, adult student in the civilian population.

The Federal Government can assist efforts to apply and adapt instructional technology to the needs of adults by sharing more of its own training products and experience with the private sector and educational institutions. There is growing interest in improving the diffusion of federally sponsored training and educational technologies to the private sector and educational institutions.

Many instructional technologies were initially funded by the Federal Government, especially the military, which was instrumental in the early development of computer-based instructional programs, interactive videodisk systems, and various simulators and emulators used in training programs. Most of the specialized skills training done by the military is in areas which have private sector counterparts, such as aircraft maintenance, electronics, and communications, and the military in some cases has used instructional technologies to teach these skills. The military is also a leader in developing new courseware for delivering basic skills education.

The Federal Government also is a major source of funds for adult basic education pro-

grams, picking up one-third to one-half the costs of State and local remedial education projects. Also, due to changes made in the Federal vocational education program in 1984, States must now set-aside part of their Federal vocational education grants to increase educational opportunities for adults. The Federal cost-share for such projects can range from 50 to 100 percent.

While it is not a major source of funds for most other kinds of continuing education, the Federal Government does play a large indirect role. Federal student aid programs support some adult students, private employers' expenses for work force training and education can be deducted from Federal taxes as a normal business expense in the tax code, and individuals can also write off tuition expenditures for courses that are directly related to their current jobs. In addition, under a tax provision that will not apply in the 1986 tax year unless extended by Congress, tuition and other educational assistance provided under a qualified company education program cannot be considered income to the employee for tax purposes. As an employer, the Federal Government—especially the military—also is the country's largest provider of education and training to adult workers.

CHANGING CONTEXT OF ADULT EDUCATION AND TRAINING

A strong commitment to education has existed in the United States since its founding. However, formal education has not always been viewed by employers as a key factor in hiring decisions for most jobs. In 1940, half the labor force had a ninth grade education or less. With the massive commitment to education following World War II, the average number of years spent in school among U.S. citizens rose very rapidly. Today, roughly four-fifths of those in the labor force who are 25 to 64 years old have at least a high school diploma, and nearly one-fourth have 4 years of college or more.[4] Those who did not graduate from high school are at a disadvantage in the labor market.

There also has been a large increase in adults who continue their education after high school or college. Between 1957 and 1984, the proportion of adults taking part-time education grew from 7.6 to 13.5 percent of the adult population. These part-time students cited job-related reasons for 62 percent of the courses they took in 1984.[5] Some view this growth as evidence that education is now a lifelong endeavor, helping workers adapt to changing job conditions, obtain promotions and make career changes at various stages of their working lives. Most of the adults who take advantage of education opportunities, however, are already well educated, and are in professional, technical, and managerial jobs in which the value of education is clearly recognized. (See box 7A.)

Blue-collar and nonsupervisory white-collar or service industry workers are much less likely to participate in adult education. While some of these workers do take advantage of continuing education to help them change jobs or advance within a company, education and training often has limited relevance to their current jobs. Others may have had negative experiences with education in childhood, and do not see it as relevant to their adult lives. Some of these workers do not have broad, transferable skills that would help them change jobs within a firm, or secure another job if displaced, and some have serious educational deficiencies that prevent them from developing such skills.

[4] Burt S. Barnow, ***The Education, Training and Work Experience of the Adults Labor Force From*** 1984 ***to 1995*** (Washington, DC: National Commission on Employment Policy, June 1985), pp. 7-9.

[5] 'Preliminary, unpublished data from the May 1984 survey of participation in adult education, as provided by the Office of Educational Research and Improvement (OERI, formerly the National Center for Education Statistics), U.S. Department of Education. OERI, through the Census Bureau, surveys participants in adult education (defined as part-time students over 17 years of age enrolled in an organized course of instruction) every 3 years.

Box 7A.—Who Participates in Adult Education and Training?[6]

About 23 million people over the age of 17, or 13.5 percent of the adult population of the United States took part in adult education in 1984, studying part-time at a school, or taking another form of organized instruction (e.g., in-house training courses offered by employers).[7] Almost 20 million of these part-time students were in the labor force, and, of these, about 17 million were 25 or older. Slightly over half these adults were under the age of 35. About 55 percent of adult education participants are now women, in contrast to 15 years ago when they were outnumbered by men (48 to 52 percent).

People in adult education tend to be more educated, more affluent, and more likely to be professionals and managers than the population as a whole. About 37 percent of all professionals took adult education in 1984, as did 24 percent of all managers and administrators—a reflection of the widespread provision of management seminars and continuing education courses for people in such occupations. Technicians and people in related support services also had high participation rates (about 29 percent in 1984). Only about 10.4 percent of blue-collar workers took part in adult education.

People with the most education are far more likely to take adult education than those with fewer years of school completed. One third of those with 5 years of college or more participated in adult education in 1984, compared to only about 2 percent of those with less than a ninth grade education. Participation rates also increase with income: only 8 percent of those with family incomes of less than $7,500 per year took part in adult education, compared to about 31 percent of those with incomes over $50,000.

Employed adults are far more likely to participate than the unemployed. Among those in the labor force taking adult education in May 1984, only 4.3 percent were unemployed. This compares to a national unemployment rate of 7.1 percent among those 17 and over at the time. Participation rates among the unemployed have hardly changed since 1969, while employed people are now more likely to participate. Only 4.3 percent of the unemployed took part in adult education in 1984, compared to about 18 percent of employed people. Several factors contribute to this difference, including the greater level of disposable income among employed persons, and the significant role employers play in the adult education system. For example, employers often pay for job-related courses taken by their employees, and some employers have education assistance programs that help employees pay for courses that are not job related.

With some exceptions, the pattern of training and education provided by employers to their workers follows the general pattern of adult education. College graduates receive the most training, whites get more training than blacks, and more training is for business and management than for technical or trade occupations.[8] In general, better educated workers receive a disproportionately large share of the training: workers who had less than a full high school education accounted for 28 percent of the labor force in 1983, but made up only 5 percent of the trainees that year.[9]

Employers provide most education and training to workers in high skill and high status jobs. White-collar workers receive three-quarters of the formal training, though they are only half the labor force. Professional and technical workers get a share of training twice their share of the labor force. Among blue-collar, service, and farm workers, only one occupational group—[illegible]—got a share of training roughly proportionate to its share of the labor force in 1983. Blacks are less likely to be in professional, technical, and managerial positions than whites and receive less training.[10]

[illegible], Michael Tierney, and Ivar Berg, *[illegible] Sketch of Employer-Provided* [illegible] report submitted to the National [illegible] Contract No. 400-81-[illegible] Research Institute of the University of Pennsylvania, Philadelphia, June, 1983), p. 8.

[8]Anthony Carnevale and Harold Goldstein, *Employee Training: Its Changing Role and an Analysis of New Data* (Washington, DC: American Society for Training and Development, 1983), p. 55.

[9]Ibid., p. 53.

[6]Unless otherwise noted, all 1984 data in this box is published or unpublished data from the May 1984 survey of participation in adult education provided by the Office of Educational Research and Improvement, formerly the National Center for Education Statistics, through the U.S. Census Bureau.

[7]Full-time students are not counted in these estimates (unless they also took a part-time course in addition to their full-time studies).

Implications of Demographic Change for Adult Education and Training

Demographic trends will significantly affect adult education and training requirements over the next 15 years. The adult education system will need to focus more attention on people in the mid and late stages of their careers, as the baby boom generation (people born between 1946 and 1964) move into midcareers in 1arge numbers. As is discussed in chapter 4, most of those in the baby boom have already entered the labor force.

Because baby boom workers greatly outnumber those born after them, an estimated three-fourths of the people who will comprise the labor force of the year 2000 are already in it. The labor force will also become much older than it is today. According to one analysis, middle-aged workers (those 35 to 54 years old) will make up nearly half the labor force at the turn of the century, compared to 35 percent in 1982.[11] Younger workers [those between 18 and 34) will decline from 48 percent of the labor force, to 37 percent in the year 2000. Since the number of middle-aged workers is growing as a proportion of the work force, human resource development programs will need to focus increasingly on this group.

It is also expected that women, who have traditionally received less training then men, will continue to increase their labor force participation rate, although perhaps more slowly than in the past two decades. In the year 2000, according to the above analysis, women will comprise 48 percent of the labor force, compared to 44 percent in 1982. Even though the number of workers under 35 will decline, current projections suggest that young women, many of them black, will comprise a growing proportion of this age group.

Workers who are 55 and older are not expected to increase as a proportion of the work force in the year 2000, even though people in this age group will increase in the population as a whole. However, this assumes that the current trend toward earlier retirement will continue without important changes in national retirement policies. Beyond the year 2000, older workers will make up a growing proportion of the work force, as increasing numbers of people born between 1946 and 1964 reach the age of 55.

Education and the Ability to Gain Employment

Since 1940, the median time spent in formal education among U.S. adults has increased from 8.4 to 12.6 years of school. Among young adults (those between 25 and 29) the increase in time spent in school is especially striking. In 1940, six out of ten workers in this age group had not graduated from high school, and only 6 percent had a college education or more. In 1984, all but 14 percent in this age group were high school graduates, and one in five had graduated from college.[12] Although the increase in the proportion of recent high school graduates entering college appears to be tapering off, the average number of school years of people in the labor force will continue to increase as workers born before World War II retire or die.

The increase in number of years of school has occurred in all major occupational areas, and therefore cannot be attributed simply to rapid growth in professional, technical and clerical jobs. About two-thirds of the male blue-collar workers who were employed in 1982 had completed at least 4 years of high school, and many have spent some time in college. About 56 percent of the employed male laborers were high school graduates in 1982, compared to 27 percent in 1970.

It is difficult to generalize about how much of this increase in length of time spent in formal education is actually needed in the performance of jobs. In many instances, job requirements have become more sophisticated,

[11] As discusser in Malcolm H. Morrision, "The Aging of the U.S. Population: Human Resource Implications, " *Monthly Labor Review,* May 1983, pp. 13-19.

[12] All figures cited in this paragraph are taken from Dave M. O'Neil and Peter Sepielli, Education *in the United* States: 1940-1983, U.S. Department of Commerce Bureau of the Census CDS-85-1 (Washington, DC: U.S. Government Printing Office, 1985), pp. 45-49.

so that workers with more education are needed. In other cases, employers may reject job applicants who have not graduated from high school because of an assumption that high school graduates may be more productive and capable than those with fewer years of schooling. (See ch. 8 for discussion of the effects of technology on the nature of jobs.)

Using education to "screen" job applicants is largely a post World War II phenomenon, when education began to be seen as a work prerequisite not only for professional and white-collar jobs but also for many apprenticeship programs, and skilled or semiskilled factory jobs. Even for laborers, some employers hire only high school graduates among job applicants. While such policies obviously make it more difficult for the less educated to find jobs, they are not totally arbitrary. Deficiencies in basic education, poor oral communication skills, and inappropriate work attitudes are a major problem for U.S. businesses. The problem extends to many who have graduated from high school and even college, but tends to be greatest among those with fewer years of formal schooling.

Education and Income

Strong correlations have been drawn between work force participation rates, employment levels, and number of years at school. The labor force participation rate for those who have not completed junior high school is less than 40 percent, compared to 68 percent for those with a high school diploma, and 77 percent for college graduates.[13] In March 1984, according to the U.S. Department of Labor, the unemployment rate among college graduates stood at just 2.7 percent, compared with 7.2 percent for high school graduates and 11.6 percent for those with 8 years or less of schooling. The unemployment rate among high school dropouts was even higher, 12.4 percent. One reason for this strong correlation is that workers with less education are also more likely to be in occupations that are subject to high unemployment.

Many studies have found years of school to be strongly correlated with lifetime earnings and with upward occupational mobility. These correlations were especially strong during the 1950s and early 1960s, During the 1970s, most estimates of rates of return from investment in education declined from their high point in the mid-1960s.[14] The income gap between college graduates and high school graduates without college diplomas narrowed, possibly reflecting the large number of baby boom people entering the job market. This situation may have been temporary in nature: very recent data (covering the period 1979-83) show the median income of male college graduates once again increasing relative to the income of high school graduates, at least among males who were 25 to 34 years old.[15] Attempts to disaggregate estimates of economic returns from education suggest that most of the economic benfits from education are concentrated in about 40 percent of the work force; for other workers, more years of school does not provide an especially favorable rate of return strictly as an investment.

Nonetheless, for many displaced workers, education and retraining can be the most promising avenue for finding jobs that offer long-term opportunities for advancement. As is discussed in chapter 6, a sizable minority of people in well-run displaced worker projects—perhaps 20 to 35 percent—are interested in and have the background for vocational skills retraining. Many other displaced workers have basic educational deficiencies which, if not overcome, could make it more difficult for them to successfully complete a retraining course to obtain new skills, conduct a competent job search, and compete with younger, often more educated applicants for a position. Those who receive remedial education, career guidance, and vocational or occupational training should have greater likelihood of success in seeking new jobs.

[13] As cited in Sar A. Levitan, Garth L. Mangum, and Ray Marshall, ***Human Resources and Labor Markets: Employment and Training in the American*** *Economy* ***(New*** York: Harper & Row, 1981), table 3-3, p. 30.

[14] Ibid., p. 134.

[15] O'Neil and Sepielli, op. cit., p. 40.

Estimates of Basic Skills Deficiencies Among Adults

Although the median education level in the labor force now exceeds 12 years, a large number of Americans–including many high school graduates—lack the basic skills, and general knowledge that a high school education traditionally has been supposed to confer. Some adults can only read and write at a rudimentary level; others lack skills or ability in abstract reasoning, computation, and oral communications, or do not possess interpersonal skills and positive work habits that are valued by employers. Often, people who have very serious deficiencies in basic skills are referred to as functionally illiterate.

Functional literacy is a very difficult concept to define and measure. By the strictest definition of literacy—minimal ability to read and write in any language—less than 1 percent of the U.S. population say they are illiterate when surveyed by the Census Bureau. Functional concepts of literacy or numeracy make assumptions about how proficient people need to be in reading, writing, and arithmetic to function in society (e.g., ability to read at the ninth-grade level). Competency tests attempt to identify the particular skills adults need to perform adequately in society, and then measure the ability of adults to apply these skills in everyday situations.

Most national estimates about the number of adults with basic skills deficiencies are based on a survey of 7,500 adults that was conducted in 1973 and 1974, called the adult performance level (APL) survey. APL concluded that about one-fifth of U.S. adults were "functionally incompetent" in terms of basic survival skills—such as matching personal characteristics with job requirements stated in help-wanted ads, or correctly filling out a check.[16] A higher proportion of the unemployed, 35 percent, fell into this category. Among the employed, unskilled and semiskilled workers had the lowest performance levels. The study also found that another 30 percent of Americans were only "marginally competent' 'cleaving the impression that only half of the adult population functioned competently.[17]

Although the APL study did not measure adult literacy levels, the 20 percent estimate has come into widespread use as a proxy for adult functional illiteracy.[18] The U.S. Department of Education, applying the APL findings to the 1982 U.S. population, estimated that 27 million adults are functionally illiterate today, and that an additional 47 million adults do not function proficiently. These two groups together—a total of 74 million people—have been referred to as the "pool of Americans in need of basic education."[19] Unfortunately, the APL survey does not help in identifying the levels of basic education that would be required to meet this need—i.e., it does not provide a basis for distinguishing among those that may simply need several brush-up courses and those who need basic education from the ground up. Moreover, virtually all aspects of the APL survey, from its guiding philosophy and methodology to its interpretation of the meaning of test results and documentation of test quality, have received unfavorable criticisms from educational researchers over the years.[20] The APL survey, now more than a decade old, continues to be used because nothing better or more recent is yet available.

A national assessment of young adult functional literacy levels (focusing only on adults in the 21- to 25-year-old age range) is being conducted for the National Assessment of Educational Progress (NAEP) by the Educational Testing Service. The purpose of the effort is to collect data about the nature of the literacy

[16] Results of this survey are provided in: *Final Report: The Adult Performance Level Study* (Austin, TX: The University of Texas Division of Extension, August 1977).

[17] Ibid., p. 41.

[18] See Irwin Kirsch and John Guthrie, "The Concept and Measurement of Functional Literacy," *Reading Research Quarterly,* No. *4, 1977-1978,* pp. 486-507, for a discussion of different concepts of functional literacy.

[19] Paul Delker, "Defining Functional Illiteracy," *Functional Literacy and the Workplace* (Washington, DC: American Council of Life Insurance, 1983), p. 33.

[20] For a review of these criticisms, see Walt Haney and Lloyd David, "The APL Study: Science, Dissemination and the Nature of Adult Education," *APL Revisited: Its Uses and Adaptation in States* (Washington, DC: U.S. Government Printing Office, 1980), pp. 53-79.

problem, and its extent among young adults. Results from this one time survey are expected in April 1986.[21]

The NAEP assessment, hopefully, will appreciably improve the state of knowledge about literacy problems among young adults. About 40,000 households across the Nation are being screened to find between 3,600 and 5,000 young adults and several hundred 17 year olds who will participate in a 90-minute literacy exercise, According to the study plan, participants who are able to complete some basic reading and writings tasks (e.g., reading a simple passage aloud) will be given a more complex series of tasks to perform. People who are unable to complete the basic tasks, and a random sample from those who can, will be given an oral language interview. One purpose of the interview will be to determine how well these people use spoken English. Another purpose will be to determine how familiar these people are with different forms of written materials. For example, each person will be asked to identify such common materials as job applications, classified ads in a newspaper, and bus schedules. The participants will be asked whether they know what the article is used for, whether they actually need to use this type of information, and whether they seek assistance in using it.

The NAEP study also may help to give a clearer picture of the characteristics of young adults who have literacy problems. All of the survey participants will be questioned about their background and attitudes in order to collect data about how literacy skills vary by sex, race, family history, educational background, work demands, and so forth. This information may be useful in designing remedial education programs that take into account the very different motivations and life situations of people who lack basic skills. Several different groups of people with literacy problems have been identified in previous studies:[22]

- Motivated adults who need little prompting to take advantage of remedial education, and whose personal situation makes it possible for them to commit the time and resources to education when they have access to it. These adults constitute most of the students in adult basic education classes, and they are often very successful in achieving the goals they set for themselves.
- Motivated adults who would be likely to take advantage of adult education if they could find the time or resources to participate. Some special assistance (e.g., time off from work, child care assistance, or transportation) may be needed to make it possible for these adults to participate in education.
- Adults who value education, but are unlikely to participate in education unless major changes occur in their life situations. These adults have fundamental problems (e.g., chronic unemployment, poverty, or poor health) that consume most of their time and resources. Unless they are convinced that education can help them manage these problems, they are unlikely to participate.
- Adults who do not value education, or who find it irrelevant to their lives. These people are unlikely to participate unless a basic change occurs in their attitude about education, or unless their life circumstances change. Many adults are unwilling or unable to commit enough time to overcome deficiencies in basic education or to go on to obtain a high school equivalency degree. Some of these individuals had negative experiences in school when young, feel trapped in dead-end jobs or are unemployed, and see little benefit from remedial education. They do not feel part of the middle-class system in which education plays so strong a part.

Current federally supported remedial education programs, while offered without charge to adults at the basic education level, probably reach only highly motivated adults. Less motivated adults may need extensive encouragement to participate. Reaching these people may require significant outreach activities through community-based efforts and volunteers.

[21] For a description of the survey, see National Assessment of Educational Progress, "NAEP Profiles of Literacy: An Assessment of Young Adults (Development Plan)," Princeton, NJ, April 1985.

[22] See, for example, Carman St. John Hunter and David Harman, *Adult Illiteracy in the United States: A Report to the Ford Foundation (New* York: McGraw-Hill, 1979).

Obviously, any long-term solution to the problem of functional illiteracy among adults will require improvements in primary and secondary school education. According to the National Commission on Excellence in Education, as many as 13 percent of all 17 year olds can be considered functionally illiterate. Among students who are members of minority groups, this figure can be as high as 40 percent. By applying the 13 percent figure to 1980 Census data, the U.S. Department of Education concluded that as many as 535,600 functionally illiterate 17 year olds are added annually to the pool of adults in need of adult basic education. While it is clearly an important subject, assessment of the primary and secondary school system is not within the scope of this report. Readers are referred to the OTA assessment, *Informational Technology and Its Impact on American Education*, as well as several other recent studies concerning adequacy of the U.S. education system, for further information.[23]

Basic Skills Deficiencies and the Workplace

Large numbers of workers have serious deficiencies in basic education that impede their ability to get a job, or once employed, to advance beyond entry-level positions, and to adapt to workplace changes. Results from the displaced worker projects discussed in chapter 6 indicate that about 20 percent of those who are participating in these projects need some remedial education. Since, in some cases, refresher or brush-up courses are all that is required, this finding only confirms the thrust of the APL survey, not its details,

The costs of inadequate primary and secondary education to business, industry, and government employers have never been quantified. However, they are undoubtable very large. Several recent surveys of employers have attempted to identify educational skills most sought by employers among recent high school graduates. In general, these surveys have concluded that employers want workers to have greater proficiency in reading, writing and computational skills, and better attitudes about the workplace than shown by many recent high school graduates. Employers differ about the degree to which specific occupational skills are desirable in the high school graduates they hire. Selected findings of some recent studies are summarized in table 7-1.

One of the few surveys to ask employers about the proficiency of their employees in basic skills was conducted in 1982 by the Center for Public Resources, a New York based organization that focuses on strategies for business involvement in addressing public problems.[24] Companies responding to the center's survey reported significant deficiencies among workers in jobs that required high school education. The most serious inadequacies—from the standpoint of the responding employers—were in mathematics, speaking, listening, and problem-solving skills. Many workers apparently found it difficult to understand verbal instructions, or to verbally express ideas and problems. Several companies linked poor arithmetic of their employees to incorrect inventorying, inaccurate production reports, and improper machine measurement and parts specifications. A large number of the companies in the survey had launched programs to update worker skills to the level of the 9th or 10th grade. However, these companies may not be representative of business as a whole, because the CPR survey only had an 8.7 percent response rate.

[23] At least nine major reports on the primary and secondary school systems have been issued in recent years, including those by the National Commission on Excellence in Education, ***A Nation at Risk;*** the National Task Force on Education for Economic Growth, ***Action for Excellence: A Comprehensive Plan To Improve Our Nation Schools, 1983;*** the Carnegie Foundation for the Advancement of Teaching, ***High School: A Report on Secondary School in America, 1983;*** and the Twentieth Century Fund Task Force on Federal Elementary and Secondary Education Policy, ***Making the Grade, 1983.*** Readers interested in a concise summary of these and other recent reports on the primary and secondary school system are referred to James B. Stedman, "Education in America: Reports on its Condition and Recommendations for Change," Library of Congress, Congressional Research Service, Issue Brief #IB83106, September 1984.

[24] James F. Henry and Susan Ueber Raymond, *Basic Skills in the U.S. Workforce (New* York: Center for Public Resources, 1983).

Table 7-1 .—Selected Studies of Employer Perceptions of Job-Related Skills and Education[a]

Study and date	Nature of study	Whose opinion was sought?	Key findings about education	Key findings about job skills in current work force
Conference Board[b] (1977)	Questionnare sent to 1.798 firms 610 (22%) were returned	Senior personnel executives of firms with 500 or more employees	Vocational curricula ranked higher than academic curricula m secondary schools in their ability to prepare students for work	54% found deficiencies in language skills, 24% found deficiencies in mathematical or computational skills, 18% mentioned nonskill areas (e.g. faulty attitudes towards work), 7% found deficiencies in interpersonal skills
Center for Public Resources[c] (1982)	Questionnaire sent to 2 125 firms, 184 (8.7%) were returned Questionnaire was also sent to unions and public schools	More than two-thirds of those responding were personnel directors, others were training directors or line supervisors. CPR also surveyed educators and union leaders	Respondents from business found mathematics, science, and speaking and listening skills to be the most Important skills deficiencies of high school students entering the work force Educators gave greater weight to reading and writing skill deficiencies	Business found greatest skills deficiencies in out-of-high-school employees to be mathematics, science, and speaking and listening skills, reading skills were found generally adequate for specific job, but writing skills were found to be a greater problem
Survey of os Angeles area employers (1983)	Survey of 172 firms classified by size, 32% of sample employed fewer than 50 people, 41 % employed 50-499, 27% employed 500 or more	Interviews with chief employment officer and training officer of each firm, questions were asked about hiring requirements and specific vocational training needed for specific entry-level jobs requiring less than 4 years of college	Study concluded that most employers were more concerned about positive work habits and attitudes than specific technical job skills among job applicants, since the firms themselves can provide training Study suggested that high schools should reduce emphasis on skill training, and concentrate on ' 'teaching young people to read, write, compute, and think.'"	For jobs entailing low or medium skills, good work habits and attitudes were found to be the most important component of job success in 75 and 64% of cases, respectively, followed by lingustic and computation skills (12 and 22%), and technical job skills (13 and 14%) For high-skill jobs (requiring more than 24 months of vocational preparation), technical skills were found to be the key factor in job success in 62% of cases
National Academy of Science[e] (1984)	Panel report on high schools and the changing workplace	Report reflects judgments of a panel chiefly composed of public and private sector employers about present and future job opportunities and job requirements for high school graduates	The ability of high school graduates to learn and adapt to changes m the workplace IS the major asset required by employers Core competencies to perform entry-level jobs and continue the learning process are essential, technical and vocational education can enhance employability but cannot substitute for core competencies, positive attitudes and sound work habits are of basic Importance	Not addressed, however, the appendix of the report contains a rebiew of the literature that examines the relationship between job performance and tests of cognitive skills this literature found that basic congentive skills were a chief component of job performance, especially in more complex jobs, and many of these cognitive skills (e. g , numerical skills, reading. vocabulary, and attention to detail) were ''educable ''
Research and Forecasts[f] (1983)	Telephone survey, based on a random sample of 108 firnm on the Fortune List of 1,300 corporations	Top executives, half of those surveyed were chief executive officers	47% strongly agreed and 30% somewhat agreed that a required core of basic courses m high school IS needed	

[a]This chart provides only selected findings horn the referenced reports
[b]Seymour Lusterman *Education in Industry* (New York The Conference Board 1977)
[c]James F Henry and Susan Ueber Raymond *Basic Skills in the u .s Work Force The Contrasting Perceptions of Business Labor and Public Education* (New York Center for Public Resources 1983)
[d]Wellford W Wilms The Limited Utility of Vocational Education California Employer s Views *Public Affairs Report Bulletin of the Institute of Governmental Studies University of California Berkeley* VOI 24 No 4 August 1983
[e]Report of the Panel on Secondary School Education for the Changing Workplace *High Schools and the Changing Workplace The Employer's View* (Washington DC *National Academy* Press 1984)
[f]Research and Forecasts Inc Business Poll (New York Fall 1983)

SOURCE Office of Technology Assessment adapted in part from Information provided by Paul E Barton Employers and High Schools The Fit Between Learning and Working paper prepared for the Committee for Economic Development in press 1986

DELIVERY SYSTEM FOR ADULT EDUCATION AND TRAINING

A large and multifaceted adult education and training system has existed in the United States for many years, In many urban and some rural areas, community colleges and other local institutions offer a range of educational services that are highly accessible to adults, Business firms are a major component of this system: by one estimate, employers, through in-house programs, provided about one-fourth of all adult education courses in 1984, and may also have financed an additional one-third of all adult education courses (e. g., those taken at schools and other institutions).[25] Informal (on-the-job) training by business is even greater, although expenditures for such activities are very difficult to estimate. A number of unions, through collective bargaining agreements and some formal programs, also are active in providing education and training to workers. A quite recent development in adult education has been the learning center, often entailing computer-assisted instruction. Some learning centers are run by for-profit corporations, while others are nonprofit private organizations that are not part of the public education system per se.

While the adult education system serves the employed far better than the unemployed, displaced workers in most urban areas can find some programs that are relevant to their needs, as is discussed in the pages below. Barriers to participation, and innovative approaches for overcoming these barriers, are both discussed later in this chapter.

Expenditures for Adult Education and Training

Estimates of total national investment (private as well as public) in adult education and training range from under $50 billion to $150 billion or more. This wide range in estimates reflects the uncertainty about how much business firms spend on formal training and education of their employees. Most national estimates of business expenditures for training extrapolate data from a few firms to the economy as a whole. Because of the different methods and assumptions used, estimates have ranged from a low of about $2 billion annually to a high of $100 billion.

A report by the American Society for Training and Development (ASTD), while recognizing the inherent limitations of the data, estimated that employers may have spent between $5 and $10 billion in 1981 for formal in-house training, with $7 billion being the most likely figure. The ASTD report also estimated that employers spent another $3 billion for courses taken by employees at outside institutions. Hence, ASTD concluded that total (in-house plus outside) employer training expenditures were about $10 billion in 1981. If wages and salaries of trainees were considered a training expense, the total would rise to about $21 billion.[26] Informal training of employees at their workstations, while obviously of enormous importance, is even less susceptible to accurate

[25] Information on employer provided and financed adult education provided by the Office of Educational Research and Improvement (formerly National Center for Education Statistics) from preliminary, unpublished data from the May 1984 survey of adult education.

[26] Carnevale and Goldstein, op. cit., p. 36.

measurement than formal training, and few attempts have been made to estimate the costs of this training,

The ASTD study also attempted to identify where adult education specifically related to employment takes place (over 60 percent of adult education is for job-related reasons), The report estimated that in-house training by employers accounted for about one-third of all job-related adult education. This understates the role of employers, since they pay for a high proportion of the courses taken by their employees at outside institutions, If these courses are factored in, according to the study, employers would account for about half of the financing for job-related adult education,

About 45 percent of job-related adult education takes place at educational institutions. Four-year colleges and universities account for the largest share in this subgroup (about 16 percent of the total), However, 2-year colleges, adult programs in high schools and vocational schools, and proprietary schools together account for about one-fourth of the spending. These schools are more accessible than 4-year colleges to blue-collar and nonsupervisory white-collar and service industry workers, and often specialize in occupational and vocational training.

The Federal Government is by far the largest single organization providing training in the United States, and, within the Federal Government, the Department of Defense (DOD) conducts the greatest amount of training. DOD spent about $13.4 billion on training in fiscal year 1984.[27] About $3.2 billion of the total was for specialized training to provide personnel with the skills and knowledge needed to perform specific jobs, Many of these skills are related very closely to civilian skills, such as communications, medical services, food preparation, and maintenance and repair of vehicles or electronic equipment. For this reason, DOD's training activities are relevant to the private sector. In addition, DOD plays a key role in development of new training and instructional technologies and materials. Since many of these technologies are developed to reduce training time and costs, they are of considerable interest to the private sector, (The role of DOD and other Federal agencies in research and development in instructional technology is discussed subsequently in this chapter.)

Aggregated data on training and education activities for the 5 million State government employees and 9 million local government employees is not available, but such activities are substantial. On the State level, California, Texas, and New Jersey offer extensive programs to their employees.

Major Providers of Education and Training

A complex delivery system for adult training and education has evolved over the years. Linkages among businesses, labor unions, community colleges and trade schools are common, and are probably increasing. Many community colleges have arrangements with business firms to provide courses or customized training at plant sites, and they also have responded to union requests for courses at union halls and other places convenient to workers.

Distinctions by function also have become blurred: remedial education, once almost always given through the local public school system, is now offered by private learning centers, libraries, many 2-year colleges, and some employers. Two-year colleges, in particular, offer an assortment of education and training programs, ranging from occupational training for people without high school degrees, to technician training programs, to academic programs for people preparing to transfer to a 4-year college or university. Many 4-year colleges and universities, also, now conduct outreach programs to meet the broader educational needs of adults in their community.

Some of these are long-standing programs. Since 1903, for example, the Massachusetts Institute of Technology (MIT) has operated the Lowell Institute School, which offers technician training to high school graduates, This

[27] U. S. Department of Defense, *Military Manpower Training **Report for** FY **1984,*** report prepared by the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics), March 1983, p. z.

program was originally set up to train industrial foremen to use new industrial equipment that was coming into use in turn-of-the-century America. Today, about 500 students are trained at Lowell each semester in electronics, mechanical drafting, and other technical areas. The students do not receive associate degrees, but because they are able to use MIT facilities and equipment (much of it state-of-the-art), the program is popular with many employers in the area.

Employee Training by Business and Industry

Employer-provided training tends to be short-term and job-specific. Labor force mobility, or "job-hopping" is quite high in the American labor market. In 1981, the median job tenure for men was 4 years, while for women it was 2.5 years.[28] As a result, employers have a strong financial incentive not to provide training in broad, transferable skills which would be lost to the company if an employee finds other employment.

Remedial education and retraining programs are offerred by some firms. About 18 percent of firms responding to a 1985 *Training Magazine* survey of some U.S. firms with 50 or more employees said they offered a remedial education program of some sort.[29] Such programs will be addressed in greater detail later in this chapter.

About one-fifth of the firms that responded to the survey also said they made a special effort to retrain employees whose jobs were being phased out so that they could perform substantially different jobs within the company.[30] (In 1984, when the same question was asked, about 29 percent of the responding firms said they offered retraining). Production workers were most likely to receive retraining, followed by middle-managers, first-line supervisors, office/secretarial employees, and customer serv-/ice employees.

Besides job-related education and training, some firms offer educational assistance programs (e.g., tuition aid for continuing education courses) for their employees. Since 1978, the Federal Government has encouraged companies to establish such education programs, through a provision in the Internal Revenue Code that allows employees to receive education assistance under a qualified company program without paying taxes on it. (As discussed in ch. 2, the provision will not apply to the 1986 tax year unless Congress acts to extend it.) A recent survey by the American Society of Training and Development reported that, among companies with educational assistance programs that responded, 5.6 percent of the eligible employees participated in educational assistance programs in 1984. The 319 companies that responded to the survey employed about 6 percent of the U.S. work force.[31] The highest level of participation, 14.4 percent of eligible employees, was reported by firms employing less than 500 employees; however, only 38 firms in this category responded to the survey. Among firms of all sizes, 72 percent of the recipients of educational assistance made less than $30,000 per year, and about 22 percent made less than $1.5,000 per year.

While most firms play a limited role in continuing education, many large or technologically sophisticated firms operate "learning centers" for their employees, often offering self-paced courses ranging from remedial education to continuing education in engineering. Several business firms and some industry organizations have established their own colleges and universities. A report by the Carnegie Institute for the Advancement of Teaching[32] identified some 18 corporate education institutions that grant degrees of one sort or another, of

[28] Francis W. Horvath, "Job Tenure of Workers in January 1981," ***Job Tenure and Occupational Change, 1981*** (Washington, DC: U.S. Department of Labor, Bureau of Labor Statistics, 1983), p. 2.

[29] Dale Feuer, "Where the Dollars Go," ***Training: The Magazine of Human Resources Development,*** October 1985, p. 48.

[30] Ibid., p. 51.

[31] American Society for Training and Development, ***Employee Educational Assistance: Who Pays, Who Benefits*** (Alexandria, VA: American Society for Training and Development, May 1985).

[32] Nell Eurich, *Corporate Classrooms: The Learning Business,* A Special Report on Education in Industry and Business (Princeton, NJ: Princeton University Press, 1985).

which half had received accreditation since 1977. Some of these schools (e.g., Northrop University) were originally created or sponsored by corporations, but have since become independent organizations.

Union Training and Education Programs

Concern about technological innovation and its impact on workers has raised the importance of training and education to labor unions. Unions are trying to make employer provided training more accessible to union members, and are seeking training, retraining, and education agreements in collective bargaining with management. Some unions also run education programs supported by membership contributions.

Several recent collective bargaining agreements, including those negotiated by the Communications Workers of America and the United Auto Workers, place substantial emphasis on broadening training and education opportunities for workers beyond job-specific training. The 1982 Ford and General Motors settlements established nickel-an-hour and dime-an-hour funds for training and retraining of autoworkers. (These funds are discussed in ch. 5.) Under the Communications Workers settlement, reached in August 1983 before the AT&T breakup, each Bell operating company and AT&T was given one year to begin offering, at company expense, training and retraining programs to employees for personal and career development, and to qualify workers who would otherwise be displaced for other jobs within the company. Most of the Bell operating companies are now offering a range of training programs, including home study and classroom training through community colleges in response to the agreement. More than 45,000 workers were participating in such courses by the end of 1985.

The Lifelong Education and Development (LEAD) program of the Service Employees International Union (SEIU) is an effort to provide workers in low-paying, entry-level positions in the health care industry with the necessary training and education to advance to better jobs, In 1980, the LEAD program, with the encouragement of the U.S. Department of Labor, was successful in establishing the Nation's first nurses apprenticeship programs, Since then, the program has worked to establish joint labor-management committees to implement career ladder programs, which identify the qualifications and training and education requirements employees need for job advancement where they work.

Delivery of Remedial Education

Since 1966, the Federal Adult Education Act has supported State and local remedial education programs. The purpose of the law, which was most recently reauthorized in 1984, is to enable all adults in the United States to acquire the basic skills needed to function in society, including "employability" skills, and to acquire the equivalent of a high school diploma if they do not already have one. The program supports adult basic education (ABE), adult secondary education (ASE), and general education development (GED) courses to prepare adults to take the high school equivalency exam. In addition, many primary and secondary schools also offer adults English-as-a-Second-Language (ESL) courses for immigrants.

Federal support for ABE programs is channelled through the States to public and private organizations (including public school districts, community colleges, and community organizations) under the Adult Education Act. About **2.3** million people enrolled in ABE, ASE, and ESL programs in the program year ending on June **30,1981.** (This was the last year for which official national data is available; State officials estimate that 2.6 million people participated in these programs in 1984,) Enrollment quadrupled between 1970 and 1980, The Federal role in supporting adult education is discussed in detail later this chapter, and in chapter 2.

Traditionally, remedial education has been offered at night in elementary and secondary schools. However, the ***1978*** amendments to the Adult Education Act encouraged the expansion of programs to other sites. By 1980, according to the Department of Education, over 60 percent of all classes took place in churches, community centers, and other nontraditional

sites. In addition, an increase in outreach activities had occurred.[33]

Volunteer efforts are an important part of remedial education. Volunteers from two national literacy organizations (Laubach and Literacy Volunteers of America) reach about 75,000 people per year. Volunteers are also used in State-administered adult basic education programs, but data on the number of volunteers is not available,

In 1984, the Coalition for Literacy, made up of 11 literacy and adult education organizations, began the National Adult Literacy Campaign to emphasize the need for volunteer efforts in literacy programs. In conjunction with the Advertising Council, the coalition is conducting a 3-year advertising campaign to recruit volunteer tutors, bring opportunities for remedial education to the attention of functionally illiterate adults, and encourage involvement of the business community. In addition, a National Adult Literacy Project has been established by the Reagan Administration.

Recognition that functional illiteracy has widespread costs to business and society has led some employers to actively promote remedial education for their work forces; some companies provide basic skills courses for their employees. In 1983, the Business Council for Effective Literacy, founded by Harold W. McGraw, Jr., was established to encourage greater awareness of the business community about the problem of adult functional illiteracy. A later section of this chapter discusses the potential role of employers in basic skills education.

[33] U.S. Department of Education, "Justifications of Appropriation Estimates for Committees on Appropriations Fiscal Year 1985, " p. 274.

Occupational and Vocational Education

Most formal occupational and vocational training for adults is provided at publicly supported community colleges and vocational-technical area schools and institutes, and private proprietary schools. Table 7-2 shows the number of postsecondary schools offering occupational programs, while table 7-3 shows enrollments in different programs from 1975 to 1981. Most students in these programs are recent high school graduates seeking vocational skills, and adults looking to improve their existing skills, or to learn new ones. Students usually must pay for occupational training, although costs can be quite moderate. Some students are participants in federally assisted employment and training programs, and are in many cases eligible for other Federal assistance. Apprenticeship programs also meet the training needs of some workers.

The Community College System.–While perhaps better known for college-level course offerings, most community colleges offer occupational

Table 7-2.—Number of U.S. Public and Private Postsecondary Schools With Occupational Programs, by Type of School, 1982

Type of school	Total	Public	Private		
			Total	Proprietary	Nonprofit
Total	9,208	1,904	7,304	6,013	1,291
Vocational/technical	734	611	123	102	21
Technical institute	157	8	149	138	11
Business/commercial	1,287	5	1,282	1,235	47
Cosmetology/barber	2,177	6	2,171	2,164	7
Flight	799	7	792	788	4
Trade	747	11	736	702	34
Arts/design	248	1	247	214	33
Hospital	783	119	664	59	605
Allied health	364	87	277	227	50
Junior/community college	1,017	820	197	83	114
College/university	597	228	369	9	360
Other	298	1	297	292	5

SOURCE U S Department of Education, National Center for Education Statistics, Survey of Postsecondary Schools with Occupational Programs, 1982

Table 7-3.—Enrollment in U.S. Noncollegiate Noncorrespondence Postsecondary Schools With Occupational Programs, by Type of School, 1975-81

Type of school	1975	1977	1979	1981	Percent change 1975-81
Total	1,399,100	1,495,200	1,623,918	1,687,097	20.6
Vocational/technical	495,000	478,400	522,051	469,926	5.1
Technical institute	92,100	34,500	35,348	61,117	33.6
Business/office	339,200	440,500	498,599	468,374	38.1
Cosmetology/barber	113,000	132,400	148,467	171,417	28.9
Flight	72,900	63,300	67,407	63,362	13.1
Trade	158,000	159,100	169,055	228,113	44.4
Arts/design	[a]	*36,800*	*44,095*	*56,613*	[a]
Hospital	71,100	48,200	42,595	40,610	42.9
Allied health	[a]	*55,600*	*60,554*	*60,041*	[a]
Other	37,800	46,400	37,747	67,524	78.6

NOTE Surveys of Noncollegiate Postsecondary Schools were conducted in 1976, 1978, 1980, and 1982, but in each case data are for the number of students enrolled during the 12-month period ending June 30 of the previous year.
[a]Data not available

SOURCES U S Department of Education, National Center for Education Stat! stics, "Enrollments and Programs in Noncollegiate Postsecondary Schools, " 1976 and 1978, and unpublished data from the 1980 and 1982 surveys of Noncollegiate Postsecondary Schools

and vocational programs that reflect local labor force needs. Occupational students at 2-year colleges now outnumber academic program students who expect to transfer to 4-year colleges or universities.[34] Community colleges are highly responsive to the learning and training needs of workers in their communities, More blue-collar and nonsupervisory white-collar or service workers take courses at 2-year colleges than other types of schools. Many community colleges also offer remedial education to students who need to improve their basic skills, and some community colleges offer highly innovative adult literary programs (for an example, see the discussion of Project ABLE in the instructional technology section of this chapter.)

Linkages (or "partnerships") between community colleges and local businesses and industries are common. The pros and cons of these cooperative projects are discussed in a subsequent section. Community colleges also have close ties with labor unions, and many offer programs off-site in workplaces, union halls, and community centers.

For-Profit Proprietary Schools.–Over 6,000 proprietary schools provide occupational and vocational training, accounting for two-thirds of all postsecondary schools that offer occupational programs. In 1980, about 4,100 proprietary schools had been accredited by an organization recognized by the U.S. Department of Education, or were eligible for certain Federal student assistance programs.[35] Proprietary schools often specialize in one trade or specialty, such as business and commercial schools, schools of cosmetology, and flight schools, Generally, these schools offer certificates for completion of occupational study programs, but not degrees. Often, a high school diploma is not required for admission.

Proprietary schools offer considerable flexibility in scheduling, which is attractive to adult workers. Courses are often short, liberal arts requirements are usually minimal, and a year-round schedule of day and evening classes is common,

Tuition at proprietary schools is often much higher than at publicly supported community colleges. Nonetheless, these schools often attract lower income students, including many who are not high school graduates. Enrollees in accredited proprietary schools are eligible for Federal Pen Grants (formerly Basic Educational Opportunity Grants) and Federally Insured Student Loans. Because there are so many proprietary schools, it is difficult to gen-

[34]Paul E. Barton, *Worklife Transitions: The Adult Learning Connection (New* York: McGraw-Hill, 1982), p. 18.

[35]Information provided by the National Center for Education Statistics [now the Office of Educational Research and Improvement], U.S. Department of Education, 1985.

eralize about their effectiveness in preparing students for jobs.

A 1984 study by the U.S. General Accounting Office found that many proprietary schools that were eligible to receive Pen Grant students had misrepresented themselves when recruiting students and had violated the rules of their accrediting associations.[36] The study also said that the industry-based accrediting associations rarely took action to ensure that their standards were met, Dropout rates from the schools eligible for Pen Grant recipients were very high, The proprietary schools dispute these findings, noting that their high dropout rates reflect the difficult backgrounds of their students, and arguing that they have improved their ethical standards. Together with educators in publicly supported schools and private industry trainers, the proprietary schools have begun to explore greater self-regulation as a means of improved quality of instruction and curriculum.

Apprenticeship Programs.–The goal of apprenticeship is to produce highly skilled workers who are well versed in the theory and practice of their trade, and are therefore adaptable to variety of work situations. In theory, workers who complete good apprenticeship programs should be more productive than those with less training. Because of their understanding of the theory of their trade, they also may be more versatile in adapting to technological changes that can make specialized skills obsolete.[37]

Apprenticeship is widely used in Western Europe, especially in West Germany, where it is an integral part of the vocational education system. Called the "dual system" because it combines on-the-job training and conventional vocational education, this apprenticeship system involves about 90 percent of West German 16 year olds who are not bound for a university. (Those who do not participate must attend vocational school until they are 18.) Students in the dual system typically spend 1 or 2 days a week at a vocational school; during the other weekdays, the students work under contract with an employer.

The practice of apprenticeship in the United States is much different. Apprenticeships here often involve formal agreements between employers and candidates for apprenticeship (often with union involvement when collective bargaining exists). Traditionally, over half of U.S. apprenticeships have been in the construction trades. Other trades with large numbers of apprentices include metalworking, service and repair trades, personal services, and graphic arts.

Although informal apprenticeship occurs, formal programs are registered by State labor departments or meet U.S. Department of Labor standards. Apprentices in these programs receive classroom instruction or another form of structured study in subjects pertinent to their trades, and are employed for 1 to 4 years under the tutelage of a masterworker before receiving certification. The Federal program, launched in 1937 under the National Apprenticeship Act (Fitzgerald Act), provides technical assistance, and support services to State agencies and local programs through the Department of Labor's Bureau of Apprenticeship and Training. Federal vocational education funds can also be used to support classroom instruction of apprentices at vocational high school or other public schools with approved vocational plans.

Apprenticeship programs at one time served mostly white males. Adoption of equality of opportunity provisos and outreach efforts to attract minorities and women to apprenticeship programs have had some success. Minority representation in registered programs grew from less than 6 percent of apprentices in 1967 to about 18 percent in fiscal year 1981. Women comprised less than 1 percent of apprentices in 1973, but 6 percent in 1981. In 1984, about 322,000 people received training under registered apprenticeship programs.

[36] U.S. Genera] Accounting Office, ***Many** Proprietary Schools **Do Not Comply with the Department of Education's Pen Grant Program Requirements, GAO/H RD-84-17*** (Washington, DC: U.S. Government Printing Office, Aug. 20, 1984].

[37] Levitan, Mangum, and Marshall, op. cit., p. 186.

Adult Participation in Higher Education

As a response to displacement, higher level academic education has less relevance to most blue-collar and nonsupervisory white-collar and service industry workers than vocational and technical training. However, for some displaced workers, pursuing an academic degree can be the path to an entirely different career,

Two-year academic programs offered by community colleges are highly accessible to adults. Many courses are offered in the evenings or on weekends, a schedule most working adults find convenient, and tuition is often low. Average tuition in 1983-84 was $528 for public 2-year colleges, compared with $1,284 for public 4-year universities.[38] Also the liberal admissions policies of many 2-year colleges may attract adults who did poorly in high school,

Academic programs offered at 4-year colleges and universities are generally less accessible to displaced workers and disadvantaged adults than those at 2-year colleges. In 1978, nearly half of the courses taken by adults at 4-year colleges and universities were for academic credit. Most studied part-time or in short courses, and two-thirds were working full-time. The types of adult enrolled, half were professional and technical workers and one-quarter were managers, reflects an educational mission that is aimed at higher level academic education.[39]

Continuing education or extension programs at 4-year institutions also attract large numbers of adults. These programs generally do not provide credit toward a degree and the programs are generally supported almost entirely from student fees. Continuing education students are generally well educated and have relatively high incomes,

Over the next decade, as the size of the traditional college-age population continues to decline, more colleges and universities will be forced to attract an older clientele, or else decline in size.[40] As a result, collegiate institutions are becoming more flexible in accommodating the needs of adults.

Some modifications—such as scheduling classes in the evenings and on weekends, offering courses at regional campuses, libraries, workplaces, and union halls, providing childcare services, or using television and audio transmission to reach students—may have little effect on the academic standards of the institution. Some other devices—such as granting academic credit for studies in trade schools, on-the-job training, participation in community-based groups, volunteer work, employment experience, artistic achievement, and military service and training—may be attractive to adults who wish to complete an academic program quickly, but clearly do have the potential to lower academic standards if they are abused,

[38] U.S. Department of Education, National Center for Education Statistics, ***The Condition of Education: 1985 Edition*** (Washington, DC: U.S. Government Printing Office, 1985), table 2.16, p. 118.

[39] Ivan Charner and Byrna Shore Fraser, "Access and Barriers to Adult Education and Train ing, " contract study prepared for the Office of Technology Assessment, September 1984, p. 22.

[40] Herbert L. Smith, "Higher Education Future, ***American Demographics,*** September 1983, p. 22.

INSTRUCTIONAL TECHNOLOGY IN ADULT EDUCATION AND TRAINING[41]

Most studies of instructional technologies have focused on primary, secondary and college students, or on special populations of adults (e.g., members of the military). Much less attention has been given to the use of instructional technology in helping meet the education and training needs of adult blue-collar workers and nonsupervisory white-collar workers. This section discusses the use of computers, interactive videodisk systems, and other technology-based systems in delivering vocational training, and basic skills education to adult workers.

Historically, the Federal Government has played a primary role in research and development of new instructional technologies. Many pioneering applications for instructional technologies were initially developed or supported by the Department of Defense, the National Science Foundation, and the Department of Education and its predecessor agency.

The entire field of instructional technology is changing rapidly, as new applications and markets for education and training products are developed. Advances in basic research on information technologies may greatly expand the capabilities of instructional technology over the next 15 years. For example, research on expert systems (a form of artificial intelligence) has already led to initial commercial uses in certain well-defined applications. A recent OTA report, *Information Technology R&D: Critical Trends and Issues*, discusses trends and prospects for information technology in detail.[42] Another OTA study is looking at the long-term implications of what might be possible to achieve through the use of instructional technologies after the year 2000.[43]

Delivery Systems for Instructional Technology

The use of computers, videotapes and videodisks, and other technology-based systems for delivering education and training is increasing. Instructional technologies have become widespread in training programs used by the military and large corporations. Although educational institutions have been slower to adopt instructional technologies, the number of computers in public school classrooms has grown rapidly since 1980, and several thousand instructional programs for computers are now advertised for educational applications.

Technology-based delivery systems for education and training are changing rapidly, reflecting advances in information technology. It can be expected that as new, more sophisticated technologies are marketed, instructional applications for these systems will be developed. Computer-based instruction, videotape and videodisk systems, and instructional television are briefly discussed below,

Computers.–Most current uses for the computer in learning involve computer-assisted instruction (CAI), or computer-managed instruction (CMI), or both. CAI refers to several forms of instruction that computers can deliver to students—e,g., drill-and-practice exercises for printed material previously given to the student, or new materials presented through programmed learning, Other terms (e.g., computer-enhanced learning) often refer to more advanced CAI applications, such as use of simulation or games in learning.

A major use of CMI is to keep track of the progress of individual students or groups of students. It can be used to guide the student to appropriate learning materials or instruc-

[41] Parts of th, discussion on instructional technology in this chapter are adapted from Norman D. Kurland & Associates, *The Role of Technology in the Education, Training and Retraining of Adult Workers,* a report prepared for the Office of Technology Assessment, Oct. 5, 1984. This contract report provides a detailed analysis of instructional technologies used in adult education. Readers interested in use of instructional technologies in the educational system as a whole, including children and young adults, are referred to the OTA assessment, ***Informational Technology and the American Educational System,*** op. cit.

[42] OTA-C IT-268, February, 1985.

[43] These implications are being addressed in OTA's assessment of technology and American economic transition,

tional sequences, depending on the student's progress and objectives, CMI is valuable for collection of data about student performance. It can help improve the productivity of teachers and trainers, since it often reduces the time they must spend in routine tasks such as grading tests and keeping records, CMI can be used either independently, or in conjunction with CAI. Until recently, the computational and data storage requirements of CMI systems limited their use to large-scale learning systems, However, with the heightened capability of microcomputers, combined CMI-CAI systems can be used in networks of microcomputers,

Computer instruction in basic skills is now more than 20 years old. During this period, several basic skills programs have been developed. PLATO, a very large computer-based educational system that was developed in the 1960s at the University of Illinois with substantial Federal support, includes both basic skills and GED preparation programs. PLATO is now marketed by Control Data Corp. The Computer Curriculum Corp. (CCC), a for-profit corporation founded in 1967 to develop marketable CAI materials for basic math and reading skills, offers turnkey systems of computer hardware, educational software, and support services for CAI in basic skills and GED preparation that have been used in several adult education projects .44

Interactive Videodisk Systems.–When linked to a computer, interactive videodisk or videotape systems can be very versatile. Interactive systems allow the students or trainees to map their way through the system, progressing to the next problem when they succeed in completing the previous one, or "branching" to a remedial exercise when they are unsuccessful. Until recently, most interactive video systems used videotapes, not disks. However, the advantages of disk systems (in terms of random access capabilities, information density, and durability) are increasingly recognized.

Each side of a disk can store 54,000 frames of textual or graphic information. Because the resolution is high (about 350 lines per inch) when displayed, each frame can store high-quality pictorial or graphic images. Individual frames can be recalled from any location on a disk in 2 seconds or less, and can be kept on the screen indefinitely without damage. By contrast, it can take 30 seconds or longer to recall portions of videotapes, and the tape can be damaged if' frozen on the screen.

While not yet in widespread use, interactive videodisk systems can be expected to play a growing role in industrial training programs. The price of disk systems has been declining rapidly, Some commercial training vendors now market skills training lessons to industrial clients at prices roughly comparable to those for similar videotape lessons (assuming that the client already has the necessary hardware). Interactive videodisk systems do not appear to be used in adult basic education programs at this time; however, a basic skills curriculum using interactive videodisks has been developed in the Army, and is now undergoing evaluation.

Television.–Several forms of television (e.g., broadcast, cable, videotape) remain important for adult education and training, As a broadcast medium, television is able to bring instruction to large numbers of people who otherwise might be unable to attend classes at a particular location or time. While most adults prefer live instruction to television, studies conducted in the 1960s showed that students learn from television about as well as from direct instruction.

Broadcast television often requires a large number of paid subscribers, or a subsidy to cover the high costs of producing or delivering programs, Several technologies can reduce costs of delivery, so that specialized courses can be offered, Instructional Television Fixed Service (ITFS) is a low-cost broadcast system which can transmit live courses over a 20-mile reception area, using microwave transmission and dish-shaped receivers, Northeastern University is using ITFS to deliver graduate level

44Case studies describing the development and use of PLATO and the CCC systems up until 1982 can be found in the OTA assessment, ***Informational Technology and Its Impact on American Education.,*** op. cit., pp. 128-134.

courses to professional engineers at some Boston-area electronic and electrical companies. The service includes one-way video and two-way audio, so that the students can communicate with faculty. Television also has been successfully used in providing information and education to displaced workers. An example of such a project, Detroit's Communication/Information System for the Unemployed, is discussed later in this chapter.

Studies of the Effectiveness of Instructional Technologies

Several studies conducted over the last 10 to 15 years have found well-designed CAI programs to be effective in teaching basic academic skills. Most of these studies have focused on elementary and secondary school students, disadvantaged youths and young adults, or special adult populations such as members of the armed services or prisoners.[45]

The few existing studies on the effectiveness of instructional technologies in education and training of older adults also suggest positive outcomes. Nearly all these evaluations predate 1980, and therefore do not reflect the greater experience with use of computers in instruction that has been gained since then. Researchers at the University of Wisconsin's Center for Research on Learning and Teaching recently analyzed the findings of 24 evaluations that compared computer-based education (CBE) with conventional classroom training of adults. These studies—all that remained after the research team's criteria for screening were applied—generally found that CBE had positive results for adult learners.[46]

In particular, the analysis showed that the adults taking computer-based education needed three-quarters or less instructional time than those adults who received conventional instruction. The adults in CBE classes also received slightly higher scores on their final examinations than those receiving conventional instruction. Five of the twenty-three studies involved adult basic education; the remaining studies involved technical training.

While these results are promising, some caution should be exercised in generalizing about the superiority of one medium over another. One educational researcher, analyzing the research record, concluded that learning differences could not be unambiguously attributed to different media.[47] Since it is very difficult to control all the factors that could lead to differences in learning, several rival hypotheses can be devised from the same data to explain differences in performance or time-savings. For example, more attention may be given to instructional design when new technologies are introduced than when the same material is presented through conventional instruction. If the same attention were given to instructional design in conventional courses, the students receiving conventional instruction might fare just as well. However, if computers and other new media prompt greater attention to instructional design so that delivery of instruction is made more effective, this is a virtue of the new media.

It should also be kept in mind that instructional technologies are evolving very rapidly, and that the new technologies may be superior to those only a few years older, As educators have gained experience about instructional technologies, the knowledge base about how to use them also has grown. In the University of Wisconsin's review of CBE project evaluations, only a few of the studies involved recent projects. Of the 24 studies, 13 were conducted after 1975, but only 2 after 1980.

[45] For a discussion of these results, see the OTA assessment, ***Informational Technology and Its Impact on American Education,*** op. cit., pp. 128-134.

[46] Chen-Lin C. Kulik, James A. Kulik, and Barbara J. Shwalb, "Effectiveness of Computer-Based Adult Education, " Center for Research on Learning and Teaching at the University of Michigan, a presentation at the annual meeting of the American Educational Research Association, Chicago, March 1985. As used in this paper, computer-based education included computer-assisted instruction, computer-managed instruction, and computer-enriched instruction (CEI). Eighteen of the studies involved CAI, three involved CMI, and two involved CEI.

[47] Richard E. Clark, "Reconsidering Research on Learning From Media, " ***Review of Educational Research,*** winter 1983, vol. 53, No. 4, pp. 445-459.

In the section that follows, more recent experience with CAI in adult basic education is addressed, A subsequent section discusses the growing use of instructional technology in industry, and the potential of these technologies in vocational skills training.

Recent Examples of CAI in Adult Basic Education

Several CAI projects for adult basic and adult secondary education have been launched since 1980, While few formal evaluations of these projects have been published so far, some of the projects appear to have been highly effective. Often, the projects have involved innovative planning and design, considerable use of teachers and trained volunteers, and sometimes, active support from community organizations and local foundations.

An example is Project ABLE (for Adult Basic Literacy Education), a program run by Central Piedmont Community College in Charlotte, North Carolina. This CAI project began in July of 1983, and more than 250 students with reading levels below eighth grade had enrolled by April of 1984. Students receive instruction at neighborhood centers, including a shopping center that is open 6 days a week, a community center, and a church.

During the first year of Project ABLE, the adult students (who averaged 36 years of age) reportedly needed only about 21 hours of instruction to gain one grade level in reading and math, a striking accomplishment compared to an average of 150 hours required for similar gains elsewhere in the State. The project provides individual tutoring by volunteers to all students with less than fourth grade skills, and tutoring is also available for students in more advanced instruction, The project combines this individual human attention with the use of PLATO and 12 other software packages for adult basic education and GED preparation.

Community leaders were extensively involved from the early stages of Project ABLE. Members of an advisory committee composed of people from the local media, the ministry, business and county government promoted the project, and helped to recruit adult students. The recruitment campaign, using public service announcements on radio and television, appearances on talk shows, and announcements at churches, was aimed at an adult audience with limited ability or inclination to read. In addition, newspaper stories, and flyers sent with food stamp mailings and water bills, publicized the program to the community at large, and helped attract volunteer tutors. On the first day the center was open, 77 people enrolled in Project ABLE; 20 more followed the next day. About 70 volunteers showed up on the first day training was offered; the project staff had expected only about 20.

Many adults in CAI basic education courses study more than their counterparts in conventional courses. In a basic education program run by the Great Neck, New York, public school system, adults participating in computer-assisted basic education averaged 196 hours of attendance. This was about 80 percent more than the average for non-CAI students, 108 hours. By the end of the course, the CAI students showed an average gain of 3.71 years in reading and 3.55 years in math—compared to the course objective of 2.5 years. (Average gain by non-CAI students is not available.) The CAI project was developed by the Computer Curriculum Corp.

A questionnaire given to participants in the Great Neck project provides additional evidence that CAI projects can motivate adults to study more. Ninety-eight percent of the adult students said that they enjoyed studying with the computer, especially mentioning the clear explanations and immediate feedback. Nearly three-fourths of the students said they would like to use the computer more often; only 5 percent said they would like to use it less often.[48]

Very good results also have been reported by nonprofit learning centers around the country that are using a Comprehensive Competency Program (CCP) that is being distributed by the Remediation and Training Institute. CCP uses a variety of previously developed materials for teaching academic and functional skills, in-

[48] As discussed in Norman D. Kurland & Associates, op. cit., p. 65.

eluding public and private domain printed materials, software, and audiovisual materials. While CCP does not have to be delivered on computer, most of the centers use a combination of CAI and printed materials. CCPS also have instructors available to help students.

During the second quarter of 1985, 1,220 people at 58 nonprofit learning centers were terminated from these programs. About 42 percent of the people were over 22 years of age. For all second-quarter terminees, the centers reported an average gain of 1.2 grades in reading skills in 50 hours of related instruction, and 1.5 grades in math in 40 hours of related instruction. If projected linearly, this would suggest gains of 2.4 years in reading and 3.7 years in math for 100 hours of instruction. However, only about 15 percent of the participants in these projects completed 100 hours of instruction. According to the institute's summary report:

> . . the mean reading and math gain rate per 100 hours of instruction were four times higher for learners with less than 50 hours of instruction than for those with over 50 hours. Nevertheless, the "gain rate per 100 hours of related instruction" is the common metric for assessing basic skills instruction, and the reading and math gain rates achieved by CCP learners were more than double the standards for remedial education.[49]

This difficulty in expressing learning gains in quantitative terms illustrates a fundamental problem that exists in evaluating CAI projects, and in making comparisons among ABE projects in general. The ideal comparison would take into account not only differences among teachers, instructional materials, and approaches, but also differences among the students themselves. Students enter ABE classes with very different levels of academic skills. Those who are simply rusty in, say, arithmetic, may recover their knowledge very quickly, while those who never had this knowledge to begin with may learn slowly. Also, students often show plateaus in learning—i.e., rapid progress may be followed by a period of consolidation, before another period of rapid progress begins. For these reasons, the expected level of achievement or a norm for adult basic education can only be stated in very gross terms—e.g., one grade level gain for every 80 to 120 hours of instruction. so

Even using this broad range, the evidence strongly suggests that more rapid learning takes place in well-managed CAI systems than is likely to be achieved in most basic education classes that use only traditional methods of instruction. In addition, while not yet established, effective replication of results may be easier to accomplish using CAI than in systems that are more highly dependent on the individual teacher. A key purpose of the Remediation and Training Institute's program is to provide an academic and functional competency program that can be applied in a variety of settings. Thus the institute provides step-by-step information to the learning centers on how to organize, manage, implement, and evaluate the Comprehensive Competency Program. Although it is too soon to say for sure, the fact that so many projects report initial success with CCP suggests that the program can be effectively replicated.

Cost Factors Affecting the Adoption of Instructional Technologies

The cost of introducing new technologies has been viewed as a barrier in many education programs. Indeed, the initial costs of acquiring hardware and courseware can appear high when costs are looked at in simplistic fashion. However, well-designed CAI programs can offer a number of cost advantages that are attractive in comparison with conventional methods of adult education.

First, when well-designed courseware is used, the computer can help raise the productivity of teachers, allowing each teacher to

[49] All figures cited are from "The Comprehensive Competencies Program: A Summary, " Remediation and Training Institute, Washington, DC, n.d. The quotation is from p. 15 of the same report.

[50] See for example, Thomas G. Sticht, *Basic Skills in Defense,* report issued through the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics), March 1982, p. viii, for discussion.

spend more time on instruction and less time on administration, grading, and recordkeeping, Second, the costs of acquiring hardware have declined very rapidly, and many ABE projects may have access to computers in schools, libraries, training facilities, businesses, and other institutions. While good courseware is often expensive, it can be used at any location and at any time. This is particularly useful in providing basic education to adults, who may have difficulty in scheduling classes or getting to class locations, Third, since adults tend to learn more quickly in CAI projects than is typical for basic education, these projects may be able to serve more people. Most adults find savings in time needed for education very attractive.

Computerized learning centers are not all that expensive to set up, judging from data compiled by the Remediation and Training Institute from 58 learning centers that used its Comprehensive Competency Program during the second quarter of 1985. The typical center had a capacity to serve about 30 people, and used about eight computers for instruction, as well as another computer for management purposes. The mean investment to establish the typical learning center was slightly under $43,000. Computers, peripherals, and instructional software accounted for about 52 percent of this investment, and another 28 percent was for printed materials, and audiovisual equipment and materials, The remaining 14 percent was for supplies, furnishings, and center restoration, Using the second quarter of 1985 as a base, the institute estimates that the annualized operating costs for the typical center would be about $80,800. Nearly three-fourths of this would be for staff salaries and fringe benefits. With amortization of the investment in the learning center over a 3-year period, the annual costs of the learning center would rise to just under $100,000 [assuming a 10 percent interest rate).

The costs of providing instruction at the centers can be measured in a number of different ways. Using full operation costs for the second quarter of 1985 (including the costs of amortizing the investment in the center), the costs per instructional hour work out to $8.45. If amortization of the investment is not included in this calculation, the operating costs per instructional hour are $6,90, However, the institute estimates that the learning centers were used at only 23 percent of their maximum capacity in the second quarter of 1985. If the centers were used at 75 percent of maximum capacity for 50 hours weekly, the costs per learner instructional hour would be $2.00, according to the institute.

Low utilization levels have been a problem in some other projects as well. One western New York public school district, for example, received a grant in 1983 from the Governor's office for a project to help steelworkers in danger of displacement obtain a high school equivalency degree—a requirement for a job interview at one steel mill that was still hiring in the area. The school district leased a CAI program and 16 computer terminals for the project, Some of the project's computer terminals were made available 24 hours a day, and one was located in a union hall for the convenience of workers. Even so, the terminals were used less than half the time.[51] One factor that probably contributed to the low utilization level was the fact that many of the laid-off workers were receiving occupational skills training during the day, and had little inclination to pursue GED courses at night, To attract greater use, the program was opened to anyone in the community who wanted to use it; however, the initial response was not great and the project was suspended at the end of December 1983.

Even at the 23-percent utilization level, the CCP learning centers apparently have been quite successful in attracting public and private funding. Based on the second quarter of 1985 data, the Remediation and Training Institute estimates that the average annualized revenue (e.g., contract services, in-kind support) of the centers would be $114,000 (including in-kind support) —well above the estimated $99,000 needed to run the typical center even when the investment for computers and other equipment has not been amortized. This sur-

[51] Norman D. Kurland & Associates, op. Cit., p. 67.

plus can be used for improvements, adjunct services and institutional support.

Evaluation of Courseware in Adult Basic Education

Most basic skills software now available is designed for the K-12 market, not the market represented by adult basic education. However, some of these products—particularly those used for high school students—contain remedial components which in some instances may be suitable for adults.

Many States have established software evaluation projects or clearinghouses for elementary and secondary education—but this has seldom been extended to the adult basic education level. One of the few organizations that does evaluate software for adult basic education is the Region X Adult Education Software Consortium, which is comprised of ABE officials in Idaho, Oregon, Washington, and Alaska. The consortium has established a software evaluation team which specifically looks at the suitability of courseware for ABE instruction, and disseminates its findings to school districts in the region. While useful to adult educators, the Region X consortium has limited resources.

National independent organizations that specialize in evaluation of educational software, such as the Educational Products Information Exchange Institute (EPIE) and the MICROSIFT project of the Northwest Regional Educational Laboratory, also focus largely on the K-12 system. However, some evaluated products aimed at remedial education for older adolescents (16 to 18 years of age) maybe suitable for ABE instruction as well. Although most of the evaluated products are tried out to some degree in school settings, these evaluation services do not conduct formal "field testing" under controlled conditions.

Vocational education is another area where limited evaluation of courseware has been undertaken. The National Center for Research on Vocational Education, located at Ohio State University, has developed an evaluation form and guide for vocational education courseware, including secondary and postsecondary curricula. The center plans to provide some coordination of evaluations using its system.

Role of Learning Centers in Computer-Assisted Instruction

Both for-profit and nonprofit private learning centers provide a variety of educational services to adults. Many of the pioneering CAI projects for adult basic and secondary education have been undertaken by such centers. Some centers have been supported primarily by private funding, with little or no funds from Federal and State ABE programs. The large role played by the private sector indicates the active interest of community organizations, community colleges, private foundations and for-profit corporations in reducing adult functional illiteracy.

Some companies—most notably Control Data Corp.—have established for-profit learning centers in many cities across the country which will provide basic skills training either to individuals directly or to employees through their employers. CDC now operates more than 100 such centers, and in each of them adults can take basic skills training using the PLATO system. In addition, a number of companies have established learning centers for their employees.

Since 1980, many nonprofit learning centers, supported in part by local and national private foundations, have become active in computer-assisted instruction programs. In some areas, foundations and educational institutions have cooperated to establish model learning centers, designed to serve adults and also to provide community colleges, school districts, and other local organizations with the training and resources needed to establish their own CAI programs. In the Minneapolis-St. Paul area, for example, five local foundations and the St. Paul public school system have committed $1.3 million to support the Technology for Literacy Center (TLC), which opened at a St. Paul shopping center at the end of May 1985.

Patterned in part on Project ABLE, TLC is intended to serve as a model for other literacy projects in the twin cities region. It focuses on

adults who have reading, writing, and math skills below the eighth grade level. The TLC staff hopes to enroll 1,300 adults in the program over a 3-year period, and to train 200 administrators, teachers, and volunteers in the use of CAI. Matching grants will be offered to existing literacy projects to stimulate the use of instructional technology. An important part of the program is to train instructors and volunteers from other programs to use CAI. The project is administered by the community education department of the St. Paul Public School System, which employs the staff.

During its first 5 months of operation, TLC served 487 people. About 56 percent of these people were not high school graduates and 68 percent tested below the eighth grade level. About 43 percent of the people were employed, and about 46 percent had sought prior help for basic skills education. Students working at the fourth to twelth grade levels use the Control Data Corp. 's PLATO basic skills program, plus a variety of offerings from other companies, in their learning program. Students who are below the fourth grade level do not use CAI, but receive one-on-one tutoring from volunteers trained in the Laubach method of literacy education. About 55 volunteers are involved in the project. The project will be subject to continuing formal evaluation over the 3-year period,

Nationally, the Remediation and Training Institute's Comprehensive Competency Program, developed with the support of the Ford Foundation, was used by 73 nonprofit organizations in 20 States by the end of June 1985. A variety of different kinds of nonprofit institutions are represented on the list, including Job Training Partnership Act Title 11 project agencies, postsecondary schools, community-based organizations, and alternative schools.

While CCP does not have to be delivered on computer, most centers use a combination of CAI and printed materials. For example, students at Project Options, a program at the National Learning Center in Washington, DC, spend about one-third of their classroom hours using CAI, and the rest of the time using printed or audiovisual materials. The program is individualized and self-paced. After students get initial orientation and testing to determine their performance level, a teacher selects appropriate first week lessons for them, and tells them how to locate materials in the room. From then on, the students pace themselves. They test themselves, using written answers, when they feel it is appropriate. Teachers are available for one-on-one help whenever students request it.

Project Options, set up in early 1984, has been supported by several foundations, with computer companies and book companies providing or donating some materials and technical assistance. Local government agencies, including correctional agencies and employment services agencies, engage the center by contract to provide basic skills and job skills competencies to young adults and adult students. The center offers morning, afternoon, and evening classes in 3-hour segments to minimize interference with work schedules. Orientation sessions, offered every 2 weeks to new students, encourage scheduling flexibility.

Vocational and Industrial Applications for Training Technologies

A number of different forms of instructional technology are used in vocational education and industrial training. Tutorials, ranging from slide projector presentations, to videotape, to highly interactive videodisk lessons, are among the most extensively used formats for training materials, Off-the-shelf audiovisual tutorials are available in a wide range of vocational and business management subjects.

While not yet widely used in vocational education and industrial training, interactive videodisk systems may well become a major new medium for industrial training, As a training medium, interactive videodisk systems offer several features that are well suited for industrial skills training. The high visual quality of the videodisk, random access to all frames on the disk, and features such as touch screens can be used to engage the participation and attention of the student, The ability of these systems to simulate actual equipment and situations, to keep track of problem areas for the

student, and to offer individualized remedies are other attractive features,

Currently, most training applications for interactive videodisk are customized products developed for highly specialized military or industrial functions. However, generic, off-the-shelf products are beginning to appear as the costs of producing interactive videodisk decline. For example, some training firms are now offering skills training lessons for interactive videodisk to their industrial clients at prices roughly competitive with videotape. For example, the Industrial Training Corp. recently began offering an interactive videodisk training program in electrical/electronics theory and skills training. Its introductory prices for individual lessons on videodisk are actually lower than the prices it charges for its individual videotape lessons in similar subjects. This does not include the costs of presentation hardware, however.

Other applications for instructional technologies in industrial training and vocational education include simulators, emulators, and various kinds of job aids. Simulators and emulators are usually employed when it would be too expensive, dangerous, or logistically difficult to provide training on the actual equipment or system. To varying degrees, simulators duplicate the behavior of actual machines (e. g., a ship or airplane) or. complex systems (e. g., a powerplant). While the extent of their use in vocational training is limited, some companies (e.g., companies offering temporary services) use simulators or emulators to train people to use a wide variety of word-processing systems that temporary typists can be expected to encounter as they move from one company to another.

Job aids are used to either supplement prior training or, in some instances, to reduce the need for training. Job aids are often used to provide instructions to workers so that they can perform tasks that require specific skills that are only infrequently required. A recent development in job aids is embedded training, in which instructions for use or repair of equipment is implanted in the equipment itself, As microchips have become cheaper, it has become possible to design machines to automatically instruct workers in how the machines should be used and repaired.

Use of instructional technology in business has spread rapidly, in part because industry places a premium on technologies that can reduce training time. Large firms account for the most widespread use of these technologies. According to a *Training* magazine survey, about 27 percent of all U.S. companies with 50 or more employees used computer-based training in 1985, compared to 22.3 percent in 1984. Among 1arge companies (those with 10,000 employees or more) about 56 percent used computer-based training.[52]

The *Training* magazine survey also found that about 12 percent of companies with 50 or more employees used some form of computer-driven interactive videotape or videodisk players in their training efforts. Among different businesses, use of interactive video (both tapes and disks) was highest among finance, insurance and banking firms. About 6.5 percent of manufacturing firms with more than 50 employees used interactive video in some format in their training programs. Vidoetapes accounted for about four-fifths of the interactive video use, and only about 2.6 percent of all firms in the survey used interactive videodisk systems.

A recent Conference Board report, based on survey and interview information from 218 large U.S. companies, concluded that new training technologies are having important effects on corporate training programs, Benefits of the new technologies, according to the report, include more effective instruction, pacing of instruction to meet individual needs, and the ability to train individuals on an as-needed basis rather than in groups. Also, the technol-

[52]Jack Gordon, "computers in Training, " *Training; The Magazine of Human Resources Development,* October 1985, p, 55, The survey found that a much larger proportion of firms—46 percent of all firms with 50 or more employees and 74 percent of firms with 10,000 or more employees—used computers in training for some purpose; however, this included data management, word processing, and graphics, as well as computer-based training.

ogies allowed for greater control over the content of the training program.[53]

Three out of five corporations in the survey reported significant changes in training methods and training technology in the past 5 years. In some companies, changes in training methods followed adoption of new training technologies (e. g., computers facilitate self-administered training), A rapid growth in various forms of television for training was noted. Live videotape playback, for example, is used to appraise and correct employee performance in training sessions. One company's training department operated an internal corporate television network, transmitted by satellite to 67 company locations in the United States and Canada. The network is used primarily to train sales, service, and other personnel about new products; it has also been used for engineering education.[54]

Many large corporations have their own training staff, who are versed in the use of new instructional technologies, and often prepare training materials for in-house use. In addition, a number of firms in the training industry itself specialize in providing either generic or customized instructional technologies and media to business. Some of these firms have carved out niches to provide training products and services to meet the specialized training needs of a wide variety of businesses.

Nationwide information about the size and characteristics of this component of the training industry is limited. However, according to the above cited *Training* magazine survey, U.S. firms with 50 or more employees budgeted at least $4.4 billion in fiscal year 1985 for external training expenses. While seminars and conferences were the largest single item of the training budget, these firms also earmarked about $763 million for off-the-shelf materials, $618 million for custom materials, and $797 million for hardware for fiscal year 1985. Outside services (a category that includes printing and production costs for training materials as well as consultant services that did not involve conferences) were budgeted at $808 million.

Federal Role in Instructional Technology Research and Development

Over the years, the Federal Government has been a major actor in developing many instructional technologies that are now used in the public education system and private sector training. Federal agencies with the most direct and important roles over the years have been the Department of Education (ED) and its predecessor agency, the Office of Education in the former Department of Health, Education, and Welfare, the National Science Foundation (NSF), and the Department of Defense (DOD). DOD expenditures on educational technology R&D were over $250 million in fiscal year 1982, compared to combined expenditures by NSF and ED on educational technology of $18 million.[55]

DOD, NSF, and ED research funds have been important in developing key educational applications for several technologies. In 1959, NSF, as well as the DOD, provided initial funding for development of the PLATO computer-based educational system at the University of Illinois. Another major computer-based education system, called TICCIT, was developed by the Mitre Corp. with NSF support. NSF also supported research at Stanford University to develop uses for the computer in basic reading and math skills. The Office of Education played an important role in early history of educational television, and supported development of a number of computer-based educational materials, among other things. The Department of Defense, owing to the large share of its budget earmarked for training of personnel in specialized skills, has made major contributions to the development and use of CAI, CMI, simulation, and training and education applications for interactive videodisk.

[53] Seymour Lusterman, *Trends in Corporate Education and Training (New* York: The Conference Board, Inc., 1985), p. v.
[54] Jbid., pp. 13- I 4,

[55] The overall role of the Federal Government in educational technology research and development is addressed in detail in the OTA assessment, *Informational Technology and Its Impact on American Education,* op. cit., pp. 111-137.

Several R&D projects are now underway in DOD that concern basic skills education. Many of these research projects are part of an overall effort by DOD to develop basic education programs that are directly tied to development of the skills needed for performance of specific jobs.[56] While still under development or evaluation, these new approaches for basic education may be relevant to basic skills projects provided by employer or displaced worker projects. Because of the job-specific orientation, this approach may be less appropriate for adult basic education classes which may have broader literacy and education goals among their objectives.

The Army is developing a computer-based functional curriculum (called the Job Skills Education Program or JSEP) for soldiers who show deficiencies in knowledge or basic skills required for successful job performance.[57] A precursor to JSEP was the completion, in 1983, of a detailed Baseline Skills Analysis of the academic competencies soldiers need to perform tasks in 94 military occupational specialties (MOS). Also, diagnostic tests were developed to determine whether the individual soldier actually possessed the prerequisite level of competency required for the job.[58] From this information, a taxonomy was developed of over zoo prerequisite competencies needed at certain skills levels for the 94 MOS, as well as skills all soldiers need to know,

Under the JSEP project, computer-based modularized lessons are being developed for 180 of the prerequisite competencies. Florida State University is developing JSEP under an Army Research Institute (ARI) contract awarded in 1982.[59] The system is designed to be delivered on the Army's five mainframe PLATO systems, and on MicroTICCIT, a micro-computer-based tutoring and instructional management system marketed by the Hazeltine Corp. Three field tests of JSEP were conducted in the summer of 1985, with a fourth scheduled for 1986. Evaluation information was not available as this report was completed.

In the Navy, an Experimental Functional Skills Program (XFSP), is under development by the Navy Personnel Research and Development Center in San Diego and the Naval Postgraduate School. XFSP is intended to develop functional reading and mathematics skills that are related to a knowledge base that has a specific Navy orientation.[60] The reading component of XFSP is designed to be delivered in three forms: by a teacher using paper-and-pencil materials only, by a computer in a learning center only, or by a combination of these two in a classroom.

The computer-based instruction component of the program uses several existing public and private domain materials, including a reading skills improvement software program called LaSCAI that was developed by the Navy. Each software program has an editing feature that teachers can use to customize lessons. For example, a vocabulary drill can be tailored to include technical terms used in specific Navy jobs.

The XFSP research also has produced a new reading test battery for testing reading skills

[56] These activities reflect congressional concern, expressed by the House and Senate Appropriations Committees for fiscal year 1978, that on-duty basic skills programs offered by the services be related to job performance. While beyond the scope of this assessment, the Department of Defense is a major provider of remedial education in the United States, and basic skills programs offered by the individual services have been the subject of considerable analysis over the years. See, for example, U.S. General Accounting Office, *Report to the Secretary of the Army: Poor Design and Management Hamper Army's Basic Skills Education Program*, GAO/FPCD-83-19 (Gaithersburg, MD: U.S. General Accounting Office, June 20, 1983). For a history of remedial education programs in the services, see Thomas G. Sticht, *Basic Skills in Defense*, report issued by the Office of the Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics], March 1982.

[57] For a detailed discussion of JSEP, see Beatrice J. Farr, "The Job Skills Education Program: Computer Systems for Army Education, " paper prepared for the International Conference of the Association for the Development of Computer-Based Instructional Systems, Philadelphia, PA, March 1985.

[58] This work was performed by RCA under contract with the Training and Doctrine Command (TRADOC). RCA subcontracted with the Educational Testing Service to develop the diagnostic tests.

[59] The contract is funded by the Education Directorate of the Army Deputy Chief of Staff for Personnel.

[60] For a discussion of this project, See Thomas Sticht, Louis Armijo, Natalie Koffman, and Kent Roberson, "The XFSP: Reading and Mathematics Project, " paper presented at the annual meeting of the Military Testing Association, San Diego, CA, October 1985.

and gains in Navy-related knowledge. A small evaluation study has been conducted which compares test results from students in the XFSP with a sample of students in "general" reading programs offered by education contractors to the Navy. These students were given the new Navy-related reading tests, and also a general reading test. Not surprisingly, students in the general reading program did better on the general reading test, while students in XFSP showed little improvement in general reading but consistent gains in Navy-related reading and knowledge.

The Department of Defense is playing a major role in the continuing development of interactive videodisk systems, through the Army's Electronic Information Display System (EIDS). According to a recent report by the U.S. General Accounting Office, the Army plans to acquire up to 20,000 interactive videodisk systems between fiscal years 1986 and 1990 for use in training and other information display activities.[61] It has programmed $100.3 million for this acquisition over the 5-year period, as well as an additional $27 million for development, production, and distribution of videodisk courseware from fiscal year 1984 to 1990. The Army told GAO that it will reevaluate field needs for the equipment before large-scale procurement begins in 1989. The EIDS units will be built to a standard specification, so that the same interactive video courseware can be used on all of the units. The Army has also developed an authoring system for interactive videodisk, called the Production Management System (PMS). PMS automates a number of functions, and reduces the need for computer programming in developing training programs for interactive videodisks.

Other research is exploring the potential of interactive videodisks in applications that are relevent to basic skills education. The Army Research Institute has sponsored the development of the Spatial Data Management System (SDMS), an interactive videodisk learning strategies program. This package is intended to help students apply learning strategies such as mental imagery, identification of keywords and ideas, or mnemonics in studying, taking tests, solving problems, and making decisions. In a pilot test of this "learning strategies curriculum" with high school students who were poor learners in Berks County, Pennsylvania, both the students and the teachers reacted favorably to the instructional material and the mode of delivery.[62]

Another interactive videodisk project is the Space Time Army Reconnaissance System (STARS), which uses a format similar to videogames to present basic skills lessons. Under contract with the U.S. Army in Europe Continuing Education System, the University of Maryland has developed a STARS curriculum for general basic skills, and another curriculum designed to help soldiers read and understand a specialized repair manual. Evaluation of the STARS program has been conducted, but results were not available when this study was completed. Like most of the basic skills education projects conducted by the Department of Defense, STARS is oriented to the young adult, and uses images and examples that people in the military can relate to.

Several federally sponsored research projects are also underway to create instructional design tools, such as courseware authoring systems, for developing new educational products and curricula. These tools are intended to help trainers and educators who are not computer specialists to design new courseware. This research is funded in part by various military research laboratories and the National Science Foundation, Another role of the Federal Government is in developing evaluation information about its own experience with instructional technology,

The prominent role played by the Federal Government in instructional technology re-

[61] For a discussion of this and other Army procurement plans for training materials, see U.S. General Accounting Office, *Improvements Needed in the Army's Program for Developing Extension Training Materials for Use by Soldiers in Field Units*, GAO/NSIAD-85-73 (Washington, DC: U.S. General Accounting office, 1985).

[62] Peter R. Ramsberger, Paul J. Sticha, and Anne S. Leopold, "Interactive Videodisc for Basic Skills Training Using the Spatial Data Management System, " n.d.

search, development, and application has led to concern about whether adequate procedures are in place to transfer instructional technologies developed with public support to the private sector and educational institutions. Most of this concern has been focused on research funded by the Defense Department. DOD work on instructional technology often has broad applicability to civilian training and education programs, but is not specifically developed for use by the private sector or public education institutions. By contrast, technology diffusion is a principal purpose of both NSF and ED activities in this area.

A generic mechanism for diffusion of federally developed technologies was called for by the Stevenson-Wydler Technology Innovation Act of 1980 (Public Law 96-480). While some aspects of Public Law 96-480 have not been implemented, many Federal laboratories have established Offices of Research and Technology Applications (ORTAs, called for by the law. The purpose of the ORTAsis to facilitate information transfer about laboratory activities that have potential for use by industry. The law also established a Center for Utilization of Federal Technology in the Department of Commerce to compile and disseminate information about technologies owned or originated by the Federal Government. (This function has been assigned to the National Technical Information Service.)

Stevenson-Wydler can be used for diffusion of Federal training technology developed in Federal laboratories to State and local governments and the private sector. For example, the Department of Defense and the National Commission on Libraries and Information Science have been cooperating in a project to determine whether the LaSCAI reading improvement program developed by the Naval Personnel Research and Development Center for Navy recruits can be effective in teaching basic skills in CAI projects for adults and high school dropouts. CAI programs using LaSCAI have been launched at two libraries (one in Maryland, the other in West Virginia). The project has involved ORTAs at both U.S. Army Human Engineering Laboratory and the Naval Personnel Research and Development Center. Extension of the project to the Pittsburgh area is under consideration. [63]

Facilitating the transfer of training technologies for civilian use is one of several subjects addressed by a joint committee on education and training for national security that has been established by DOD and ED. A working group of the committee looks at civilian sector applications for training and education technologies developed by DOD. Another working group works on basic skills issues. The Department of Defense is also working with the Department of Education to provide information on JSEP.

Legislation has been introduced in the 99th Congress to establish a training technology transfer program to encourage more effective diffusion of Federal training technology to educational institutions and the private sector, The bill, S. 1662, defines training technology as computer software developed by Federal agencies to train their employees. It includes instructional software for computers, interactive videodisks, audiovisual devices, programmed learning kits, and manuals or devices that are integrally related to the software.[64] Under the legislation, all Federal agencies that use such training software are to designate a training technology transfer officer. It also would establish an overall Office of Training Technology Transfer in the National Technical Information Service of the Department of Commerce. Among other things, the office would compile and maintain an inventory of Federal training technologies. The bill also would establish a mechanism to encourage the involvement of for-profit companies in converting or modifying Federally developed training technologies so that they can be effectively used by non-profit institutions. (See ch, 2 for further discussion of this legislation.)

[63] Information provided by the National Commission on Libraries and Information Science.

[64] Sec. 3 of S.1662, as introduced on Sept. 19, 1985.

OVERCOMING BARRIERS TO ADULT EDUCATION[65]

While the number of adults in education and training courses has increased greatly over the last 25 years, many people most in need of education and training are nonparticipants. No national surveys have been made to determine why people fail to take advantage of adult education. However, State and local studies have identified impediments to participation, some of the most common of which are listed in table 7-4.

Some barriers arise from the life experience and situation of the person: for example, many adults lack self-confidence or motivation to make education pay off in the job market. Other problems are institutional or structural: people who live in rural areas are less likely to have a full range of educational services available, and in many urban areas, some education programs may be offered in suburban locations that inner-city residents find difficult to reach. Costs of adult education, while often reasonable, may be too high for unemployed or low-income adults to pay without help. Finding relevant courses that fit in with adult schedules is also a problem for many adults.

As experience with adult learners has grown, it has become clear that changes in traditional curricula, teaching methods, and delivery approaches are often needed for a program to work well with adults. Good adult education programs must respond to real-world needs of participants for skills, jobs, or services, and must be delivered in ways that overcome barriers that prevent adults from participating. Some approaches to accomplish this are briefly discussed in the next three sections.

[65]Some of the discussion in this section is drawn from Norman D. Kurland & Associates, *The Role of Technology in the Education, Training and Retraining of Adult Workers,* a previously cited contract report prepared for OTA, and Ivan Charner and Byrna Shore Fraser, *Access and Barriers to Adult Education and Training,* another previously cited contract report prepared for OTA.

Table 7-4.—Barriers to Adult Participation in Education

Category and specific barriers
Situational barriers:
• Not able to afford the class
• Lack of time
• Not able to enroll because of lack of previous education
• Family responsibilities
• Job responsibilities
Social-psychological barriers:
• Lack of confidence in ability
• Feeling too old to learn
• Low self-esteem
• Tired of school
• Lack of interest
• Family or friends do not approve
Structural barriers:
• Inconvenient course scheduling
• Work schedule prevents class attendance
• Lack of transportation
• Relevant courses not offered
• Financial support restrictions
• Program is too long to complete
• Too much red tape
• Lack of information about courses
• Lack of information on support assistance
• Inadequate counseling

SOURCE Adapted by the Off Ice of Technology Assessment from Ivan Charner and Bryna Shore Fraser, "Access and Barriers to Adult Education and Training, " contract report prepared for the Off Ice of Technology Assessment, September 1984

Employer Involvement in Basic Skills Education

Many employed workers with basic skills deficiencies find little reason to participate in remedial education offered by public schools.

Photo credit; UAW-Ford National Development Training Center

Adult participation in education and training can be facilitated if courses are provided at convenient times and places. This computer literacy project is being provided at a local union hall, as part of an employee development and training program.

Some workers, such as high school graduates with poor basic skills, may not recognize that they have educational deficiencies that could affect their job performance. A number of corporations have become involved in basic skills education, and some offer basic skills education to their employees. These corporate programs can overcome some barriers that keep some working adults from taking adult education classes offered by public school systems. In particular, onsite programs can reduce scheduling and transportation conflicts, especially if the classes are offered at worksites during or after shifts. A few corporations overcome time barriers, which can be significant for workers with families, by offering courses on company time. Corporate and union encouragement also can help motivate some employees to take advantage of adult education opportunities. Employer involvement in adult literacy programs is being actively encouraged through the Business Council on Effective Literacy (BCEL), a publicly supported foundation set up in 1983 to increase corporate awareness of functional illiteracy problem.[66]

Employer-provided basic skills programs are probably more common than is generally recognized. However, little information is available about the number and effectiveness of such programs, or how many workers are served by them. It is difficult to judge whether more firms offer basic education to their employees than in the past, simply because few firms were surveyed until recently and no survey is complete. Training magazine's 1985 survey of U.S. companies with more than 50 employees found that about 19 percent of the firms that responded offered some form of remedial education; this was an apparent reduction since the 1984 survey, when one-fourth of the responding firms said they offered remedial education.

Another source of information about corporate involvement in remedial education comes from the Center for Public Resources' 1982 study of basic skills in the U.S. work force. Three-fourths of the 184 firms that responded to the CPR survey (although not a representative sample of U.S. business) offered basic skills competency programs to their employees. About 35 percent of the firms simply offered tuition assistance to employees, while the remainder either provided courses onsite or in cooperation with other companies. Survey respondents were also active in partnership programs with local high schools, aimed at improving educational skills of young people who will soon be in the labor market. Table 7-5 gives examples of such cooperative approaches.

Most of the companies responding to the CPR survey were primarily concerned about deficiencies in oral communications and computation. However, some companies have broader programs. Nabisco Brands offers employees at its Suffolk, Virginia, Planters Peanuts factory 4 hours of elementary school courses a week on company time, with additional classes available on their own time.[67] Sprague Electric Co., in Sanford, Maine, offers its employees time off to attend a nearby school to improve their reading.[68] Both Polaroid Corp. and the Chesapeake & Potomac Telephone Co. (serving the Washington, DC region) have offered remedial education to workers for more than 10 years. Other innovative programs, such as Kimberly-Clark's Educational Opportunities Plan and Mountain Bell's onsite Career Resource Center, can be used by employees to overcome basic skills deficiencies.

While some larger companies offer onsite remedial education programs to their employees, most smaller companies cannot do so. Some public school systems now provide basic education and GED preparation at plant sites if asked by an employer, usually at cost. Montgomery County, Maryland, for example, has been offering a range of remedial education services to local firms for several years. Employers receive contractual services that are designed to meet the particular needs of the company and its employees. The county also offers courses in English as a second language at

[66] BCEL activities include publication of reports and a quarterly newsletter for the business community on adult literacy programs, planning, and issues.

[67] "How Business Is Joining the Fight Against Functional Illiteracy," *Business Week*, Apr. 16, 1984, p. 98.

[68] *Basic Skills in the U.S. Workforce*, op. cit., p. 28.

Table 7-5.—Corporate and School System Models To Improve Basic Skills Competencies

Models	Subject focus: Reading	Writing	Mathematics	Speaking/listening	Science	Reasoning	Other[a]	General	Locus: Internal corporate or school system	Cooperative—generic	Cooperative—unique	Third party	Form: Employee training	Teacher training	Work study	Tutoring/in-class teaching	Development of training materials	Advisory board	Tuition Assistance	Adopt-a-school	Financial support	Counseling/communication
Banker's Life Co. "People Handle with Care"				X							X					X			X			
City National Bank								X	X				X									
McGraw Hill —"Numbers Skills					X					X								X				
Mountain Bell								X	X						X							X
Polaroid.										X	X					X					X	
Kimberly -Clark										X	X					X					X	
Sprague Electric Co.				X							X					X			X			
Boston Edison										X	X	X									X	
Chesapeake &Potomac			X		X						X						X				X	
Pittsburgh Public School System								X	X								X					
Continental Illinois Bank &Trust Co.									X	X					X							
Ralston Purina Co.										X		X				X						
Reader' s Digest								X					X				X					
General Foods											X	X				X						
Mutual Benefit Life									X	X					X							
Rexnord										X		X				X						
Vought Corp				X		X					X				X							
Omaha National Bank										X		X						X				
Manufacturers Hanover								X		X								X				
General Foods "Operation Opportunity"											X				X				X	j		X
Security Pacific National Bank "Project STEP"									X			X					X					
Kaiser Aluminum								X	X	X			X	X		X						X
Genessee Intermediate School District/ Flint Chamber of Commerce									X	X		X	X			X						
Summer School District								X	X													X
Digital & Intel w/Paradise Valley USD				X							X						X	X				
Lawrence School Department								X			X											X
Harrisburg School System									X			X							X			
Xerox Corp.									X							X		X				
Eastman Kodak								X		X					X			X	X	X		X
Erie Opportunities industrialization Center	X	X	X	X	X									X					X		X	X
Merit Employers Clerical Enrichment Program								X			X						X					
National Association for Drug Abuse										X					X			X				X
Trilateral Council for Quality Education								X				X									X	
New Horizons										X	X					X			X			
Worcester Area Career Consortia									X							X			X			
Control Data				X	X	X						X				X			X			
Washington, DC School System				X		X	X			X					X			X	X			X
Seattle Public Schools								X			X							X	X			X

[a]Including work behavior skills

SOURCE James F Henry and Susan Ueber Raymond, *Basic Skills in the US. Work Force* (New York Center for Public Resources, 1983), p 29

plant sites, a service that is well-received by local employers because of the large number of recent immigrants to the area.

Affiliations between local ABE projects and businesses and unions to provide basic skills instruction to workers are fairly common. According to a recent survey of State adult education directors, about 4,000 arrangements of this sort exist among the 31 States that have formal programs to involve companies and unions in ABE projects. Most of these projects involve small or medium-size corporations, Federal Adult Education Act funds, apparently, provided the greatest amount of money for these services, followed in order by business and industry funding, other State and local funds, JTPA, and other sources.[69]

[69]Jorie Lester Mark and Garrett Murphy, "The Basic Skills-Business/Union Connection," American Association for Adult and Continuing Education, Washington, DC, October 1985.

Some private community-based foundations are also active in promoting basic education at the work site. In the Twin Cities, Literacy '85, a project of the St. Paul Foundation, will assess basic skills of workers, and develop special curricula for employers under contract.

Many workers faced with imminent layoffs or displacement can also benefit from remedial education course offerings, provided sufficent time is available to institute a program. Often, such programs depend on cooperative efforts on the part of management, unions, and educational institutions,

A successful program of this sort was run cooperatively by the Ford Motor Co. and the United Autoworkers prior to the planned shutdown of Ford's Escort assembly plant in Milpitas, California, in the spring of 1983. (This program is described in ch, 6.) During the 6-month period prior to the shutdown, the company and union undertook an extensive education and retraining program. Initial testing of over 1,600 workers showed that 11 percent scored below the sixth grade level, and another 16 percent were below the eighth grade level.[70]

As a result, the union-management team realized that remedial education would be extremely important to the success of their planned occupational retraining programs. The team called in the Milpitas Unified School District, which offered the workers courses at the plant site, after hours in the 5 months before the plant actually closed in May 1983, and during the day through most of the following year. Intensive courses in basic education, algebra and pre-algebra, GED preparation, and English as a second language were offered each time, depending on the workers' needs and enrollment levels. The courses were repeated six times over the entire course of the project, giving the displaced workers several opportunities to participate.

Because of the flexible scheduling, the use of the plant site both before and after the shutdown, and the union's active encouragement, response to the course offerings was very high. By May 1984, a year after the plant had closed, over one-third of the laid-off workers (770) had taken one or more classes. Of these, 341 entered occupational training programs and 205 were placed in jobs, for a total of 546 successful completions.[71] As the result of these courses, 175 displaced workers passed the GED examination.[72]

Designing Programs To Meet Adult Needs

Adults who do not think of education as a continuing activity in their lives may not turn to it even when education could help them make occupational adjustments to threatening changes in the local economy. Programs to attract these adults, therefore, are more likely to succeed if they are designed to anticipate the special problems and needs of the group they are intended to serve. A successful remedial education program for laid-off auto workers, such as the Milpitas project described above, may have quite different characteristics than projects that are successful among rural people or economically disadvantaged adults in the inner city. Three projects that have been specially designed to meet the needs of specific groups of adults are discussed briefly below.

Adults who live in rural areas often have difficulty in obtaining educational services that meet their specific needs. Some rural adults who are functionally illiterate high school graduates, for example, may not be eligible for some local GED programs and may live too far away to take advantage of the voluntary literacy programs that can be found in many urban areas. A program offered by the Center for Adult Education of the West Virginia Institute of Technology is aimed at serving this group.

Begun in the fall of 1983, the project is based on the premise that adults will be more likely to stay in remedial education if they learn to read about issues that concern them most.

[70] Carol A. Upton, *Meeting the Educational Needs of the UAW/Ford Displaced Workers* (San Jose, CA: San Jose State University, 1984), p. 13.

[71] A few workers were enrolled in remedial education courses at that time, and many were enrolled in occupational training classes, making it impossible to determine final job placements.

[72] "Related Basic Skills Vocational Training UAW/Ford-Milpitas Adult Education Grant 200" (unpublished data from Milpitas Unified School District, dated Apr. 9, 1984).

Adults are encouraged to define their own interests, and the materials used to teach them (e.g., union contracts, welfare regulations, or newsletters) reflect their life experience. Courses are sponsored by unions, community groups, and prisons, and these organizations provide the location for classes. The program uses adult adjuncts (former project participants or staff from unions, prisons, and community groups) to help in the teaching, and participants are paired to reinforce learning. This informal support network, along with using reading materials that participants are comfortable with, helps overcome deficiencies in self--confidence. [73]

Although a promising approach, the project is only reaching a very small portion of the State's adults with literacy problems. About 250 adults participated in the program during its first year, and another 175 people in the second year. Most were unemployed mine workers or textile workers. A variety of different measurements of the effectiveness of the approach have been made by the project staff. Participants given standardized tests frequently used in adult education classes did very well in language skills. The program was funded by the U.S. Department of Education's Fund for the Improvement of Postsecondary Education through a 2-year $180,000 grant.[74]

In another part of rural America, a quite different kind of literacy problem—the need for computer literacy—is being addressed by an Idaho project for rural adults. Acronymed READI, the project arose from a recognition that an increasing number of rural jobs in the State required workers to use computers, but training opportunities in rural areas were very limited. Among other developments, computerized lumber mills were being built in the State, and many farmers felt a need to learn how to use computers in bookkeeping and farm management. Computers are also increasingly used by the rural banking industry, local government, and county extension offices.

Begun in the fall of 1983, the program is administered by the University of Idaho's cooperative extension department. Two major goals were identified: developing a curriculum to teach rural adults how to use computers (programming computers is not part of the objective), and developing an appropriate delivery system for rural communities. Access to computers has not been a problem, since computers in county extension offices and local high schools, as well as the university's extension system computer are available to participants.

The project relies heavily on local advisory committees, who are actively involved in the actual delivery of the program. Peer teachers (local owners of small businesses, farmers, and homemakers) are selected by the local advisory committees and trained by project staff to recruit students and teach the courses under the overall supervision of the project staff. This approach is intended to encourage participants to exchange ideas and feelings, and increase their self-confidence. The courses are provided free of charge to participants, and are held two evenings a week for a 4-week period. Job referral services are also made available to participants.

From the summer of 1984 through fall of 1985, about 500 people took the course. About one-third of these people were self employed people who use computers in their businesses. Another third of the students were taking courses to get jobs in such fields as bookkeeping, word processing, or office work. The project is expected to continue through the fall of 1986. It is funded by a $268,000 3-year grant from the Fund for the Improvement of Postsecondary Education, and about $150,000 in matching funds. This includes course development costs, as well as peer teacher training, outreach, and delivery.

Urban areas generally have a far broader range of educational services for adults than is typically present in rural America. However, cities that are confronted with widespread layoffs or unemployment may have an immediate need to provide job counseling, education

[73] Charner and Fraser, op. cit., pp. 85-86.

[74] Information provided by the staff of the Center for Adult Education of the West Virginia Institute of Technology.

and retraining, and other services to the unemployed that exceed local capabilities.

In Detroit, where heavy layoffs in the auto industry in the early 1980s created massive displacement, a project called the Communication/Information System for the Unemployed (CISU) has tapped the potential of television to bring education and information services to large numbers of displaced workers. CISU is sponsored by Wayne State University and a number of other schools that formed the Southeastern Michigan Educational Television Consortium in the late 1970s, WTVS (the Detroit public television station), the United Auto Workers, the Michigan Employment Security Commission, and a number of other organizations.[75]

When the layoffs hit Detroit in the early 1980s, the consortium, in coalition with UAW, the State employment security commission and WTVS, were able to use television to provide the unemployed with information on the local job market, job-hunting techniques, and occupational training. In 1982, the coalition set up CISU to provide information and education services on a continuing basis, and in 1983, CISU received a JTPA Title III grant from the Governor's office for job training to make displaced workers aware of locally available services.

CISU provides information to unemployed viewers about services that are available locally through use of public broadcasting, cable television, and instructional television fixed service (ITFS), A 24-hour cable television channel, called the Working Channel, offers courses and services related to job search assistance, job listings, "survival" information services, GED and ABE courses, and vocational training. ITFS is used to deliver material for broadcast to the many cable systems involved in the project.

The Working Channel can be viewed not only in homes equipped for cable, but also at over 200 sites in southeastern Michigan. To serve areas without cable, about 50 viewing sites have been equipped with dish-antennas that allow them to receive direct transmission of programs through ITFS (this low-powered, short-distance transmission system was discussed in the instructional technology section earlier in this chapter). Another 150 viewing sites have been set up in areas served by cable, as well. Sites include union halls, churches, public service agencies, libraries, and community colleges, among others. Unemployed people also have the opportunity to come to these centers to participate in working circles, groups of 5 to 15 people that work together to address common problems. Videoconferencing is used so that different working circles can exchange information and perspectives.

Unemployed workers in Detroit also can benefit from Wayne State University's "weekend college, " a program begun in 1973 to reach working adults through televised courses, complemented by classroom sessions on the weekends. In 1975, Michigan's employment security commission held that unemployed workers could receive unemployment insurance benefits while attending the weekend college. An effort is being made to encourage unemployed workers to use Pen grants and tuition grants to enter the degree program.

Although it would be a mistake to generalize too much from these few examples, it is clear that education programs that are aimed at a specific part of the adult population—such as unemployed workers or educationally disadvantaged adults—work best when they are designed with the specific needs of the target population in mind. Programs that are effective in responding to the educational objectives of mature adult workers often require modifications in traditional curricula and teaching methods, as well as innovative approaches in the delivery of education. Often, these programs will involve linkages between educational institutions and business, unions, and community organizations.

Targeting Occupational Training to Job Needs

Communities or regions that are responsive to changing labor market needs are often able

[75] This discussion of CISU is based on Norman D. Kurland & Associates, op. cit., p. i', and additional information provided by CISU staff.

to attract new industry, even if they have lost some of their old employment base. Local vocational education institutions can be an important factor in attracting new industry to an area, as a 1984 study of Lowell, Massachusetts, suggests. 'G The area has experienced a great deal of structural change since 1960, with large job losses in textiles and apparel and a major influx of jobs in such industries as computers, electronics, transportation equipment, and instrument manufacturing. Over the same period, the occupational training system expanded rapidly and changed its curriculum to meet the changing needs. Between 1970 and 1982, over 85 percent of the graduates of public and private vocational schools received skill training that was "on target" or "reasonably aligned" with occupational employment changes. Courses in skills required by the rapidly-expanding "high-tech" sector grew twice as fast as other training programs.[77]

Firms generally consider the availability of a skilled work force to be an important factor in making location decisions. A recent OTA report found that about half of all State efforts to attract high-technology development included education and training programs.[78] Strong vocational education programs alone cannot create a healthy economy. However, a recent report by a committee of the National Research Council found that firms may well be attracted to areas that have strong vocational programs that meet the particular firms needs.[79]

A number of steps can be taken to target occupational training more closely to real-world job needs. Information about the training needed to develop skills for specific jobs can be very important. Sometimes, careful study will reveal mismatches in the requirements of vocational skills training courses and the kinds of skills that are really needed on a job. For example, an extensive study of job requirements in Canada found that, while communications, reasoning skills, and interpersonal skills were important to a wide variety of jobs, vocational skills training courses included requirements far beyond these generic skills, especially in mathematics and science. As a result of the study, the Ontario community colleges greatly reduced the science component in several skills training courses. In the United States, the Department of Defense, through such efforts as the Army's Baseline Skills Research Project (discussed earlier in this chapter), is developing a great deal of information about the basic education and training requirements needed to perform specific jobs in the military. Since many military jobs have civilian counterparts, this information may be useful to corporate trainers and vocational education teachers outside of DOD.

Another approach to closer targeting of vocational courses to real-world training needs is collaboration between institutions that provide vocational education and local business. Since passage of the Vocational Education Act of 1963, private sector involvement in planning of vocational education has been encouraged through various advisory councils at all levels of government. The National Research Council study referred to above found that high-quality vocational education programs typically had developed close ties with business and labor.[80] However, it also concluded that more effort is needed to extend collaborative ventures to other programs and situations.

The National Research Council study focused primarily on vocational education in the secondary schools. However, the trend towards increased partnerships between community colleges and local business also can lead to closer targeting of vocational education with the needs of the local labor market. These arrangements with business take a variety of

[76]Patricia M. Flynn, *Production Life Cycles and Their Implications for Education and Training* (Waltham, MA: Bentley College, 1984).

[77]1 bid., p. V-2.

[78]U ,s. Congress Office of Technology Assessment, Technology, *innovation, and Regional Economic Development,* OTA-STI-238 [Washington, DC: U.S. Government Printing Office, 1984), p. 62.

[79]National Research Council Committee on Vocational Education and Economic Development in Depressed Areas, *Education for Tomorrow's Jobs* (Washington, DC: National Academy Press, 1983), pp. 66-67.

[80]Ibid., p. 68.

forms, including plant-specific training provided by the college under contract with a local employer, equipment use or donation, industry assistance in developing programs, faculty assignments in industry, industry personnel provided as part of the instructional staff, sharing of facilities, and on-the-job training.

Employees in firms engaged in such partnerships often stand to benefit from the arrangement, Some employees who might not participate in a skills training course may be encouraged to do so if it is linked to their own firm. Some firms pick up the cost of courses when their employees take them, and a few even allow employees to take these courses on company time. Lack of self-confidence may also be overcome when courses are offered at the workplace and classes are made up of peers, rather than younger, full-time students.

Such cooperative arrangements benefit community colleges in several ways by broadening their ability to meet community needs, enhancing program offerings, and increasing revenues. However, concern exists that partnerships could lead some schools to lose sight of their broader educational mission, and that other important program commitments could be diminished. Areas for concern include possible loss of faculty to industry; overreliance on short-term programs to support the college; the chance that industry's specific training demands may threaten the schools' responsibility for providing programs with the same standards as its on-campus offerings; and the danger that focusing on job-specific training may limit the general employability of workers and reduce the adaptability of the work force.

FEDERAL SUPPORT FOR ADULT EDUCATION AND TRAINING

While the Federal Government contributes less than 10 percent of all funds for public education nationwide, it plays a more important role in State and local programs providing adults with basic education and vocational education. The Adult Education Act (AEA), administered by the U.S. Department of Education (ED), contributes nearly half of the funds States and localities spend for adult basic education under this program. Under the Carl D. Perkins Vocational Education Act, enacted by Congress in 1984, the States are now required to target some of the grants they receive from the Federal vocational education (Voc Ed) program (also administered by ED) to provide more vocational education opportunities to adults, with the Federal Government authorized to pick up half or, in some cases, all of the costs of such programs.

Due to changes made in 1984, the AEA and Voc Ed laws authorize States to give employers, for-profit schools, and businesses that specialize in educational services a greater role in these programs than heretofore, The 1984 amendments also call for greater coordination of these programs with JTPA (which is administered by the Department of Labor). Some funds appropriated under Title II of the Job Training Partnership Act are earmarked to State continuing education agencies, including vocational and adult education agencies.

Most other kinds of continuing education receive little direct support from the Federal Government, but indirect support is important. The tax code allows businesses to treat the costs of training work forces as a normal business expense in calculating their Federal taxes, and individual workers can write off tuition expenses for courses that are directly related to their current jobs. Also, from 1978 through 1985, employees did not have to consider tuition and other forms of educational support provided under qualified company programs as income on which they owe Federal taxes. This provision will not apply in the 1986 tax year unless extended by Congress. Some adults also receive support from Federal student aid programs.

The Adult Education Act

The Adult Education Act, first enacted in 1966 but amended most recently in 1984, is the largest Federal program supporting remedial education for adults. AEA provides grants to States for local programs of adult basic education, adult secondary education, and English as a second language. The Federal Government is authorized to provide up to 90 percent of the cost of providing these services, with the balance contributed by the State. In practice, the State cost-share varies significantly, Some *States* contribute the minimum, while others pick up three-quarters or more of the cost of providing these services.

About 2.3 million people took part in AEA-supported projects in the 1981 program year, the last year for which official data on participation are available. According to unofficial data provided by State administrators, about 2,6 million adults were served by AEA projects in 1984, including 1.8 million people in ABE classes, and 760,000 people in ASE courses. An estimated 281,000 people completed GED requirements in 1984. The 1984 information is not based on official U.S. Department of Education data, however. In 1981, the Administration placed restrictions on the kinds of data that the States were required to report under AEA. As a result, much of the State and local information for program years 1982 through 1985 is based on data provided unofficially by the States. In reauthorizing the program in 1984, Congress authorized the Department of Education to obtain additional program data from the States, so that more detailed official reporting on AEA can be expected in the 1986 program year. Table **7-6** shows selected characteristics of participants in the AEA program.

Federal funding for AEA has fluctuated over the last 5 years; in fiscal year 1981, $100 million was appropriated for the program. In fiscal year 1982, funding for AEA was reduced to $86.4 million. In fiscal years 1983 and 1984, funding was increased to $95 million and $100 million respectively .81 The Adult Education Act Amendments of 1984 (Title I of Public Law 98-511) authorized the appropriation of $140 million in adult education funds for fiscal year 1985, and such sums as may be necessary for fiscal years 1986 through 1988. Congress appropriated $102 million for the program in fiscal year 1985 and a like amount for fiscal year 1986. The adult education program is a forward-funded program, so that funds actually appro-

[81] Appropriations for State grants, teacher training, and special projects gradually increased from about $2o million in fiscal year 1965 to a high point of $122 million in fiscal year 1980. (This included $22 million in emergency funding for English training of Cuban, Haitian, and Indochinese immigrants,)

Table 7-6.—Demographic Characteristics of Participants in Adult Education Projects, by Program Type

Characteristic	Participation, by program type (percent)			
	Adult basic education	Adult secondary education	English as a second language	All programs
Sex:				
Male ., ...	45.6	41.1	*47.4*	41.2
Female.	54.4	58.9	*52.6*	58.8
Age:				
16 to 21 years old	31,0	*47.5*	22.9	22.4
22 to *34* years old	37.6	33.8	44.9	42.7
35 to 59 years old	24.2	15.8	25.9	28.2
≥ 60 years old.	7.3	2.9	6.4	6.7
Ethnicity:				
Hispanic	24.8	6.6	*57.3*	*20.6*
Native American. , ...	1.1	1.4	0.1	*1.2*
Asian/Pacific , ...	1,7	0.1	31.1	*7.5*
Black, not Hispanic	22.5	18.7	0.5	*27.4*
White, not Hispanic	49.9	73.2	11.1	*43.3*

SOURCE U S Department of Education, Off Ice of Vocational and Adult Education

priated for fiscal year 1986 will be expended between July 1986 and September 30, 1987.

In program year 1982, the Federal Government provided about 44 percent of the $229 million that State education agencies and local school districts spent on AEA programs. The Federal share declined to about one-third of AEA costs in program year 1983; about $259 million was spent on AEA programs that year, with the State and local contribution amounting to $173 million. California accounted for most of the increase in State spending, contributing $103 million in program year 1983, compared to $64.8 million in program year 1982. The decline in the Federal share also reflects the reduced Federal expenditures for AEA in fiscal year 1982.

In 1978, Congress called for expansion of the AEA delivery system so that it would include other organizations besides the public school system, including business, labor unions, and community organizations. As shown in table 7-7, a high proportion of adult education projects, especially ABE projects, are now given outside traditional elementary and secondary school settings. Congress also authorized the States to allocate some of their AEA funds to nonprofit organizations to establish or expand adult education projects. In its 1984 amendments, Congress authorized States to use AEA funds for projects run by for-profit organizations that could make a "significant contribution" to attaining the objectives of the act, and if the for-profit agency could provide "substantially equivalent education at a lesser cost" or provide "services and equipment not available in public institutions."[82]

Section 310 of AEA requires States to allocate at least 10 percent of their Federal grant to special experimental demonstration projects and teacher training. Special projects include those involving innovative methods, materials, or programs. Funding for Section 310 projects involving instructional technology doubled between fiscal years 1983 and 1985, from $600,000 to $1.2 million. States have also used Section 310 funds to develop new assessment materials and procedures, such as the California Adult Student Assessment System (CASAS). CASAS is intended to improve competency-based adult education programs.

Section 309 of AEA authorizes the Secretary of Education to set aside 5 percent of appropriated funds (but only when annual appropriations are over $112 million) for special research, development, demonstration, dissemination, and evaluation projects. Three kinds of activities are authorized: 1) "improving adult education opportunities for elderly individuals and adult immigrants"; 2) "evaluating educational technology and computer software suitable for providing instruction to adults"; and 3) "supporting exemplary cooperative adult education

[82]Adult Education Act Amendments of 1984, Public Law 98-511, Sec. 304,

Table 7-7.—Selected Characteristics of Adult Education Projects

Characteristic	Participation, by program type (percent)			
	Adult basic education	Adult secondary education	English as a second language	All programs
Setting:				
Elementary school	12.6	5,6	5.5	8.6
Secondary school	14.4	44.1	32.5	29.0
Community college/vocational-technical school	5.5	12.2	15.0	9.8
Adult learning center	26.3	25.9	33.8	27.6
Other	41.2	12.2	13.3	25.1
Format:				
Individualized instruction	37.7	66.4	13.8	44.0
Group instruction	27,1	21.5	41.8	27.7
Combination	35.2	12.1	44.4	28.2

SOURCE: U S Department of Education, Office of Vocational and Adult Education

programs which combine the resources of business, schools and community organizations. " Funding for AEA has not reached the $112 million level, and Section 309 has not been used.

The Vocational Education Program

A continuing program of Federal support for vocational education has been in place since 1917, when the Smith-Hughes Act first authorized grants to States for vocational education in public schools and other noncollegiate institutions. Several subsequent pieces of legislation, including the vocational education acts of 1946, 1963, 1976, and 1984 expanded Federal support for vocational education. While Federal funds comprise only about 10 percent of total State and local vocational education expenditures, most of these funds are targeted for specific objectives (such as serving the needs of special populations or promoting innovation in vocational education), and often support half or more of a State's activities aimed at these specific objectives.

In 1984, Congress made far-reaching changes in the Federal vocational education program through enactment of the Carl D, Perkins Vocational Education Act (Public Law 98-524).[83] The new law places substantially more emphasis on providing vocational education opportunities to adults, displaced homemakers and single parents, and workers displaced by technological change or in need of training to remain employed. The law also authorizes States to use Federal funds to support employers in training and retraining of employees in some circumstances, and emphasizes basic skills education to a greater degree than prior vocational education law. State vocational education plans are to specify coordination provisions with Job Training Partnership Act and the Adult Education Act,

[83]Public Law 98-524 amends and replaces the Vocational Education Act of 1963 (Public Law 88-210). It is named the Carl D. Perkins Vocational Education Act, in honor of the late Congressman from Kentucky who died in 1984,

The 1984 law authorizes the appropriation of $950 million for vocational education in fiscal year 1985, and such sums as may be necessary for fiscal years 1986 through 1989, to support several existing and new program objectives. As a forward-funded program, fiscal year 1985 funds will be disbursed in the July 1985 to September 30, 1986 period. Major provisions in the law that apply to training and retraining of adult workers are discussed below.

Basic State Grants (Title II).–Basic grants, which are allocated to the States by a funding formula, comprise about 84 percent of the total funds authorized under the 1984 act. States can use these basic grants for three kinds of activities: State administration; provision of "vocational education opportunities" to certain population groups (Title IIA); and for "improvement, innovation and expansion" of vocational education (Title IIB). Congress appropriated $782.5 million for the basic grants in fiscal year 1985, and $782,4 for fiscal year 1986.

Of the total basic State grant, up to 7 percent can be used for State administration, and of the balance remaining, 57 percent is to be used to provide vocational education opportunities. This is to take the form of vocational education services and activities that "meet the special needs" and enhance participation of several groups of people, including adults in need of training or retraining, and single parents and displaced homemakers (Title IIA). States must match the 12 percent of the Title 11 allocation that is earmarked for adult training and retraining needs, while there is no matching requirement for the State in the case of the 8.5 percent of the Title II funds that is directed at single parents and displaced homemakers. Other groups of people covered by the targeted Title 11A allocations are handicapped persons, the disadvantaged, individuals in programs to eliminate sex bias and stereotyping in vocational education, and criminals in correctional institutions.

States have greater discretion in the use of the remaining 43 percent of their basic grant that is earmarked for improvement, innovation,

and expansion of vocational education under Title IIB. Among many other things, States are authorized to use these funds for improving or expanding adult programs for upgrading the skills of employed workers, workers who are unemployed or threatened with displacement due to technological change or industrial dislocation, workers with limited English proficiency, and displaced homemakers. The law also authorizes States to use Title IIB funds to provide stipends for students with "acute economic needs" which could not be met through work-study programs. The stipends cannot exceed "reasonable amounts" prescribed by the Secretary of Education.

Under both parts of Title II, States are authorized to use employers, private vocational training institutions and private postsecondary institutions as providers of training when these private institutions could contribute to the objectives of the State plan and could provide equivalent training at less cost, or could provide equipment or services not available at public institutions. This opens up the possibility that more training and retraining activities conducted by employers will be supported by Federal funds.

State's may use Title 11A allotments for basic skills instruction when it is related to instructional programs for those special need populations targeted by the act, Title IIB funds may be used for curriculum development in vocational education, including application of basic skills training.

Special **State Programs (Title** III).–Title III of the act authorizes grants for five kinds of special State programs, including programs for adult training, retraining, and employment development. This special grant may be used for vocational education programs authorized under Title 11 of the law that meet the needs of:

1. high school graduates or dropouts who need additional vocational education to enter the labor force;
2. unemployed people who need training to increase their employability;
3. employed individuals who need retraining to keep their jobs, or training to upgrade skills so that they can obtain a better or more dependable job;
4. displaced homemakers and single parents;
5. workers 55 and over; and
6. employers who require assistance in training individuals for new employment opportunities or in retraining employees for skills needed because of changes in technology, products, or processes.

The funds can be used for "short-term programs of retraining" for upgrading or updating skills due to changed work requirements, and for "education and training programs designed cooperatively with employers. " The law identifies several examples of such cooperative efforts, including:

1. institutional and worksite programs, including apprenticeship programs;
2. quick-start customized training in new or labor short industries;
3. building linkages between vocational education institutions and private sector employers; and
4. recruitment, job search assistance, counseling and remedial services, and information and outreach programs.

The special program funds can also be used to cover the costs of serving adults in other vocational education programs, including instruction costs, and costs of keeping school facilities open longer.[84]

Although the law authorized the appropriation of $35 million for this special program for fiscal year 1985 (and such sums as are necessary for fiscal years 1986 through 1989), Congress did not appropriate funds for this purpose in fiscal years 1985 and 1986.

Another special State program authorized by Title III is for career guidance and counseling (such as activities to assist individuals in maintaining marketability of current job skills in established occupations, developing new job skills to move away from declining occupa-

[84]Other examples listed in the law include curriculum development, acquisition of instructional equipment and materials, personnel training, pilot projects and related services, and instruction for apprentices in apprenticeship programs.

tional fields, and developing midcareer job search skills). Also, Title III authorized a special program for industry-education partnerships in high-technology occupations. Congress did not provide appropriations for these programs in fiscal years 1985 and 1986.

National Programs (Title IV).–Some of the national programs called for by the law also have direct relevance to displaced workers. (National programs are administered directly by the Department of Education, not the States.) Research is to be conducted on, among other things, strategies for improving worker training and retraining, and development of new curriculum materials and methods relating to new technology, and assessment of workplace changes and its effect on individual jobs. An independent assessment is to be made of the vocational education programs assisted by the act, including the effectiveness of the program in reaching adults and other people identified in Title 11A. The National Center for Research on Vocational Education (now housed at Ohio State University) is to undertake research and development on effective methods to provide quality vocational education to these targeted individuals, and to report annually on joint planning and coordination of vocational education law with JTPA. (The report is to go to Congress and the Secretaries of Education and Labor).

The Secretary of Education is directed to set up at least one center for retraining of displaced workers to demonstrate the application of vocational education theories to the specific problems encountered in retraining displaced workers. The Secretary is also to establish model centers to focus attention on the vocational education needs of older individuals (those 55 and above), including training and retraining of older workers whose skills have been rendered obsolete by technological change, and older individuals who are displaced homemakers.

Job Training Partnership Act

The role of remedial and vocational education in retraining displaced workers under Title 111 of JTPA is discussed in detail in chapter 6. In addition, Title II of JTPA can be used to provide economically disadvantaged adults and youths with basic education, vocational education, and other educational opportunities.[85] For fiscal year 1984, Congress appropriated about $1.9 billion for Title 11A activities, which are directed at provision of training opportunities for economically disadvantaged youths and adults.

The law requires States to allocate 8 percent of these funds to State educational agencies, including vocational and adult education agencies. According to U.S. Department of Education survey data on the use of the set-aside, States actually utilized $62.8 million for this purpose in the initial year (fiscal year 1984). Nearly half of. the set-aside was used for postsecondary education, and about one-third was used for vocational education; only about 17 percent of these funds ($10.7 million) was used for remedial education.[86] Thus, it appears that most of the Title II set-aside is being used for postsecondary and vocational education programs, and that the State agencies are using only a small portion of the set-aside for remedial education.

While displaced worker projects supported by Title III of JTPA often provide remedial education, no special funds are set aside for remedial or other kinds of education under Title III. As is discussed in chapter 6, there is an apparent reluctance on the part of some State agency administrators to encourage greater use of remedial education in Title III projects for displaced workers. The possibility of establishing a set-aside of funds for remedial education in Title III projects is discussed in chapter 2.

'Remedial education for adults was also authorized under the Comprehensive Employment and Training Act (CETA), which JTPA replaced. Under CETA, about 90,000 adults attended classes in remedial education, English as a second language, and high school equivalency in 1980. See Congressional Budget Office and National Commission for Employment Policy, *CETA Training Programs: Do They Work for Adults?* [Washington, DC: U.S. Government Printing Office, July 1982), p. 8.

'Information provided by the Office of Vocational and Adult Education, U.S. Department of Education. An additional $13.2 million was used for "other" purposes such as corrections programs.

As has been mentioned, Congress, in its 1984 reauthorizations of both the Adult Education Act and the vocational education program, recognized a significant need for careful coordination of these programs with JTPA, which is administered by the Department of Labor. Among other things, State planning periods under the vocational education program are to be "coterminous" with those under JTPA. Local applications for State assistance under the vocational education program are to be made available for review by the appropriate JTPA administrative entity.

Educational Support for Individuals

For several years, the Federal Government has encouraged employed adults to participate in employer-provided tuition assistance programs by making such assistance tax exempt to the employee. Job-related tuition assistance has never been considered income for employees, and is therefore tax exempt. In 1978, Congress extended this exemption to all forms of tuition assistance, including tuition assistance for courses that were not job related, provided under qualified company educational programs. This provision lapsed at the end of 1985, just as this report was being completed, raising the possibility that employer-provided tuition assistance that is not directly related to an employee's current job will be taxed as ordinary income in the 1986 tax year. However, as is discussed in chapter 2, legislation to extend the provision are under consideration in the 99th Congress. For example, a provision in H.R. 3838, the proposed tax reform bill that was passed by the House on December 17, 1985, would extend the provision through the end of 1987.

Federal financial assistance programs for students may help some employed workers, displaced workers, and homemakers who elect to participate in postsecondary vocational or academic education. Forms of Federal student aid include direct loans, guaranteed student loans, grants, veterans assistance, and other kinds of direct assistance to special populations. Many Federal assistance programs for postsecondary education support students in vocational and technical education programs at eligible (accredited) institutions as well as academic students at colleges and universities. The largest Federal assistance programs are shown in table 7-8.

A number of practical barriers make it difficult for adults to compete for the available financial assistance. Most employed adults participating in adult education are enrolled half-time or less because they are working or have family responsibilities that make it difficult to enroll full time in a program. Under most of the programs, students must be enrolled at least half-time to qualify for aid. Exceptions are Supplemental Educational Opportunity Grants and College Work-Study; even though 10 percent of the funds in these programs can be given to people enrolled less than half-time, few schools earmark the full 10 percent. Students who are not enrolled in a degree or certificate program, or other formal program of preparation for a recognized vocation, are ineligible for most forms of assistance except Guaranteed Student Loans. Adults who own their own homes may be penalized in calculations of financial need. Another problem, affecting displaced workers especially, is that determination of need for financial aid is based on the previous year income. Hence, workers who had a good income prior to a layoff maybe ineligible for aid. As is discussed in chapter 2, a number of different proposals have been made to expand financial assistance opportunities for displaced workers and adults generally. Some bills, for example, propose to amend the Higher Education Act to discount home equity in calculating financial aid needs for displaced workers, and would base the determination of need on current income.

Often, student financial aid packages involve combined support from more than one Federal loan and grant programs, as well as support from other public and private institutions. Federal support (both loans and grants) generally cannot exceed $5,000 in any given academic year. Financial aid can be used for tuition, room and board, and educational assistance. Adults who are not in residence at a school may be eligible for limited "cost of attendance allowances" which may defray a portion of their living expenses while they are enrolled.

Table 7-8.—Selected Federal Postsecondary Financial Assistance Programs

Program	Funding level FY 1985 ($ millions)	Eligible recipients	Type of postsecondary education or training: Vocational	Undergraduate	Graduate	Professional	Other[a]	Type of assistance	Comments
Pen Grants[b]	3,612	Financially needy undergraduates enrolled at least half-time in institutions of postsecondary education who are maintaining satisfactory academic progress	X	X				Grants, maximum $1,900 in award year 1984-85 Awards usually disbursed through the institution in which students are enrolled Pen Grants may be used m conjunction with other Federal assistance	About 2,850,000 students received Pell Grants in 1984-85 school year for an average award of $990 In 1983-84, 75% of awards were to students whose family incomes were $15,000 or less
Supplemental Educational Opportunity Grants	412	Available through school to needy students as supplement to Pen Grants or to help with other educational needs Schools can allocate 10% of funds for less than half-time students	X	X				Grants, award level made by school but must be between $200 and $2,000	About 655,000 students at 4,200 postsecondary schools received SEOGs in 1984-85 school year
Guaranteed Student Loans	3,798	Students enrolled half-time at eligible postsecondary institutions Students from families with incomes of more than $30,000 undergo a financial need test to determine eligibility	x	x	x	x		Educational loans from participating banks and lenders, guaranteed through government	33 million loans entailing $75 billion in borrowed capital were disbursed in FY 1984, including some multiple awards
National Direct Student Loans	217	Students accepted or enrolled at a participating postsecondary institution who demonstrate financial need	X	X	X	X		Loans provided through participating schools	During 1984-85 school year, 867,000 students received loans averaging $800 from NDSL. Three fourths of NDSL awards have been given to students whose family incomes are $20,000 or less Postsecondary institutions must match Federal loan capital contributions on a l-to-9 basis
College Work Study	592	Lower income undergraduate and graduate students at participating Institutions Up to 10 percent of CWS funds can be used for students enrolled less than half-time	X	X	X	X		Grants to institutions that cover 80% of wages paid to students for part-time employment	In 1984-85, 737,000 CWS awards were made with total funding including matchnng funds by schools) amounting to $649 million In 1982-83, about 70% of the awards were to dependent undergraduates, 20% were to independent undergraduate students, and 10% were for graduate students
Veterans Educational Assistance Program (GI bill)	1,295	Miltary personnel on active duty for 180 days between 1955 and 1976	X	X	X	X	X	Up to 45 months of assistance provided directly to eligible veterans (1.5 months of assistance per month of active service) Assistance can be used for education, on-the-job training, apprenticeships correspondence courses, and work-study programs	In FY 1983, GI bill educational assistance was provided to 476,104 veterans in college-level courses, 9,402 in correspondence courses, 1,118 in flight school, 25,444 in on-the-job training, 84,410 in secondary and other schools, and 2,232 in farm programs

[a]On-the-job training, apprenticeships etc
[b]Formerly the Basic Educational Opportunity Grant Program FY 1985 funding level shown does not include $250million to cover FY 1984 shortfalls

SOURCE Off Ice of Technology Assessment Data used in this chart was assembled from several sources including Charlotte Jones Fraas Student Financial Aid Programs FY 86 Budget Library of Congress Congressional Research Service Issue Brief 85056 Dec 16 1985 and Karen Spar *Federal Employment and Job Training Programs* Library of Congress Congressional Research Service Report 84-79 EPW Apr 30 1984