

**Chapter 3**

# **Human Resources for Competitiveness**

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# Human Resources for Competitiveness

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## SUMMARY

Principal findings of this chapter include the following:

1. Quite independently of skills required for dealing with new technology, turnover and new business formation create a continuous need for training—a need some American companies meet much better than others. Some of this training entails little more than introducing new employees to the workplace. Some seeks to build commitment to corporate goals. Other training programs include extensive instruction in task-specific technical skills—e. g., operating a nuclear powerplant.
2. Small firms—those with 100 employees or less—create many of the new job opportunities in the U.S. economy. Such firms face special training problems. Many lack experience with training, and the resources to afford it. Typically experiencing higher than average rates of turnover, small companies are reluctant to invest in their employees. Policies that support the training needs of smaller firms have a special claim, particularly because these establishments provide so many entry-level jobs for younger workers.
3. Four classes of workers likewise have a special claim on training: young, entry-level employees; older Americans; displaced workers; and minorities.
  - Because younger workers change jobs so frequently, many employers give them only the minimum training necessary. Given the importance of early training—e. g., in forming attitudes toward work and motivating continuing learning—there is a clear public interest, independent of the interests of employers, in supporting training for younger workers.
  - With the labor force steadily aging, there is an equally clear public interest in training for older Americans. In the past, companies have been reluctant to invest in training for older blue- and grey-collar employees. With fewer entry-level workers, this will have to change.
- Displaced workers typically find themselves unemployed through circumstances outside their control, while training opportunities of any kind drop sharply during recessions (because employers seek to cut costs). This conjunction of layoffs and declines in training points to a need for public policies that pay consistent attention to the training needs of displaced workers and that kick in added support during business downturns.
- In the past, access to the best training (e.g., apprenticeships) was largely limited to white males. With new workforce entrants more likely to be minorities and immigrants—many of whom have relatively poor basic skills (e.g., reading, arithmetic)—new training practices and programs suited to their needs will be required. Training is particularly important because, more so than in the past, the right certificates, diplomas, and degrees will be needed to start on an upward career track.
4. The outcomes of international competition—particularly the success that countries like West Germany have had with relatively formalized systems—suggest that the United States will need a much stronger commitment to training in the future. Indeed, the U.S. training system seems remarkably underdeveloped compared with our leading competitors. Most American companies look frost at the costs of training, and at the time workers spend away from the job. To them, shorter training programs are better training programs. In both Germany and Japan, in contrast, training is viewed as an investment. The German and Japanese systems are very different, but both are more extensive and more effective than that of the United States.

For many decades, the United States drew strength from a remarkable pool of skills, one fed by immigration and by long standing commitment to universal education. Immigration still contributes, particularly in engineering and science, but today other countries can boast of superior primary and secondary education. And if the U.S. economy is the most dynamic the world has ever seen, the Nation's

training system is not. Companies have been reluctant to invest in training. Other institutions have failed to keep up with emerging needs. As a result, the United States is operating with a glaring weakness in international economic competition. That half of the labor force that is below average in education, training, and **skills is** poorly prepared compared to their counterparts in a number of the Nation's principal economic competitors.

Nearly half of all Americans now take some college courses. The education and training system serves these people relatively well, especially those who complete college and go on to white-collar jobs in the professions or in management. The system does a poor job of meeting the needs of people who do not pursue higher education, who may not even graduate from high school. Countries as different as Germany, Japan, and South Korea work much harder to educate and train, not only the upper half of their labor forces, but the lower half.

For the United States, the message conveyed by a multitude of surveys of educational credentials (high school graduation rates, table 1-3 in ch. 1), achievement (basic skills, ch. 6), workplace capabilities (ch. 4)---is simple and direct: the training system and the schools—more properly, society as a whole—do a poor job of serving the economically disadvantaged, particularly blacks and other minorities. In the years ahead, the drive to raise productivity and improve the competitiveness of U.S. industry could help transform the ongoing debate over social equity into one over economic growth. For the first time since World War II, the needs of the workplace and those of the disadvantaged could merge. This will not happen by itself. It will take commitment to better preparation for work—by individuals, by schools, by employers, by government.

Lack of skills not only hurts the people in the bottom half as individuals, it hurts the economy. These people will lose the most if U.S. industries continue to decline competitively: they will be laid off first, or find the pressure of international competition forcing their earnings downward. Many have already found ladders of upward mobility pulled down, as the invisible logic of computer-

based systems makes abstract thinking more important than manual skills, and companies rely on educational credentials to find trainable workers.

In the end, the Nation's economy must support everyone at some level. This simple fact creates the fundamental justification for public investments in training. The lagging quality of the U.S. labor force slows economic growth and drags down the standard of living for everyone—not just those who suffer as individuals from poor education and training. By the same token, a better qualified labor force will benefit society as a whole.

## THE SKILL POOL

Companies hire from local, regional, and national labor markets, and draw on internal labor markets when they promote current employees or move them laterally into new jobs. A company's choices reflect the pool of people and skills available to it externally and internally, relative to its needs. Those needs depend on its place in the economy. Service industries employ a mix of people differing from that in manufacturing; the knowledge-based services (including education, finance, and business services) draw on quite different sets of skills than the traditional or tertiary services (e.g., retailing, transportation).<sup>1</sup> As summarized in app. 3A, at the end of this chapter, U.S. employment has been growing rapidly in knowledge-based services (and in a few knowledge-intensive manufacturing sectors). But because high-technology industries remain small compared to the overall economy, job creation concentrates in sectors such as retailing and occupations such as clerk and custodian.

The skills available in the labor market drive economic growth and competitiveness. The United States has always revered its inventors and entrepreneurs, Edison and Carnegie in the past, Steven Jobs and Mrs. Fields today. Nor is it only the storybook figures that matter. Nearly any enterprise will need a substantial range of skills to survive and prosper: 'unskilled' blue-collar workers; middle-level grey-collar employees (e.g., technicians); white-collar salespeople and bookkeepers; supervisors, administrators, and managers.

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<sup>1</sup>U.S. Congress, Office of Technology Assessment, *International Competition in Services*, OTA-ITE-328 (Washington, DC: U.S. Government Printing Office, July 1987), ch. 7 and 8. See especially pp. 228-230 for the distinctions between knowledge-based and tertiary services, as well as traditional and knowledge-intensive manufacturing. Also see table 3A-2, in the appendix to this chapter.

People's skills expand and develop over time, as they attend school, enter the labor market, gain experience, move from company to company. Some of the practical skills essential in the workplace come largely from everyday experience. People learn one set of problem-solving, social, and communications skills in school, quite a different set at home, on the playground, learning to cook and to ride a bicycle. Both sets are important.

Simple tests exist for measuring simple skills: manual dexterity; visual acuity. Basic skills can be surprisingly difficult to measure. Such skills remain important, but competitive manufacturing and service firms in a high-wage economy also require higher order skills—judgment, reasoning, interpersonal communication. These are still more difficult to measure, to teach or train for.<sup>2</sup>

Table 3-1 classifies skills from lower order (manual) to higher (cognitive, social), and from the academic skills associated with schooling to the practical skills learned in daily life (of which school is part). The three broad classes in the left hand column build on one another in the sense that people normally employ mental/cognitive skills in the course of activities that also call for manual skill. And by definition, social and communications skills have mental/cognitive dimensions. Because higher order skills are harder to measure with tests, employers today rely more heavily than they once did on interviews, even when hiring unskilled or semiskilled workers. As the examples in the table suggest, many everyday or practical skills can be just as important in the workplace as academic skills learned in school or technical skills learned in specialized training programs.

As more American companies in both manufacturing and the services adopt production systems that call for people to work in groups, social skills and communication become more important. (Ch. 4

explores patterns of work organization in some detail, while box 7-F inch. 7 discusses technologies for automated training in interpersonal skills.) Work groups, moreover, are typically expected to help solve problems involving not only routine but unexpected events (e.g., equipment breakdowns).

Because measures of skill, and testing procedures for skills, remain primitive, employers frequently use educational credentials as surrogates (even though education often fails to predict on-the-job performance). This trend has begun to widen the split in the U.S. labor market between a lower tier of poorly paid unskilled and semiskilled jobs, many in the services, and an upper tier, or superstructure, of well-paid jobs, many of them professional and managerial.<sup>3</sup> To the extent that employers rely on educational credentials as a screening device, passage from the lower tier to the upper grows more difficult. Although the upper tier is growing rapidly, many people lacking a saleable combination of educational credentials, motivation, and training and experience (a moving target as the economy changes) will never get a chance to compete for these jobs, or to show their ability to take on more challenging work. Fewer ladders will extend from the lower tier to the upper—a trend already quite evident in sectors ranging from textiles to retailing. Compared with earlier decades, the middle levels will be sparser. Reorganized manufacturing firms, for example, frequently cut back or eliminate jobs for first-line supervisors (ch. 4)—jobs once filled largely by promoting production workers. As illustrated by examples from the textile industry, later in this chapter, grey-collar technical jobs increasingly require education or training credentials secured outside the workplace; on-the-job experience might suffice for learning to repair wholly mechanical machines, but not those that incorporate digital electronics.

<sup>2</sup>Higher order skills are poorly understood, and so tooteaching/training/learning. See, for example, *Thinking and Learning Skills, Volume 1: Relating Instruction to Research*, Judith W. Segal, Susan F. Chipman, and Robert Glaser, eds. (Hillsdale, NJ: Erlbaum, 1985), especially Peter G. Poison and Robin Jeffries, "Instruction in General Problem-Solving Skills: An Analysis of Four Approaches," ch. 12, pp. 417-455; *Practical Intelligence: Nature and Origins of Competence in the Everyday World*, Robert J. Steinberg and Richard K. Wagner, eds. (Cambridge, UK: Cambridge University Press, 1986); and Richard E. Nisbett, Geoffrey T. Fong, Darrin R. Lehman, and Patricia W. Cheng, "Teaching Reasoning," *Science*, Oct. 30, 1987, pp. 625-631.

<sup>3</sup>For a more extensive discussion, see *International Competition in Services*, op. cit., footnote 1, chapter 7. As a simple example of the shifts taking place, note that early generations of computer systems deskilled many jobs in services like banking and insurance. Companies replaced clerical workers and bookkeepers with data-entry clerks (fewer relative to the volume of work) plus a small coterie of supervisors, and the systems specialists who oversaw the mainframe computers of that era. With later generations of decentralized computer systems, much of the routine data entry work also disappeared. The remaining jobs tend to require at least some problem-solving skill. Nonetheless, these remaining jobs have carefully delimited boundaries, offer limited opportunities for upward mobility, and can be nearly as routinely repetitive as yesterday's keypunching.

Table 3-I—Skill Dimensions and Examples

Skill type	Academic	Technical	Everyday/practical
Manual . . . . .	Penmanship	Welding; short-order cooking	Painting walls; changing a flat tire
Mental/cognitive . . . . .	Writing an essay	Inspecting welds; institutional menu planning	Furnishing a room; driving in traffic
Social/behavioral . . . . .	Teaching composition	Designing playground equipment; serving meals in a restaurant	Giving a dinner party; managing a car pool

SOURCE: Office of Technology Assessment, 1990.

These shifts, already underway if slowly paced, could have profound implications, not only for the competitive ability of U.S. industry, but for social stability. More than likely, the mismatch between job opportunities and labor force abilities will continue to widen. Through lack of training and channels for upward mobility, industry may be cutting itself off from needed skills. Even when unemployment stood at 9 or 10 percent, in the early 1980s, a million or more jobs remained unfilled because employers could not find people with the right skills. Meeting the needs of both individuals and industry will require better training in task-specific skills, as well as problem-solving capabilities and social skills. Basic skills and education must provide the foundation.

### *Labor Market Dynamics*

#### The Demand for Training

Churning in the economy far exceeds net job creation as a driving force for training. The number of newly hired people entering a given industry (or occupation) in a single year can easily exceed the net total of jobs created in that industry over a full decade. This is true even for rapidly growing industries and occupations. Labor mobility makes employers reluctant to provide training.

Of the nearly 20 million Americans that take a new job each year (in a civilian labor force approaching 125 million), no more than one-quarter can claim previous experience in the same occupation (these tending to be managers, professionals, or technical/craft workers).<sup>4</sup> Some 15 percent of the labor force may need training each year simply because of mobility and churning. Many, unfortunately, do not get it.

In good times and bad, mobility in the U.S. economy remains high. When unemployment rates fall, people move voluntarily—often to take jobs at higher wages. When unemployment rises, people hold onto their jobs but may lose them involuntarily to layoffs. Young people switch jobs much more frequently than older workers. Nearly 80 percent of teenagers have been in their current job for less than a year, compared with just under 10 percent for those aged 60-64. Workers under 30 account for about a third of total employment, but 56 percent of those on the job for less than a year. Lateral moves by older workers, particularly men with blue-collar manufacturing experience, are likely to be a consequence of layoffs rather than choice.

A good deal of the total need for training, then, as opposed to ongoing workplace learning, arises simply from churning. People move from job to job; entrepreneurs start new companies; existing companies grow, promote people, move them horizontally. These events occur with much greater frequency in the United States than in Western Europe or Japan. American companies must integrate new employees, many of them young workers with relatively little experience, into their organizations on an ongoing basis.

Even firms with shrinking employment levels—because they have lost business, because they have sold off divisions, or because of productivity improvements—may have to bring in new people to stay ahead of attrition. Companies laying workers off may need to reassign and retrain those remaining. Births and deaths of firms also add to labor market turbulence. New small firms face special training needs: most of them lack experience in providing training and the resources to pay for it.

<sup>4</sup>James P. Markey and William Parks II, "Occupational Change: Pursuing a Different Kind of Work," *Monthly Labor Review*, September 1989, pp. 3-12, which analyzes data collected in the January 1987 Current Population Survey—source of the most recent information on U.S. labor mobility.

### Job Creation and Small Firms

Net growth in employment equals the sum of jobs created by new firms, plus expansion by existing firms, minus the jobs that disappear when establishments close their doors or lay off workers. In recent years, small enterprises—those with less than 100 employees—have accounted for a near-constant 35-36 percent of total U.S. employment.<sup>5</sup> Births and deaths of these firms number in the hundreds of thousands each year.

Over the 1976-86 period—the latest for which such data are available—the United States generated slightly more than 22 million new jobs. This total was the result of 45 million new jobs created by startups, and 14 million jobs generated through expansions, offset by 29 million jobs lost through establishment “deaths” and 8 million lost to contractions. Table 3-2 shows that, over this entire 10-year period, firms with fewer than 100 employees and those with more than 500 employees generated roughly equal numbers of jobs. However, during the recessionary period of 1980-82, very small firms—those with fewer than 20 employees—created almost all the net new jobs. Big firms tend to cut back on training during recessions, and small firms do little formal training under any circumstances, so that training opportunities drop sharply when business slumps.

New small firms tend to grow by fits and starts, often responding differently to changing economic conditions than their larger, better established counterparts. In a young computer software or biotechnology company, a rapid growth spurt may be followed by employment decline, as the firm struggles to develop its products, begin production, enter the marketplace, and finally expand (at which point it may begin generating many new jobs). Other enterprises remain small by choice: many are started by people who prefer to be their own boss, but have no particular desire (or ability) to turn a small business into a large one. Neighborhood retailers and franchise outlets typify these enterprises, a much

**Table 3-2—Employment Growth by Size of Firm**

Period	Employment growth (millions)	Percentage share by size of firm (number of employees)			
		1-19	20-99	100-499	500+
1976-86	22.3	26.2%	17.470	13.6%	42.8%
1980-82	1.5	97.8	-5.9	3.5	4.5

SOURCE: *Handbook of Small/Business Data* (Washington, DC: U.S. Small Business Administration, 1988), table 8-13, p. 259.

larger group than entrepreneurial startups; when they disappear, it is more likely because of poor management (or retirement, a lost lease, or some such reason) than that they have over-reached.

High rates of births and deaths among small firms contribute to a rate of labor market mobility in the United States exceeding that in economies with a less pronounced entrepreneurial dynamic. This form of churning creates background noise that can make it difficult for both companies and workers to detect labor market signals. Businesses may downplay the need for training if contractions and closures elsewhere continually replenish their labor supply, while workers lacking stable occupational prospects may be reluctant to invest in training on their own.

In part simply because of their high labor turnover, small companies invest less in training than large firms. Many workers leave small firms because they can earn more by moving to a bigger enterprise.<sup>6</sup> But smaller establishments provide a major port of entry to the labor force for young people (men especially—women are more likely to take jobs with large enterprises), who get general training as well as job experience, then ‘cash in’ by moving to another employer. This puts a double burden on small companies, in addition to their typical lack of resources and training experience. First, small enterprises rarely have enough workers in need of training at any one time to justify an organized effort. Second, those workers who do get training will, everything else the same, be more likely to leave a job with a small firm. As a result, small firms

<sup>5</sup>*Handbook of Small Business Data* (Washington, DC: U.S. Small Business Administration, 1988), table 6-6, p. 143. The job creation data in the next paragraph come from table 6-12, p. 257. The Small Business Administration maintains the only U.S. database linking job creation with firm-level business activities.

<sup>6</sup>D. id Drury, William Dickens, and Christopher Martin, “Labor Turnover and Worker Mobility in Small and Large Firms: Evidence from the SIPP,” report prepared for U.S. Small Business Administration by Berkeley Planning Associates, Berkeley, CA, December 1988. Data from the Survey of Income and Program Participation (SIPP) show that turnover rates for 1984-85 were higher in companies with fewer than 100 employees, after adjustments for differences in industry/occupation, wages, and hours worked, and that employees who leave a small firm for a larger one earn higher wages on the average.

provide less formal training than larger companies.<sup>7</sup> It seems fair to conclude that it is often not in their interests to do more.

### Workforce Demographic<sup>8</sup>

Demographic changes will compound the growing needs for training created by international competition and new technology. At a time when labor force projections show growth rates of about 1 percent annually, the economy is expected to continue growing at two or three times that rate. Labor shortages may arise in some regions and some sectors. Average ages will increase, with the graying of the labor force combining with an increasing fraction of minorities to create a new set of training needs.

### Shifts in Composition

Over time, as the labor force expands, its composition shifts (see app. 3-A, table 3A-1). Young people leave school and seek jobs, immigrants enter the labor market, older workers retire. With the baby boom bulge past, overall labor force growth has slowed. During the late 1970s, the civilian labor force grew by almost 3 million people each year; by the late 1980s, the increase had fallen to 2 million per year.<sup>9</sup>

In other ways as well, the U.S. labor market has changed quite dramatically over the past decade. Unemployment has been cut almost in half, to 5-plus

percent compared with nearly 10 percent in 1982 and 1983. At the same time, labor force participation has reached a new high. Until the middle 1970s, participation had remained relatively stable at 58-60 percent. Today, two-thirds of Americans aged 16 and over hold a job or are actively seeking work. The big change: more women in the workplace. Nearly twice as many women held jobs in 1989 as in 1969 (53 million compared with 29 million).<sup>10</sup>

During the 1990s, women will account for nearly two-thirds of U.S. employment growth. Younger women now join the workforce at rates approaching those for their male counterparts.<sup>11</sup> Historically, black women have been more likely to work than white women, except in the youngest age groups. This difference in participation rates will probably shrink somewhat, as more white women work. Although more women have been finding jobs in traditionally male occupations—e. g., the professions—women's wages relative to those of men have improved only slightly over the last two decades. Still, with the rise in employment opportunities for women, the past becomes a poor guide to the future. For example, considerable uncertainty attaches to future labor force participation rates of older female workers, which BLS predicts will rise for those aged 50 to 64, but decline for those over 65.

Many women work part-time or take temporary positions, sometimes (like men) because this is the only work they can find.<sup>12</sup> From the middle 1960s to

<sup>7</sup>Sheldon Haber, Joseph Cordes, and James Barth, "Employment and Training Opportunities in Small and Large Firms," report prepared for the U.S. Small Business Administration by Sirnon & CO., Potomac, MD, June 1988. This report also draws on SIPP data, which show, for 1984, that only 5.4 percent of workers in companies with fewer than 100 employees had ever participated in a formal training program with that employer. The percentage of workers reporting such training was twice as high (10.4 percent) for those with jobs in firms having more than 100 employees. About 15 percent of each group had received training outside of their present firm, suggesting that workers with previous training are hired in roughly equal proportions by small and large firms, but that those in large firms are twice as likely to receive job-specific, in-house training.

<sup>8</sup>Much of the analysis in this section is based on Willie Pearson, Jr., "Demography of the Workforce," Working Paper #1, Office of Technology Assessment, Mar. 22, 1989. Unless otherwise noted, data and projections come from the moderate growth scenario of the Bureau of Labor Statistics (BLS), as summarized in the November 1989 *Monthly Labor Review*. This scenario assumes a 2.3 percent (real) annual increase in gross national product, 1.2 percent annual increase in the labor force, and 5.5 percent unemployment.

Following BLS practice, all Hispanics are treated as a single group in the discussion and tables in this chapter. Nearly 95 percent of people of Hispanic origin are classed as white, but in the text and tables that follow, "white" refers to non-Hispanic whites only.

<sup>9</sup>*Employment and Earnings*, vol. 37, January 1990, table 1, p. 160.

<sup>10</sup>*Employment and Earnings*, vol. 37, January 1990, table 2, p. 161.

Although BLS expects participation rates to edge upwards towards the 70 percent mark, a relatively low level of population growth means that labor force growth could be no more than one percent annually during the early 1990s. And depending in part on future rates of immigration, the labor force growth rate could drop to zero by 2020. See U.S. Congress, Office of Technology Assessment, *Technology and the American Economic Transition: Choices for the Future*, OTA-TET-283 (Washington, DC: U.S. Government Printing Office, May 1988), pp. 474-475.

<sup>11</sup>Between 1975 and 1986, labor force participation rates for mothers of children less than a year old doubled, from 26 percent to 50 percent; more than half of all married women with children aged one and up now work, most of them full time. Today, mothers with children under age six represent the fastest growing segment of the labor force. See "Needed: Human Capital," *Business Week*, Special Report, Sept. 19, 1988, pp. 100-141; William B. Johnston and Arnold W. Packer *Workforce 2000: Work and Workers for the 21st Century* (Indianapolis, IN: Hudson Institute, 1987), p. 95. Fifty-two percent of mothers hold full-time jobs, but only 13 percent want to.

<sup>12</sup>On temporary and part-time employment, see *International Competition in Services*, op. cit., footnote 1, pp. 243-250.

the middle 1980s, the fraction of the workforce with part-time jobs increased from about 15 percent to more than 20 percent. The increase in contingent employment—part-time, temporary, and contract work, plus self-employment—reflects, on the one hand, the choices of people seeking time to be with their families and the freedom to pick and choose what they wish to do. But it also reflects the drive for flexibility in business and industry. As noted in the next chapter, by moving from a large core workforce to a smaller group of more-or-less permanent employees, coupled with temporary and contract workers brought in as needed, businesses can adjust more easily to shifting competitive circumstances. They can also save on their wage bills: part-time and temporary employees rarely receive the fringe benefits that go to permanent staff.

The people who will hold jobs in the first decade of the next century have already been born; most of them are working now. Many of the new workers will be black, Hispanic, or members of some other minority group. Nonetheless, three-quarters of the U.S. labor force will be (non-Hispanic) white. Because of the size of the workforce, it takes many years for its composition to change much. Even so, as table 1-2 in chapter 1 showed, by 2000, women will make up nearly half the labor force, and minorities one-quarter. There will be far fewer young people, and swelling numbers of middle-aged and older workers.

By the end of the century, those in the baby boom generation will be entering their 40s and 50s. As this group passes into and through their middle years, the median age of the workforce will move upward from 36 currently to 39-plus by 2000.<sup>13</sup> Those aged 45-64 will reach a peak expected to be about 28 percent of the workforce in 2010, after the last of the baby boomers pass into this age range.<sup>14</sup> As these people move on into the over-65 category, it will expand rapidly—horn 13 percent of the population in 2010

(only slightly above the current level), to more than 20 percent in 2030.

While labor force participation rates have been declining for men over 50, the training system will plainly have to adapt to a steadily aging population during the first several decades of the next century. Employers have traditionally been reluctant to invest in training for older workers. On the other hand, older workers tend to be much less mobile, which should help dampen employers' fears of training people only to see them move on to other jobs.

### Minorities

New labor force entrants will come increasingly from minority groups simply because of population trends: blacks, Hispanics, and recent immigrants represent growing fractions of the overall U.S. population. Other factors are secondary, although not insignificant. For instance, falling labor force participation rates among black men mean that black women and Hispanic men could outnumber them in the workforce by the end of the century.<sup>15</sup> Already, labor shortages in some suburbs stand alongside high levels of central-city unemployment, predominately among minorities.

Minorities (like women) will be most heavily concentrated among younger workers in entry-level jobs—in principle, prime candidates for training. In 1988, blacks and Hispanics made up 23.6 percent of the labor force aged 16-24, a share expected to approach 30 percent by 2000.

With exceptions including a number of Asian groups, minorities enter the labor force with less schooling than average, and often with educational attainments below average for their grade level. Many more students drop out of high school in cities and States with heavy concentrations of minorities: nationwide, about 85 percent of young people

<sup>13</sup>The median age was even higher in the early 1960s, peaking at 40.5 years—a consequence of low birth rates during the depression of the 1930s. Howard N. Fullerton, Jr., “New Labor Force Projections, Spanning 1988 to 2000,” *Monthly Labor Review*, November 1989, table 6, p. 10.

<sup>14</sup>*Projections of the Population of the United States, by Age, Sex, and Race, 1988 to 2080, current Population Reports, Series P-25, No. 1018* (Washington, DC: Department of Commerce, Bureau of the Census, 1989), table 4, Middle Series.

<sup>15</sup>Projections for Hispanics are sensitive to assumptions concerning future levels of immigration, both legal and illegal. Immigrants as a whole represent an extraordinarily diverse group, one that includes scientists and engineers born in India and China, and physicians and nurses from the Philippines, as well as both skilled and unskilled workers from Latin America. (Rates of business ownership are much higher for Asians than for other minority groups—55 per 1,000 in the population, versus 13 per 1,000 for blacks and 17 per 1,000 for Hispanics. Wendy Manning and William O'Hare, “The Best Metros for Asian-American Businesses,” *American Demographics*, August 1988, pp. 35-37, 59.)

On immigrants in the U.S. labor force more generally, see *International Competition in Services*, op. cit., footnote 1, pp. 250-252. Also *The Effects of Immigration On the U.S. Economy and Labor Market*, Immigration Policy and Research Report 1 (Washington, DC: Department of Labor, Bureau of International Labor Affairs, 1989).

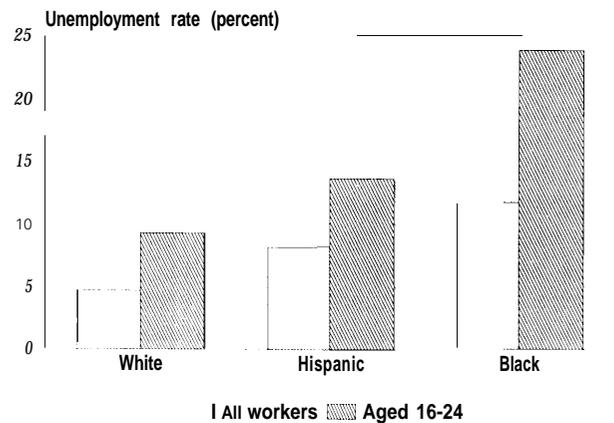
graduate from high school, but the rate in Louisiana is barely 50 percent.<sup>16</sup> A growing mismatch between the skills of this part of the labor force and the jobs available in the U.S. economy will place far greater demands on the training system (and the schools). A glance at the unemployment rates in figure 3-1 suggests the difficulties faced in assimilating younger blacks, in particular, into the workforce. This is the stiffest test the Nation's education and training system will face in the years ahead—a test that it shows little sign of being prepared to meet.

Employers rely heavily on educational background in deciding who to hire, particularly when it comes to young people with little or no job history. On average, more years of schooling mean higher earnings. People with more education are more likely to participate in the labor force, less likely to experience bouts of unemployment.<sup>17</sup> It is no surprise, then, that blacks and Hispanics earn less than other workers, and find jobs that tend to be concentrated in occupations expected to grow at below-average rates (App. 3A) or to decline. Demographic patterns are largely fixed. If they will not change, the education and training system will have to.

What kinds of occupations have minority workers traditionally found? Blacks comprise 10 percent of the workforce. Table 3-3 lists the occupations in which blacks held 15 percent or more of all jobs in 1988. They tend to be low in pay and in skill requirements. Employment in the health services will expand rapidly in the years ahead, but as noted in app. 3A (table 3A-4) the fastest growing occupations will require credentials. Meanwhile, opportunities for operators, fabricators, and laborers will remain static, and household workers will decline in number.

Demographic shifts are reinforcing the trend toward a two-tier structure in the U.S. labor market. With minorities comprising a growing fraction of

Figure 3-1—Unemployment Rates, 1988\*



\*Adding discouraged workers who have given up seeking jobs would raise these percentages somewhat; the U.S. Government defines the unemployed as including those seeking work and unable to find it, but not people who have stopped looking for jobs. The latter are also excluded from labor force totals. In 1988, 94.5 percent of white men aged 25-54 were counted as laborforce participants, compared with 88.7 percent of black men in the same age group.

SOURCE: Ronald E. Kutscher, "Projections Summary and Emerging Issues," *Monthly Labor Review*, November 1989, table 5, p. 72.

Table 3-3—Occupations With Heavy Minority Representation<sup>a</sup>

	Percentage of jobs held by	
	Blacks	Hispanics
Health services . . . . .	28%	6%
Custodial . . . . .	23	15
Household workers . . . . .	23	17
Mail clerks and messengers . . . . .	22	9
Operators, fabricators, and laborers . . . . .	15	11

Occupations in which blacks held 15 percent or more of all jobs in 1988. Blacks made up 10 percent of the workforce in 1988, Hispanics 7 percent.

SOURCE: George Silvestri and John Lukasiewicz, "Projections of Occupational Employment, 1988-2000," *Monthly Labor Review*, November 1989, table 11, p. 84.

<sup>16</sup>Robert B. Reich, *Education and the New Economy* (Washington, DC: National Education Association 1988), p.19. Americans living in the South, regardless of race or ethnic background, report less education than those living in other parts of the country; more than 35 percent of all adult Southerners lack a high school diploma. *Employment and Training Reporter*, Dec. 7, 1988, pp. 344-345. Black Southerners get less education than white Southerners, and rural residents less than city dwellers.

For the country as a whole, 57 percent of blacks and about half of Hispanics (but only one-quarter of whites) live in central cities with generally poor schools and poor job prospects. Four in ten blacks reside in one of 11 cities, of which only two, greater Los Angeles and Atlanta, have experienced relatively high rates of economic growth in recent years. *Workforce 2000: Work and Workers for the 21st Century*, op. cit., footnote 11, p. 91.

<sup>17</sup>In 1988, 88 percent of all college graduates aged 25-64 were in the labor force, but only 61 percent of people aged 25-64 who had not completed high school. The jobless rate for college graduates aged 25-64 was only 1.7 percent, compared with 9.4 percent for high school dropouts. Yet 3.3 percent of black college graduates were unemployed, more than twice the level for whites. "Educational Level of U.S. Labor Force Continues to Rise," News, Department of Labor, Bureau of Labor Statistics, Aug. 29, 1988.

new entrants to the labor force, and with labor shortages in fast-growing occupations and regions, some companies in some parts of the country will be forced to reexamine their hiring and training practices, finding an accommodation between two very different extremes:

- bidding up the wages of well-educated younger workers, most of whom will be white, and/or providing more training and retraining for older workers; or
- adopting more aggressive training programs for **assimilating young minority** workers into their organizations.

Companies, of course, may not pose the question this way, and most will chose some combination of these two alternatives.<sup>18</sup> Furthermore, the context for their decisions is broader. It includes such alternatives as automation to reduce labor requirements (in service industries as well as manufacturing), moving to parts of the country where labor is less expensive and/or better educated, and moving to foreign countries in search of cheap labor. Visible success over the next few years in the education and training of young minority workers could substantially influence future decisions by companies—decisions that are likely to have impacts on American society going far beyond employment and competitiveness.

## TRAINING AND COMPETITIVENESS

The international competitiveness of U.S. goods and services depends on the value for money offered by American firms compared with foreign products—as judged in the marketplace. Customers vote with their dollars and deutsche marks. When Americans buy cars produced by Honda or Hyundai, their purchases register in the ledger of competitiveness. Much the same is true when Citibank underwrites a bond issue for a West German corporation.

Products that do not trade internationally also count in the ledger of competitiveness, although not so directly. First, American companies that export, or that compete with imports, buy goods and services from other domestic firms. The prices charged and quality provided affect competitive outcomes downstream. For example, about 15,000 American firms sell parts and components to motor vehicle manufacturers. Thousands of other companies sell to this group of direct suppliers. A few of the suppliers are relatively large; they may produce and sell tires or electronic components or structural plastics overseas as well as at home. But most are smaller firms that make sheet-metal stampings, fabricate equipment and tooling to order, or provide contract services ranging from engineering to plant security.

There is a second reason why the productivity and efficiency of smaller firms matters, along with services that do not trade internationally. The more productive each U.S. industry is, the higher will be average U.S. living standards. All else the same, more productive industries can pay higher wages, produce goods and services at lower costs, and sell them at lower prices. Greater efficiency in fast-food restaurants means American consumers get more for their money.

### *Competing in the New International Economy*

*If* national welfare depends on productivity, efficiency, and competitiveness aggregated throughout the economy, these depend, among other things, on the education and training of the workforce.<sup>19</sup> Better educated workers have learned to learn: that is a major reason why employers rely on educational credentials for screening. Even if the subject matter is irrelevant to the task at hand, more years of schooling generally translate into more trainable- and retrainable-employees.

Education seems especially important (e.g., as an indicator of receptiveness to training) when workplace technologies are changing rapidly.<sup>20</sup> When

<sup>18</sup>For the results of a survey conducted during early 1990 on employer expectations of skill needs and availability, see “Workforce 2000—Competing in a Seller’s Market: Is Corporate America Prepared? A Survey Report on Corporate Responses to Demographic and Labor Force Trends,” Towers Perrin and Hudson Institute, July 1990. The survey suggests that few companies have, as yet, begun to implement human resources strategies keyed to changing labor market demographics.

<sup>19</sup>Edward Denison, in his seminal study *Why Growth Rates Differ* (Washington, DC: Brookings, 1967), found that relative levels of education accounted for a significant share of differences in productivity growth rates among nations.

<sup>20</sup>Ann P. Bartel and Frank R. Lichtenberg, “The Comparative Advantage of Educated Workers in Implementing New Technology,” *Review of Economics and Statistics*, Vol. LXIX, February 1989, pp. 1-11; Hong W. Tan, “Private Sector Training in the United States: Who Gets It and Why,” National Assessment of Vocational Education discussion paper, February 1989.

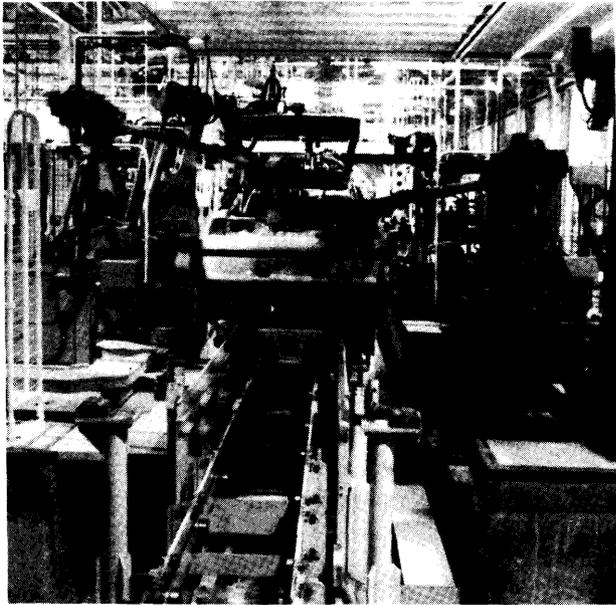


Photo credit: Diamond-Star Motors Corp.

Robots on automobile assembly line install tail lamps.

the technology is fluid, as it is today in computer-intensive industries, company-provided training takes on greater significance because needed skills are less likely to be taught in the schools (see ch. 5).

Larger, more competitive firms can often pay above-average wages to attract the talent they seek. Even so, the pressures of international competition have forced many such U.S. firms to reexamine their hiring practices and redesign their workplaces. New hiring criteria go hand in hand with production systems intended not only to reduce costs, but to improve product quality and organizational flexibility. Chapter 4 discusses the new practices, which have begun to ripple through the economy as they diffuse from innovating companies.

In the years ahead, employee skills will be particularly important for building organizations with the ability to respond quickly to new market opportunities. Restructuring and work reorganization place new demands on employees. Two decades ago, lack of literacy was no great handicap in a textile mill; in many mills today, operators of high-speed looms must be able to read and write (box 3-A). In this industry, as in others, lower costs

and greater flexibility come both from technology and from a workforce that is asked to know more and do more.

### ***Reorganizing Production: Costs, Quality, Flexibility***

*In* industry after industry over the last two decades, familiar U.S. brand names have lost market share to aggressive competitors from abroad. Even in industries like textiles, market segments that once seemed safe attracted new competitors. The reasons are many. American firms had become rather relaxed, not only about manufacturing quality, but about the quality of their product designs. Managements underinvested in plant and equipment, sometimes failed even to maintain existing facilities.

In the future, American firms will have to do better on three dimensions of manufacturing: costs, quality, and flexibility. Costs are central: everything else the same, American products cost too much to design, develop, and build. But everything else has not been the same. American goods have also fallen behind in quality-first in quality of manufacture (conformance to design specifications), more recently in quality of design (functional attributes and performance). Finally, many U.S. firms lag behind their competitors in introducing more flexible production systems permitting smaller lots to be produced without cost penalties.

#### costs

Xerox's experience is typical of many American companies that have found themselves falling behind their rivals. In the late 1970s, Xerox was in danger of being pushed out of all except the top end of the copier market. In extensive comparisons of its copiers with those produced by Minolta, Sharp, and others, Xerox found its manufacturing costs to be as much as 50 percent higher, and its defect rates 10 to 30 times greater.<sup>21</sup> Given this, even a near-generic brand name could do the company little good.

Xerox concluded that about half its cost disadvantages lay in product design and half in the production process. While the company has now managed to cut costs very substantially, it cannot relax: to keep up with the competition, the firm expects to reduce costs a further 50 percent by the mid-1990s. Training

<sup>21</sup>H. Barry Bebb, "Quality Design Engineering: The Missing Link in U.S. Competitiveness," paper presented at the NSF Engineering Design Research Conference, University of Massachusetts, Amherst, June 11-14, 1989. Also see "Pushing To Improve Quality," *Research-Technology Management*, May-June 1990, pp. 19-22.

has played a substantial role in bringing costs down-e.g., through reducing defects, scrap, and rework.

### Quality

American companies in industries ranging from autos to semiconductors have fallen behind in quality. Chasing moving targets, some have closed the gap part way, but few have managed to pull even. Manufacturers have always known that they give quality short shrift at their peril. Still, over the past two decades, customers have become more demanding.<sup>22</sup> At the same time, Japanese firms have made quality a major corporate objective and marketing tool.

Xerox has given each of its production employees 28 hours or more of quality-related training—a total of 4 million man-hours. Three-quarters of the firm's workforce participates in quality circle activities. At the same time, by working more closely with fewer suppliers, Xerox has cut defect rates for purchased parts and components from 10,000 ppm (parts per million) to less than 300. The company's target for 1992-93 is 30 ppm. As the size of these reductions suggests, the competitive game has truly changed.

### Flexibility

Companies in many industries, finally, have begun pursuing strategies emphasizing frequent product redesigns. Traditionally, low costs were the result of standardization and long production runs: cotton sheets, in white only; Model T Fords in black. Henry Ford had to go along when dealers and customers clamored for color, but he did so reluctantly, and Alfred Sloan's product differentiation strategy enabled General Motors to overtake Ford. The approach of the American automakers then changed relatively little until the Japanese onslaught of the 1970s. Since the 1930s, models and indeed entire car lines had been distinguished from one another largely through cosmetic changes—trim, styling, sometimes engines. Pontiacs commanded higher prices than Chevrolets even though production costs were nearly the same. Today, automobile manufacturers differentiate their products through both style and function. Automakers have intro-

duced new nameplates, developed vans and light trucks that can substitute for the family car. Consumers can choose from hundreds of models, rather than dozens.

With more consumer goods becoming fashion items-e.g., athletic shoes marketed like women's clothes-manufacturers in many industries must be able to react quickly, earn profits on smaller volumes. These trends place a premium on short design and development cycles and rapid changeovers on the factory floor. Organizations must be able to respond quickly to both success and failure, ramping up production when demand warrants, replacing products that fail to sell. So far, Japanese manufacturers have proven most adept. It currently takes Xerox 24-36 months to develop a new copier, compared with 12-18 months for the firm's rivals in Japan.

## FOREIGN TRAINING SYSTEMS: HOW DOES THE UNITED STATES COMPARE?

In many other nations, including the Federal Republic of Germany (FRG) and Japan, public and private training systems function more effectively than in the United States. There is no question that these two countries, and several others, train their workers to higher average standards. Table 3-4 (an expanded version of table 1-5 in ch. 1) briefly compares U.S. and foreign education and training systems. (Because of the lack of reliable figures for the United States, OTA has not attempted to estimate training expenditures in other countries.)

### *The Competition: Training Systems Abroad*

Germany and Japan pursue markedly different approaches to training. The contrast between the United States and Germany is particularly striking. The FRG not only has the best apprenticeship system of any major economy, jointly financed by public and private sectors, but policies and traditions that give status and respect to blue- and grey-collar work. In Germany, the prestige associated with a college education works against broad vocational

<sup>22</sup>When asked for the "main forces acting on a global consumer products company like yours," the Chairman of L'Oréal, makers of perfumes and cosmetics, replied "One of the most striking things is the increasing desire of customers all parts of the world for quality products—and their ability to perceive quality differences. Even in product categories like cosmetics, which everyone used to think of as driven by the whims of fashion, consumers are now carefully buying those products that are, objectively, technologically superior." Gerard J. Thulliez, "The View from France: French CEOs Look Ahead," *McKinsey Quarterly*, Autumn 1989, pp. 2-45 (quote on p. 40).

### Box 3-A—Training in the Textile Industry<sup>1</sup>

Since the mid-1970s, U.S. textile firms have sought to meet international competition through automation, work reorganization, and greater product variety. Two decades ago, mills were organized for long runs of a few standard products. The workforce was largely unskilled or semiskilled. Recent work reorganizations, along with computer-based automation, have placed greater demands on employee skills. Some jobs now require operators to read manuals and enter or record information on electronic control panels.<sup>2</sup> Machine repair has become much more demanding.

Textile firms have had limited success in recruiting better educated workers. Forced to improve the skills of current employees, they have begun to implement training programs in basic skills and in grey-collar technical work.

#### Forces for Change

Since the mid-1970s, three sudden shocks have hit the U.S. textile industry. First, styles began to change at an accelerating pace. Many American textile suppliers had specialized in a limited range of standardized goods. Now apparel manufacturers (and retailers and consumers) demand variety even in denim; cotton “white goods” come in hundreds of styles rather than dozens. Survival has meant adaptation. Second, import competition has grown steadily more intense, not only from low-wage Asian economies (China, Korea, Hong Kong), but from mills based in Europe and Japan that concentrate on high-quality, high-fashion fabrics. Third, after several decades of relatively stable production technology, a wave of innovation hit. Water-jet and air-jet looms operate many times faster than traditional shuttle looms. Microprocessor-based controls enhance consistency and quality. Inexpensive computer systems track product flow.

#### Automation and Organizational Change

In earlier years, U.S. textile firms had sought to keep their costs competitive by moving to the Southeast, where organized labor was weak and wage rates low. Investments in the new generation of automated equipment helped the industry increase its productivity by 5 percent annually between 1975 and 1987, a much higher rate than for U.S. manufacturing as a whole. But imports also grew, and employment fell.

Some American firms, unable to compete either with cheap fabrics coming in from Asia or with high-fashion textiles entering from other advanced economies, began to search out market segments where their capital-intensive, vertically integrated plants would create advantages. They found them particularly in fabrics for home furnishings and in industrial textiles—categories that, together, accounted for 52 percent of U.S. textile production in 1980, 60 percent in 1985, and 63 percent in 1988. Within their chosen niches, firms began offering greater variety. One spinning mill went from three active styles to 35 in 2 years; another now offers 300 furniture fabrics rather than 100. These strategies depend on fine-tuning the flow of production: computers have literally revolutionized production planning and control in the mills, where they are now used for tracking in-plant inventories as well as handling ordering and invoices. Some firms have also reorganized by replacing traditional functional departments, one for each step in the production process, with product-oriented departments that carry out a lengthy sequence of operations for a given product class.

#### Work and Skills

Textile jobs were much the same in 1975 as in 1955. The work was repetitive, and, despite high levels of mechanization, largely manual. With the technological flux of the 1980s, jobs for operators, for maintenance and repair workers (‘fixers’), and for supervisors have all changed. For instance, threads break far less often in spinning and weaving, so that operators now spend less time tying them back together—a task requiring dexterity and experience. Operators spend much more of their time monitoring automated equipment. Errors in such tasks as recording information and entering new instructions can have serious consequences; to minimize machine stoppages, operators must understand something of the production process and their place in it. Some companies

<sup>1</sup>Based on “Training and Competitiveness in U.S. Manufacturing and Services: Training Needs and Practices of Lead Firms in Textiles, Banking, Retailing, and Business Services,” report prepared for OTA under contract No. L3-3560 by Lauren Benton, Thomas Bailey, Thierry Noyelle, and Thomas M. Stanback, Jr., Columbia University, February 1990, pp. 60-89. The productivity levels and market share figures in this box come from unpublished data of the American Textile Manufacturers Institute.

<sup>2</sup>For a complementary discussion focusing on apparel, especially in Europe, see Jonathan Zeitlin and Peter Totterdill, “Markets, Technology and Local Intervention: The Case of Clothing,” *Reversing Industrial Decline? Industrial Structure and Policy in Britain and Her Competitors*, Paul Hirst and Jonathan Zeitlin, eds. (Oxford, UK: Berg, 1989), pp. 155-190. In some apparel plants, each worker now has a keypad at his or her workstation for recording production flow information. Among other things, these systems automatically calculate each workers’ pay on a piecework basis. Clive Cookson, “A Good Fit on the Factory Floor,” *Financial Times*, June 6, 1990, p. 13.

are training operators to diagnose machine problems (e.g., stoppages) and enter a corresponding code from a multipage manual. They must use good sense in deciding when to call in a supervisor or fixer. They must also have the basic skills needed for looking up the codes and punching them in; if the plant is to run smoothly, operators must not only be able to diagnose equipment problems, but read and write-skills rarely needed in the old days. In some cases, even loom cleaners, who are among the lowest paid of mill workers, must be able to follow written instructions and punch numbers into a key pad.

In maintenance and repair, the balance has tipped still farther from manual toward mental skills. At one time, tinkering outside the workplace coupled with informal on-the-job training could suffice to earn a promotion from operator to fixer; lack of basic skills was no bar. Fixers could see how older machines worked; today, with invisible electronic logic replacing electro-mechanical controls, they need conceptual understanding. Textile firms are seeking graduates of 2-year associate degree programs, and increasing the formal training they give their technicians. Promotions of operators to the next level without formal training, once common, have become rare.

#### Upward Mobility

In earlier years, unskilled workers could enter the mills in service jobs (cleaning) or as laborers (unloading bales) and move upward through progressively more demanding positions. People with aptitude and interest could look forward to becoming operators, then fixers, perhaps eventually a supervisor. Most training was informal. Companies saw no need for a high school diploma. On-the-job experience would serve, whatever a person's formal education, given the unchanging nature of the work. These traditional job ladders have broken down. Most textile firms still post openings internally, and try to recruit from within, but they have had trouble finding enough qualified people internally to fill the growing need for fixers and technicians who can cope with the latest equipment.

#### Education and Training

The industry has trouble finding skilled workers in part because it is concentrated in the smaller cities and towns of the Southeast. Wages have always been low, and textile firms buffeted by cheap imports argue that they have little scope for raising them. The industry also seems trapped by its past practices of hiring unskilled, poorly educated workers. It now needs better educated employees, but can offer neither the image nor the wages nor the opportunities that would attract them.

Vocational schools and community colleges have been little help, in part because textile firms rarely tried to work with them in the past. Few community colleges have kept abreast of the industry's technical needs; students attend these schools in part to escape the mills. Of 75,000 students in 1985-86 taking technical courses in North Carolina community colleges, 5,000 were studying for occupations in demand in the textile industry, while 35,000 were preparing for office jobs in service industries.

Unable to hire from existing labor pools, textile firms have responded in three ways: 1) by seeking to improve basic skills in local labor pools, through participation in literacy programs and strengthened relationships with secondary schools; 2) through technical training, both internally and in conjunction with community colleges; and 3) by contracting for training provided by equipment manufacturers. Companies with workplace literacy programs have aggressively pursued funds from Federal and State programs. In South Carolina, for instance, the Governor's Initiative for Workforce Excellence has established literacy programs at several textile firms, including Milliken. The literacy initiative is playing a key role at Milliken's Kingstree, SC plant, which has installed 400 new weaving machines and begun reducing the number of job classifications from 38 to four. Employees must know three of the four new jobs to be promoted; an off-hours basic skills program helps them prepare.<sup>3</sup>

While community colleges rarely took the initiative in developing technical courses suited to the needs of the industry, they have been more responsive to firms asking for specialized programs; these help the schools attract students and justify State funding. Companies have also sent employees to training programs, typically several weeks long, offered by equipment manufacturers. Some firms have then used these courses as models for in-house training on other types of machinery.

New skill requirements caught most U.S. textile firms off guard. As companies discovered they could not recruit the workers they needed, they began turning to training. If these efforts-which remain in early stages-do not succeed, American textile firms stand to lose still more ground to imports.

<sup>3</sup>"Basic Skills Education in Business and Industry: Factors for Success or Failure," report prepared for OTA under contract No. L3-1765 by Paul V. Delker, January 1990, p. 41. On Milliken's overall labor force strategy, which includes reorganization around work groups, reductions in supervisory ranks, and tighter links with fewer suppliers, see "Pushing To Improve Quality," *Research-Technology Management*, May-June 1990, pp. 19-22.

Table 3-4—Worker Training Compared

	United States	Germany	Japan	Korea	Canada
Primary and secondary schooling	Local control contributes to wide range in course offerings and quality	Excellent for those in academic high school; generally good for others	High quality; uniform curriculum; emphasis on rote learning	Strong core curriculum and basic skills emphasis evident in international test scores	Wide range in quality
School-to-work transition	Left mostly to chance; some employers have ties with local schools	Apprenticeship for most non-college-bound youth	Personal relationships between employers and local schools	Employers recruit from vocational and academic high schools	Left mostly to chance; apprenticeships available for some young people
Vocational education					
Extent	Available in most urban areas	Near-universal availability	Limited; mostly assumed by employers	Widely available	Available in most urban areas
Quality	Wide range: poor to excellent	Uniformly good	Fair to good	Vocational high schools uniformly good	Wide range: poor to excellent
Adult education					
Extent	Moderate; community colleges offer widespread opportunities	Limited but growing	Widespread; self-study common	Limited	Widespread
Relationship to work	Relatively common	Nearly universal	Common	Common	Common
Employer-provided training					
Extent	Emphasis on managers and technicians	Widespread at entry level (apprenticeship) and to qualify for promotion	Widespread at all levels	Limited; employers rely on public vocational institutes	Limited <sup>a</sup>
Quality	Sometimes excellent, but more often weak or unstructured; many firms do not train	Very good	Very good	Generally poor	Not evaluated
Public policies	Federal role limited; State aid to employers growing	Governs apprenticeship; supports further training	Subsidies encourage training by small firms	Directive--some employers resist government policies	Limited, but growing; aid to trade association and union training efforts

<sup>a</sup>One estimate is that Canadian firms spend less than half as much per employee on formal training as do U.S. firms—*Success in the Works* (Ottawa, Ontario: Employment and Immigration Canada, April, 1989), p. 2.

SOURCE: Office of Technology Assessment, 1990.

training, but not nearly so strongly as in the United States.

In Japan, rigorous academic preparation coupled with extensive company training yields a highly qualified workforce. Firms and individuals absorb most of the costs of training. Stable, long-term employment relations, particularly in large corporations, mean that Japanese companies can invest in their workers with little fear of losing them. For employees, training is more than a means for advancement: in Japan, a host of subtle and not-so-subtle pressures encourage continuous, life-long learning.

Japanese and German managers embrace broad, ongoing training as a way to enhance productivity, quality, and competitiveness. Although the two countries rely on very different training systems, the net effect is much the same. Most workers have broad skills: they can do more than one job, and participate effectively in the ongoing search for better production methods. Because many U.S. employers fear they might lose skilled workers to another employer, or have to pay higher wages, company training is spotty (see ch. 5). In smaller firms, many employees receive no formal instruction; larger firms slant their training towards supervisors and managers. U.S. apprenticeship programs have been in decline (ch. 8), while other forms of vocational education and training have not picked up the slack. Although Japan's vocational education system is weak, pervasive employer-provided training makes up for this.

#### Germany: Apprenticeship as a Foundation

The strength of the German training system lies in its integration of training with education, in contrast to Japan, where schools and employers function independently to create a high-quality labor force. The vast majority of the German work force boasts formal training; 60 percent have completed an apprenticeship.<sup>23</sup> Today, these long-established pro-

grams have been reinforced with incentives for post-apprenticeship training.

The FRG Government works with trade associations and unions to define uniform national curricula and examinations for apprentices in over 400 occupations. Most apprenticeships last three years, combining on-the-job training (for a small wage) with at least 1 day per week of classroom instruction. Certification requires passage of written tests and demonstration of practical skills. Trade associations have always played a central role: beginning as a compulsory system of artisan guilds in the Middle Ages, Germany's apprenticeship system evolved into one jointly regulated by employers and government, "with the changeable consent of the unions."<sup>24</sup>

All apprentices must attend Lander-supported vocational schools 1 day per week. The structure of the rest of the week depends on the firm. In large companies, apprentices spend much of their time in training centers, often licensed and partially funded by Lander governments; these supplement vocational school curricula.<sup>25</sup> Apprentices in smaller companies spend more time on the factory floor, often interspersed with periods of a few days to several weeks at area training centers supported roughly half and half by local chambers of commerce and the Federal Ministry of Education and Science.

Training beyond the apprenticeship has traditionally taken the form of night classes delivered by local trade associations; governmental bodies often pay the bills. Employees who pursue such opportunities, and pass the required tests, can win certification as a master craftworker. Among other things, this qualifies him or her for promotion to foreman. Workers normally attend these courses on their own time (in the United States, first-line supervisors often get their training on company time). In addition, many certified apprentices go back to school, graduating from vocational institutes or even

<sup>23</sup>*Berufsbildungsbericht 1988* (Bonn: Federal Ministry of Education and Science). P. 64.

<sup>24</sup>Arndt Serge and Malcolm Warner, *Comparative Factory Organisation* (Brookfield, VT: Gower, 1986), p. 192.

Although apprenticeships have existed in Germany for hundreds of years, they were not formalized and regulated until 1969. Two forces lay behind legislation passed at that time: 1) shortages of apprentices (young people had turned away from vocational training); and 2) labor union concern that apprentices were being exploited (working for low wages while learning relatively little). The 1969 law led to nationwide standards for each apprenticeable occupation specifying both the content of training, and testing following completion of the three-year program. The Federal Vocational Training Institute develops curricula in consultation with unions and trade associations.

<sup>25</sup>Anthony P. Carnevale and Janet W. Johnston, *Training America: Strategies for the Nation* (Alexandria, VA: American Society for Training and Development and National Center on Education and the Economy, 1989), p. 27.  
Germany's *Länder* correspond to our States.

**Box 3-B—Impacts of the German Training System on Productivity and Competitiveness:  
Two Examples**

Comparisons With British Industry<sup>1</sup>

A series of studies carried out by British investigators offers perhaps the most careful and comprehensive examination of the effects of training and skills on the performance of manufacturing firms ever undertaken. These studies demonstrate in striking fashion the impacts of the German training system on costs, productivity levels, and quality. Intended to help diagnose the competitive problems of British industry, the comparisons covered a set of quite different sectors: metalworking (45 companies producing small parts such as screws, springs, and drill bits); fitted kitchen furnishings (23 companies making such products as countertops and cabinets); and women's clothing (22 matched plants). The results demonstrate that German firms perform better than their British counterparts because of their better trained workers.

The average labor productivity in German metalworking firms was more than 60 percent greater than in the British sample. About half the shopfloor workers in the German metalworking companies had earned apprenticeship or similar qualifications, compared with one-quarter in Britain. German furniture-making firms were 50-60 percent more productive, and turned out higher quality goods. In every German furniture company sampled, 90 percent or more of the shopfloor workers had, as their minimum qualification, certification following 3 years of training; in none of the British firms did more than 10 percent of the employees have any formal qualification. Higher skill levels in the German apparel industry helped firms move into short runs of specialized, highquality clothing for export, while British firms continued to mass produce lower priced, standard goods for the domestic market. In the apparel sample, 80 percent of German maintenance workers had completed an apprenticeship program, while not a single British worker had earned any form of certification. Machinery breakdowns were far less frequent in the German plants.

Plant visits and surveys revealed no possible source for the differences except training. The British firms, for example, typically had comparable manufacturing equipment—indeed, had sometimes made heavier capital investments. But British workers and supervisors were unable to use their equipment as effectively.

Training in a German Machine Tool Firm<sup>2</sup>

When faced with stronger Japanese competition in the late 1970s, Scharmann, a machine tool manufacturer located near Dusseldorf, made worker training a central element in reshaping its corporate strategy. The firm decided to specialize in automated equipment for producing relatively large parts, rather than the standard tools emphasized by Japanese competitors. Scharmann won a major order from Caterpillar's Belgian factory in 1980, helping the company move in this new direction.

Scharmann was able to build on its own earlier experience. Like many machine tool builders, the company designs and fabricates much of its own production equipment. During the 1970s, the company had automated internally while trying to save on payroll costs by hiring unskilled workers (including several who had completed apprenticeships in unrelated fields like baking). When this effort failed, Scharmann decided to strengthen its apprenticeship program.

In the new program, a 16-year-old apprentice could expect to spend a day-and-a-half each week in one of Scharmann's own classrooms, another day at a nearby vocational school studying the principles of machine tools, plus 2 days at work in the company training center. After completion of the program, Scharmann sends selected workers to a technical college for 2 years of further study in industrial electronics. The company's unskilled work force has dropped from about 230 to fewer than 40 (of 800 total). Scharmann has been able to draw on its employee's

<sup>1</sup>This section summarizes the following articles, each from the noted issue of *National Institute Economic Review*: A. Daly, D.M.W.N. Hitchens and K. Wagner, "Productivity, Machinery and Skills in a Sample of British and German Manufacturing Plants," February 1985, pp. 48-61; Hilary Steedman and Karin Wagner, "A Second Look at Productivity, Machinery and Skills in Britain and Germany," November 1987, pp. 84-95; Hilary Steedman and Karin Wagner, "Productivity, Machinery and Skills: Clothing Manufacturing in Britain and Germany," May, 1989, pp. 41-57. Also see the broader comparisons between British and German education/training practices likewise appearing in *National Institute Economic Review*: S. J. Prais and Karin Wagner, "Some Practical Aspects of Human Capital Investment: Training Standards in Britain and Germany," August 1983, pp. 46-65; S.J. Prais and Karin Wagner, "Schooling Standards in England and Germany: Some Summary Comparisons Bearing on Economic Performance," May 1985, pp. 53-76; S.J. Prais, "Educating for Productivity: Comparisons of Japanese and English Schooling and Vocational Preparation" February 1987, pp. 40-56; and S.J. Prais and Karin Wagner, "Productivity and Management: The Training of Foremen in Britain and Germany," February 1988, pp. 34-47.

<sup>2</sup>Ira Magaziner and Mark Patinkin, *The Silent War* (New York: Random House, 1989), pp. 120-136.

new skills to make the steady, incremental improvements in work methods and production practices necessary to achieve its cost and quality targets.<sup>3</sup>

<sup>3</sup>Comparisons of British and German machine tool producers matched by size have shown that a broadly-skilled work force, capable of both programming and maintaining automated equipment, helps German firms compete more effectively. *Comparative Factory Organization*, op. cit., footnote 24, p. 164.

universities. Among those who completed apprenticeships during the 1960's, nearly 20 percent have now either been certified as master craftworkers (9 percent) or graduated from a vocational institute or university (10 percent).

As international competition and the need for top-quality products has grown, more West German employers are offering on-the-job training, as well as paying for outside courses that may not be tied directly to certification as a master craftworker. Government support for such training has grown. At the same time, more German workers are enrolling in classes on their own time, sometimes at their own expense, sometimes with government assistance. For example, between 1980 and 1985, 23 percent of employed adults took at least one job-related course (other than courses to become a master craftworker), an increase over the 1974-79 period, when 20 percent did so.

German employers view completion of an apprenticeship as evidence of motivation and willingness to learn. Nearly half (43 percent during the 1980s) of certified craftworkers find themselves in occupations other than those for which they apprenticed, but they are nevertheless much less likely to experience unemployment than unskilled workers.<sup>26</sup> Although a substantial fraction of apprentices leave the firm in which they train, nearly 80 percent of all firms with at least 20 employees participate in apprenticeship programs.<sup>27</sup> Growing numbers of German workers have also been participating in less traditional forms of continuing education and training-e.g., short courses in data processing, or sales and management.

Box 3-B summarizes an extensive series of comparisons between training and measures of costs, productivity, and competitiveness in German

and British industry, as well as outlining changes in employment and training practices in a medium-sized German machine tool firm. The German-British comparisons demonstrate in convincing detail the shopfloor benefits that German manufacturing firms get from better trained workers.

#### Japan: Training Integrated With Work<sup>28</sup>

Employer-provided training in Japan contrasts sharply with that in the United States: large Japanese firms, and many smaller ones as well, pursue training with unmatched zeal. Managers and supervisors deliver much of the training-an approach that has paid substantial dividends by integrating ongoing learning into corporate cultures.

Japanese firms provide extensive training for both new recruits and seasoned hands. After hiring in, blue-collar workers in larger firms typically begin with a week or so in an off-the-job motivational program. These programs are intended to impart not only the essentials of their employer's history, organizational structure, and product lines, but its culture and "philosophy"-based, in many cases, on the thoughts of the original founder. Employees then rotate through several jobs, a few days at a time, so they can develop a broad view of the company's business. During this period, they get systematic on-the-job instruction, commonly making use of training manuals prepared by supervisors or by a work group (e.g., as part of quality circle activities). After a few weeks, each recruit is assigned to a group, beginning with simpler tasks under the supervision of an experienced employee.

Production workers as well as managers are taught to embrace the concept of continuous improvement (*kaizen*) and hence continuous learning as a foundation for economic success. Quasi-public

<sup>26</sup>*Berufsbildungsbericht 1988*, op. cit., footnote \*3, p. 65.

<sup>27</sup>*Zur Finanzierung der Berufsausbildung* (Bonn: Kuratorium der deutschen Wirtschaft fuer Berufsbildung, 1985), p. 4. This was the percentage in 1983.

<sup>28</sup>This section is based on "Employee Training in Japan," report prepared for OTA under contract No. L3-4335 by David Cairncross and Ronald Dore, March 1990.

industry bodies, such as the Japan Management Association and the Japanese Efficiency Association, have provided training to blue-collar workers since the 1950s; in recent years, they have offered courses for managers as well. With the recent rapid expansion of foreign direct investment by Japanese firms, many companies (40 percent according to one survey) now provide language training, not only to managers and sales staff, but to technicians and other skilled workers. Increasingly, such employees may not only be asked to respond to technical inquiries from overseas but be sent abroad temporarily (e.g., to aid in new plant startups, or train foreign workers).

The distinctive Japanese approach to training is relatively recent. Following a period of conflict after the Second World War, industry and labor reached an accommodation. The mostly male core employees of large firms, especially skilled workers and supervisors, won the benefits of 'lifetime' employment (and systematic training) in return for an end to labor strife. Although lifetime employment is by no means universal for Japanese workers, the precedents and practices set by the largest firms strongly influence employment and training practices throughout the economy.

American experts helped establish the Japan Productivity Center and the Japan Industrial Training Association to meet growing training needs, especially in smaller firms. The initial focus on training supervisors as instructors helped shape the practice of integrated on-the-job training that has proven so successful. As with Japan's adoption of quality control practices pioneered in the United States, these postwar training efforts first borrowed U.S. practices, then refined and extended them.

Smaller Japanese firms sometimes benefit from assistance that large corporations provide to associations of first-tier suppliers.<sup>29</sup> For example, each of the three largest construction companies in Osaka has helped its leading subcontractors establish a local training center. Government grants also channel financing to these training centers. Finally, small firms in Japan often pool training resources through producers' cooperatives.

Training in Japan tends to be structured in terms of content, although delivered by managers and supervisors rather than specialists—both on the shopfloor and during the day or two per year that employees typically spend in a classroom setting. Their role as trainer helps managers stay in touch with the shopfloor and keep workers informed of company plans. It is no surprise that Japanese managers have more confidence in the usefulness of training than their U.S. counterparts. Moreover, the benefit/cost ratio is higher in Japan because so much training takes place on the job with little loss of working time. Employees quickly grasp the connections between new skills and their everyday work. And, as noted in chapter 1 (see box 1-B), many Japanese workers get more hours of training than their American counterparts. Not only is training in Japan more effective, there is more of it.

#### Vocational Credentials and Status

Other countries also work harder than the United States to maintain the quality of vocational education programs, seeking to keep them attuned to the needs of the labor market and to overcome widespread biases in favor of academic education. For example, Germany, South Korea, and to a lesser extent Japan, use skill certification as an incentive and symbol of achievement. The governments of Japan and Korea also support young people who participate in skills competitions (box 3-C).

Unrealistic attitudes and overemphasis on college help explain the disappointing record of high school vocational education programs in the United States (see ch. 8). Although post-secondary vocational education has a somewhat better track record, many graduates of such programs find their newly acquired skills ill-suited to the job market. Germany, in contrast, has been quite successful in creating and maintaining respect for blue- and grey-collar work: the concept of vocation is deeply ingrained, the link between formal qualifications and occupational status far stronger than in most countries. After 10 years of schooling, as required by law, about 90 percent of West Germans continue in some sort of formal education/training program—either an apprenticeship (three-quarters of the 90 percent who continue), an academic high school in preparation for university (20 percent), or a vocational high

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<sup>29</sup>One-quarter of small- and medium-sized manufacturing firms responding to a 1984 survey reported that an affiliated parent firm had helped them with training. "New Technology Acquisition in Small Japanese Enterprises: Government Assistance and Private Initiative," report prepared for IATA under contract No. J3-4950 by D.H. Whittaker, May 1989, p. 23.

### Box 3-C—National and International Skills Competitions

In 1950, Spain initiated the International Vocational Training Competition (called the International Youth Skill Olympics, or IYSO, in the United States). Entrants, who must be under age 23, compete biannually in areas ranging from welding to graphic design. In 1989, more than 400 people from 21 countries participated.

From 1975, when a U.S. team first entered, until 1983, the Americans finished last. Teams from South Korea, Japan, and Taiwan earned the highest scores, while European countries with apprenticeship systems also did well. By 1985, a U.S. team reached the middle rank.<sup>1</sup>

IYSO results mirror government policies for the support of vocational education and training. Japan, Korea, and Taiwan, among others, support national and international skills competitions to help encourage young people to enter skilled trades. In each of these countries, a government training agency sponsors the IYSO team; American entrants have been sponsored by the Vocational Industrial Clubs of America, a private nonprofit group. In other countries, government training agencies coach the contestants, sometimes provide living allowances, and may provide cash prizes to winners at local, national, and international levels. Korea, for example, uses money from a payroll levy both to support public vocational institutes (as discussed later in the chapter) and to provide substantial cash awards to winners of national and international skill Olympics.<sup>2</sup>

<sup>1</sup>The American team finished 11th among 18 competing nations in 1985, 13th out of 19 three years later, and 13th of 21 in 1989. "International Youth Skill Olympics Fact Sheet," Vocational Industrial Clubs of America, January 1990.

<sup>2</sup>Winners at the national level get about \$9,200, and are automatically certified as "Class II" craftsmen. Those who win in the IYSO contest get a sum twice as large, plus exemption from military duty, special housing privileges, and scholarships. The Korean Government also gives winners seed money for starting their own businesses. Although these rewards may not have changed the views of Korean parents and students, who place high values on a college education, they have undoubtedly spurred on the teams that have won several IYSO competitions. See "Training of Private Sector Employees in South Korea," report prepared for OTA under contract No. L3-4180 by Joe W. Lee and Youngho Lee, March 1990, p. 90. (Most of the information on Korea elsewhere in the chapter comes from this report.)

school (the remaining 5 percent). Skill certification helps encourage young people to prepare for occupations ranging from bartender to machinist to office assistant.

In Japan, many more young people—some 95 percent—go onto an academic high school than in Germany. Of the 90 percent that graduate, two-thirds attend an academic or vocational post-secondary institution; the others enter the labor market immediately. Vocational credentials get less emphasis than in Germany, although Japan's Ministry of Labor (MOL) established a national testing system in 1959, declaring its intent to "raise the social status of blue-collar workers by giving public recognition to the skill level which they have achieved."<sup>30</sup> The MOL administers examinations covering 130 occupational skills, with industry bearing most of the testing costs. In addition, the Ministry of International Trade and Industry oversees a special set of tests for skills needed in the electronics industry. Many firms have also created internal certification procedures as incentives for their employees. Japan's testing and certification standards tend to be much more specialized than those in Germany, and ongoing

informal evaluations by supervisors carry more weight within a company than formal qualifications.

#### Other Examples: South Korea and Sweden

Like a number of developing Asian nations, Korea has made education and training a central element in economic planning. Over the past 20 years, 3-year vocational high schools and 1-year training institutes, established under government auspices, have helped train some 2.4 million workers, half of Korea's current workforce (about 60 percent of whom are high school graduates).

Korean training practices draw on the German example. As in Germany, the Korean Government has sought to counter bias against occupational rather than academic skills through testing and certification programs, and by requiring government bodies at both local and national levels to preferentially hire workers with such credentials. Even more than in the FRG, training in Korea has been driven by government policies. Companies have often been reluctant partners, although it seems plain that the remarkable performance of the Korean economy—where labor productivity has grown at an average

<sup>30</sup>Cited in "Employee Training in Japan," *op. cit.*, footnote 28, p. 28.



Photo credit: National Training Fund,  
Sheet Metal and Air Conditioning Industry

Student practicing flame cutting.

rate of 10-12 percent annually and exports at 25-30 percent-owes much to education and training.

In Sweden, as in most countries with well-developed training systems, high-quality general education provides the foundation. Vocational preparation in Sweden bears the stamp of the country's strong trade unions, closely allied with the Social Democratic party. Swedish unions have traditionally opposed apprenticeships in private companies, fearing that employers will stress narrow job- and firm-specific skills. Instead, Sweden relies heavily on school-based vocational education through "integrated upper secondary schools" that provide both liberal arts and vocational courses. The government has recently added a third year to the vocational track, during which students spend at least half their time in on-the-job training.<sup>31</sup> About 55 percent of Swedish young people graduate from high school with a vocational specialty, after which they can

expect extensive on-the-job training and easy access to adult education.

### *Educational Preparation*

It is no news that education in the United States compares poorly with a number of our economic rivals—a sad irony given the historic U.S. commitment to free and universal schooling. Although the schooling system helped support industrialization during an earlier era, the United States has fallen behind during the last several decades. The most dramatic evidence comes from international comparisons on standardized tests (table 3-5). Not only did American 13-year-olds rank near the bottom in the latest such comparison, but if Japanese and Taiwanese students had been included, U.S. performance would no doubt have looked even worse. Other tests have shown similar results, with widening gaps between the performance of U.S. and foreign students as grade levels increase.<sup>32</sup>

Today, the best American high schools continue to graduate students well-prepared for elite colleges and professional careers. Many others offer a decent education to students with the initiative to take advantage of it. But the quality of instruction varies greatly across the Nation, and American schools, generally speaking, do a poor job of serving average and below-average students. This hurts not only the people who find themselves entering adulthood lacking basic skills and the willingness to work and to learn but the competitive ability of U.S. industry. Japan offers a sharp contrast, with a tightly controlled nationwide curriculum completed by most young people. While the regimented Japanese educational system has its own dark side, the bottom half of Japan's labor force maybe the best qualified in the world.

Compensating in part for weaknesses in primary and secondary schooling, and in employer-provided training, the United States can claim a well-developed system of adult education. Enrollments have grown from 8 percent of all adult Americans as

<sup>31</sup>The schools, not the companies, control the content of this on-the-job training. "Working Classes," *The Economist*, Nov. 12, 1988, p. 18.

<sup>32</sup>Students in other countries might get higher average scores in the higher grades if poorer students are selected out for early exits into the labor market. However, Americans test poorly even in the primary grades. For instance, gaps in performance between American, Japanese, and Taiwanese children in reading and mathematics have been found to grow between the first and fifth grades. Harold W. Stevenson et al., "Mathematics Achievement of Chinese, Japanese, and American Children," *Science*, Feb. 14, 1986, pp. 693-699. In mathematics and science tests conducted by the International Association for the Evaluation of Educational Achievement (IAEEA) between 1983 and 1986, the relative rank of U.S. students fell, from low at ages 10 and 14, to almost always the lowest at age 17. Kenneth Redd and Wayne Riddle, "Comparative Education: Statistics on Education in the United States and Selected Foreign Nations," Congressional Research Service, November 1988, pp. 54, 57, 59. In the IAEEA tests, Japanese students were at or near the top in both age groupings.

**Table 3-5-Rank Ordering in Mathematics and Science Tests at Age 13<sup>a</sup>**

Mathematics	Science
South Korea (568)	South Korea (550)
Spain (512)	United Kingdom (520)
United Kingdom (510)	Spain (504)
Ireland (504)	United States (479)
United States (474)	Ireland (469)

<sup>a</sup>By average score (in parentheses) on the International Assessment of Mathematics and Science, administered during 1988 by the Educational Testing Service to random samples of about 1,000 students in each country (from both public and private schools). In addition to the countries listed, the tests were given in four Canadian provinces; because no aggregate results for Canada are available, that country has been omitted from the table.

SOURCE: A.E. Lapointe, N.A. Mead, and G.W. Phillips, *A World of Differences: An International Assessment of Mathematics and Science* (Princeton, NJ: Educational Testing Service, 1989).

long ago as 1957, to 14 percent in 1984.<sup>33</sup> Still, some nations show up better. Canada, for example, estimates that a quarter of employed people over age 17 participated in adult education during 1983 (the latest available year); nearly half of those surveyed were enrolled in job-related courses, with nearly half of those courses provided by employers.<sup>34</sup>

Germany has an extensive system of adult education, offering advanced technical courses at convenient times and often at no out-of-pocket cost to the worker. And given the near-reverential view so many Japanese have of education, it is no surprise to find widespread and effective adult education in that country. Many Japanese companies encourage or require employees to take courses in off hours, while the government pays firms that help their employees with the costs. Nihon Denso, like many other larger companies, also pays its employees a small stipend (about two-thirds of the minimum wage) for the time they spend on home study or in off-site classes. Correspondence schools cover subjects from steel-making to bookkeeping. Given that self-study is widely valued throughout their society, many Japanese need little encouragement from employers.

### **Government Policies**

Policy choices underlie many of the contrasts summarized in table 3-4 and discussed above. In the United States, the Federal Government rarely seeks to influence company training or to support training

directly. In Germany, however, a partnership of employer associations, labor unions, and Federal, *Lander*, and local governments designs, delivers, and pays for apprenticeship, and increasingly, further training. Area training centers, funded equally by the Federal Government and local chambers of commerce, provide short courses for certified craftworkers as well as apprentices. They house training advisors who work directly with companies to design and deliver both apprenticeship and upgrade training programs. In addition, some firms and workers receive direct subsidies for training from a Federal payroll tax levy. The FRG also encourages firms to provide advanced programs through direct subsidies, technical assistance, and regulations.

In recent years, Japanese policies have shifted from their earlier focus on pre-employment training to emphasize upgrading the skills of employed workers. For example, many of the Skill Training Centers that once trained young people as craft workers now function as schools offering short courses for employees of nearby firms. Government bodies at both national and prefectural (local) levels channel payments to individuals, companies, and industry groups (such as the associations of first-tier suppliers mentioned earlier). To be eligible for MOL funds, companies must first submit an Enterprise Skill Development Plan. Smaller firms qualify for larger subsidies-e.g., half the cost of hiring teachers and purchasing in-house training materials, versus one-third for bigger companies. In total, Japan's prefectures spend about two-thirds as much on training as the MOL, supporting vocational colleges, skill development and training centers, and testing and certification programs.

Other governments have also looked to industry and trade associations for delivery of training, especially to smaller firms. Canada and Australia provide technical assistance for identifying training needs and designing training programs for groups set up jointly by unions and trade associations. Korea offers a package of incentives-including construction financing, low-cost land, subsidies for instructors' salaries, and free training equipment-to or-

<sup>33</sup>Susan T. Hill, *Trends in Adult Education 1969-1984* (Washington, DC: Department of Education, Center for Education Statistics, 1987), pp. 6-7. These are the most recent data available, gathered as part of the May 1984 Current Population Survey. The 1957 data from Ivan Charner and Brynna Shore Fraser, "Access and Barriers to Adult Education and Training," report prepared for OTA undercontract, 1986, p. 46.

<sup>34</sup>M.S. Devereaux, *One in Every Five: A Survey of Adult Education in Canada*, (Ottawa: Statistics Canada and the Department of the Secretary of State, 1984), table 7, p. 18. (Somewhat lower participation by men than women evidently accounts for the title of this publication.)

ganizations such as the Korea Machinery Industry Association.

#### Payroll-Based Levies

West Germany and a number of other countries tax payrolls to help pay for training. The FRG's 4-percent payroll tax-half charged to the company, half to the employee-goes to the Federal Employment Institute. Most of the Institute's budget provides income support for unemployed workers, but about 15 percent is spent on three types of training: 1) post-apprenticeship programs; 2) training in new technologies; and 3) retraining of unemployed workers. Most payments go to workers individually.

On launching its program of support for further training in 1969, the West German Government expected that most funds from the levy would be used to help firms retrain employed workers to use new technology and meet growing international competition. However, as long-term unemployment has grown and persisted, a growing fraction of the money has been targeted to displaced workers—during 1988 and 1989, over half (55 percent) of the participants were unemployed. Many of the employed participants are studying for certification as master craftworkers, while others are enrolled in on-the-job training. In addition to the payroll levy, the German Government supports the area training centers discussed above. Another source of government assistance is the *Lander*, which provide tuition aid to some workers for outside courses. Some *Lander* now require firms to give employees 1 or 2 weeks per year of paid "training leave" to attend outside seminars.

In France, Korea, and several other countries, payroll taxes are used to encourage company training: if a firm's training expenditures equal or exceed the levy, no payment is required, French companies employing 10 or more workers must devote 1.2 percent of their payroll costs to employee training.<sup>35</sup> (Another 0.5 percent is collected for apprenticeship training.) Firms can meet this "obligation to spend"

by providing training themselves, by contracting with outside providers, or by joining in a multifirm training fund. Government has little control over what is taught or who is selected for training; some French companies take these programs much more seriously than others.

Korea requires all firms with over 300 employees to either spend a certain percentage of payroll (varying with industry sector and firm size) for training or pay a tax. Most of the tax money goes to support the extensive system of public vocational training institutes that provide a year of pre-employment training for young people. In part because of stringent requirements on the type and amount of training necessary to avoid the levy, and in part because it was originally quite low, most Korean companies simply paid the tax, whether or not they provided any training. In the 1980s, with Korea's first wave of industrialization completed and the economy beginning to shift from labor-intensive industries such as textiles towards those requiring higher skills, the government passed new legislation. Current law makes it easier for companies to satisfy the government's requirements, while raising the levy substantially. As a result, many more Korean firms, including smaller enterprises, have established in-house training programs complying with government standards. Funds raised through the levy help pay for cooperative training programs involving companies and the public training institutes. In these programs, entering 15-year-olds get 3 years of training and must then spend 4 years working for the participating firm—a "dual system" modeled on German apprenticeships.

#### Older Workers

Among the major industrial nations, only the United States and Japan have implemented employment and training policies specifically for older workers.<sup>36</sup> Evaluations of U.S. programs funded under the Older Americans Act and the Job Training Partnership Act indicate that they have been suc-

<sup>35</sup>Olivier Bertrand, "Employment and Education Statistics in the Service Sector in France," report prepared for the Organisation for Economic Cooperation and Development July 1988.

Companies can include the wages of those in training as part of the required expenditures, which were set at 1.1 percent of payrolls until 1987. Any company spending less than the current 1.2 percent requirement is supposed to pay the difference to the treasury, but most firms report spending more. Indeed, the government's figures show that payroll percentages devoted training have increased steadily since since the law was passed in 1971, and now exceed 2.5 percent of payrolls. (For 1987, 2.5 percent of French payrolls would be equivalent to about \$4.3 billion.)

<sup>36</sup>Canada's government does fund a National Labor Market Innovations Program that supports pilot programs for training and employing older workers. Mary Trueman, "Training of Older Workers in Canada," ILO discussion paper, International Labour Office, Geneva, May 1989.

cessful in placing older workers in jobs.<sup>37</sup> Nonetheless, most American firms have been reluctant to train older workers, nor do Federal programs encourage them to. The aging of the U.S. labor force will no doubt force both corporate officials and government policymakers to pay more attention to these issues over the next decade or two (see ch. 8).

In Japan, the government has urged firms to continue training their older employees, providing special subsidies for companies that train workers aged 45 and up.<sup>38</sup> These and other measures are intended to encourage large Japanese companies to offer training as part of life-long career development plans, rather than "farming out" middle-aged workers at lower pay to subsidiaries.

### *Lessons From Abroad*

*In* Germany, widespread participation by companies, government bodies, and labor unions has kept the training system responsive to shifting demands for skills. Both business and labor have a stake in the system; both understand the need to adapt to ongoing changes in technology and international competition.

Japan's experience shows that comprehensive training need not carry a high price tag. If American firms embedded training in day-to-day operations like Japanese firms, using front-line supervisors as instructors, some would find they spent less on training than they do now (once they had trained their supervisors). But such an approach, by itself, would not be enough. As many Japanese firms have discovered, automation means that on-the-job training must be supplemented with classroom instruction to develop the broader and deeper skills needed by those who work with the new equipment. Despite such limitations, the Japanese approach suggests that many American firms could benefit from structured, on-the-job training as part of the daily routine for supervisors and shopfloor workers.

In addition, the payroll levies adopted by a number of countries show that such policies can spur increases in employer-provided training. But these levies also have limitations. Korean companies viewed the original requirements as onerous; few complied, preferring simply to pay the tax. In

France, on the other hand, government allows companies a great deal of latitude, with the result that some "training" consists of junkets for top management.

## CONCLUDING REMARKS

High levels of mobility in the U.S. labor market, driven by both supply (people seeking new or better jobs) and demand (new companies, established enterprises seeking new workers), create continuing needs for training. At a minimum, newly hired employees need an introduction to the workplace what the job requires, how the company views task assignments and responsibilities. Over and above these routine activities, new workplace technologies and new organizational practices entail training or retraining. Finally, American companies increasingly find they must provide some basic skills training, in addition to instruction in particular tasks. In their efforts to cut costs, improve quality, and enhance flexibility, companies are also relying on training to help motivate employees.

Most of the new jobs created in the U.S. economy over the next several decades will be in the services; relatively few service products trade internationally. Small firms will create more jobs than large firms; few small companies face direct international competition, regardless of whether their products are goods or services. Even so, the link between skills and competitiveness is a vital one. Each and every industry counts, regardless of whether firms in that industry are exposed to international competition. The need for training and retraining is pervasive; it is not just a matter of meeting the needs of growing sectors, growing occupations, or sectors beset by international competition.

Under intense pressure, often from imports, to improve quality while at the same time lowering costs, many American companies are reevaluating the ways in which work gets done, making sweeping changes in workplace organization. Together with shifts in consumer preferences and in markets for producer goods and services, the pressures have already led to substantial restructuring in U.S. industry. Like labor market churning, these changes

<sup>37</sup>Harold L. Sheppard and Sara E. Rix, "Training of Older Workers in the United States," ILO discussion paper No. 31, International Labour Office, Geneva, 1989.

<sup>38</sup>Masako M. @ & o, *Training of Older Workers in Japan* (Geneva: International Labour office, 1989).

—the subject of the next chapter—add to the demand for training.

Better training cannot but help in rebuilding U.S. competitiveness. Indeed, it is one of the essential steps. Training has proven central in aggressive corporate strategies stressing quality, flexibility, and customer service, as well as cost and price. Dispersed computing power for automating the back offices of banks places new demands on workers, just like computers for managing the flow of production in a textile mill. Management style is at least as important as worker training itself in responding to these demands: when a firm reorganizes production, it will probably need to retrain supervisors along with shopfloor workers. In larger U.S. corporations, particularly multinationals, high-level executives increasingly see continuous training as a necessary investment for competitive survival—on a par with investments in plant and equipment.

Even so, it remains true that German and Japanese firms are more likely to view training as an investment, U.S. firms to see it as a cost. And more than ever before, the international economy pits American workers against those in other countries. If the U.S. labor force fares poorly in this head-to-head competition, American living standards will suffer. Unemployment levels may rise, particularly among the disadvantaged. American companies can move operations abroad. Few American workers have such alternatives.

### APPENDIX 3-A—THE CHANGING STRUCTURE OF U.S. EMPLOYMENT

The U.S. economy will continue to create large numbers of low-skilled jobs in the future, but the most rapid rates of growth will be in occupations calling for higher skill levels. This expected pattern of occupational expansion does not match up neatly with projected labor force growth.

During the 1990s, nearly 3 in every 10 new workers will be a member of a racial/ethnic minority (table 3A-1). One in four of all new workers may well be an immigrant. Both these groups, which of course overlap, have historically fared relatively poorly in the competition for high-paying, high-skilled jobs.

According to BLS projections, nearly all the net new jobs created over the rest of the century will be in service industries, which will soon account for nearly 80 percent

**Table 3A-1—Projected Labor Force Shifts, 1988-2000a**

	Number in the labor force (millions)		
	1988	2000	Change, 1988-2000 <sup>b</sup>
All workers . . . . .	121.7	141.1	19.5
Aged 16-24 . . . . .	22.5	22.5	—
Aged 25-54 . . . . .	84.0	101.3	17.2
Aged 55 and over . . . . .	15.1	17.4	2.3
Women, all . . . . .	54.7	66.8	12.1
Blacks, all . . . . .	13.2	16.5	3.1
Hispanics, all . . . . .	9.0	14.3	5.3
Asians and other minorities, all . . . . .	3.7	5.7	1.9

<sup>a</sup>BLS moderate growth scenario.

<sup>b</sup>May not equal difference of first two columns because of rounding.

SOURCE: Howard N. Fullerton, Jr., "New Labor Force Projections, Spanning 1988 to 2000," *Monthly Labor Review*, November 1989, table 1, p. 4, and table 7, p. 11.

of nonfarm employment (table 3A-2). Of these new jobs, somewhat more than half will be in the knowledge-based services, where health care will account for the greatest number. Most of the rest will be in the tertiary (or traditional) services, with retailing making a major contribution.

Jobs created in both the knowledge-based and tertiary services will range broadly in skill requirements and pay scales. Health service occupations include housekeepers as well as nurses and physicians; likewise, financial service occupations range from clerks and tellers to loan officers and investment bankers. In the tertiary services, too, the range in occupational skills is broad. But here a much greater fraction of new jobs will be low-skilled and low-paying, the chief exceptions being managers and technical specialists (e.g., computer system analysts working for retail chains). Thus it is the *distribution* of occupational skills that distinguishes knowledge-based from tertiary (or traditional) services: the knowledge-based sector creates high-skilled jobs in substantially higher proportions. This sector includes law and accounting firms, hospitals, and private schools; the tertiary services include barber shops, funeral parlors, and movie theaters.

Table 3A-3 summarizes the job creation picture by occupation rather than sector. This table, listing the 10 occupations with the greatest expected increase in jobs, again highlights the extent to which the U.S. economy will continue creating low-skilled positions in stores, offices, and hospitals. Of the occupational categories in which large numbers of new job opportunities will exist, only two—nurses and managers—normally require post-high school credentials for entry. The other eight range in skill requirements from the personal and technical skills

Table 3A-2—Employment Growth by Sector, 1988-2000<sup>a</sup>

	Net job creation (thousands)
Total . . . . .	18,100
Sector 1, Agriculture and Mining . . . . .	-280
Sector II, Traditional Industries . . . . .	370
Construction . . . . .	760
Manufacturing, except knowledge-intensive (below) . . . . .	-390
Sector III, Knowledge-Intensive Manufacturing <sup>b</sup> . . . . .	70
Sector IV, Knowledge-based Services . . . . .	9,620
Health . . . . .	3,080
Business services . . . . .	2,740
Education . . . . .	1,200
Professional services (legal, engineering, accounting, etc.) . . . . .	810
Financial services (banking, credit, securities) . . . . .	650
Government not included elsewhere . . . . .	620
Insurance . . . . .	300
Real Estate . . . . .	130
Communications media . . . . .	90
Sector V, Tertiary Services . . . . .	8,250
Retail trade . . . . .	3,770
Personal services . . . . .	1,870
Wholesale trade . . . . .	910
Transportation and public utilities . . . . .	660
Lodging . . . . .	410
Other tertiary services <sup>c</sup> . . . . .	640

NOTE: Subtotals may not add because of rounding.

<sup>a</sup>For this table, the BLS moderate growth projections have been recast into five broad sectors following the rationale discussed in *International Competition in Services*, OTA-ITE-328 (Washington, DC: U.S. Government Printing Office, July 1987), pp. 228-230.

<sup>b</sup>Includes electrical, electronic, and communication equipment (except for household appliances and electric lighting), instruments and related equipment, office and computing machines, printing and publishing equipment.

<sup>c</sup>Includes postal workers.

SOURCE: Projections summarized in Valerie A. Personick, "Industry Output and Employment: A Slower Trend for the Nineties," *Monthly Labor Review*, November 1989, table 6, pp. 34-38.

expected of secretaries and other office workers, to the minimal (but perhaps rising) levels needed for custodial work.

A rather different picture emerges from a listing of the 10 occupations expected to grow most rapidly (table 3A-4). The totals are smaller than those in table 3A-3, despite much higher rates of expansion. Every one of the occupations listed in table 3A-4, 7 of 10 of which are health-related, will require credentials of some sort for entry, generally from a formal education or training

Table 3A-3—Occupations With Greatest Number of New Jobs, 1988-2000<sup>a</sup>

	Net increase in jobs	
	(thousands)	(percent growth)
Retail salespersons . . . . .	730	19%
Registered nurses . . . . .	610	39
Custodial workers . . . . .	560	19
Waiters and waitresses . . . . .	550	31
Managers . . . . .	480	16
Office clerks . . . . .	460	18
Secretaries <sup>b</sup> . . . . .	380	13
Nursing aides and attendants . . . . .	380	32
Truck drivers . . . . .	370	15
Receptionists and information clerks . . . . .	330	40

<sup>a</sup>BLS moderate growth scenario.

<sup>b</sup>Excludes legal and medical secretaries.

SOURCE: George Silvestri and John Lukaszewicz, "Projections of Occupational Employment, 1988-2000," *Monthly Labor Review*, November 1989, table 6, p. 60.

Table 3A-4—Fastest Growing Occupations, 1988-2000<sup>a</sup>

	Net increase in jobs	
	(thousands)	(percent growth)
Paralegals . . . . .	62	7570
Medical assistants . . . . .	104	70
Home health aides . . . . .	160	68
Radiological technologists and technicians . . . . .	87	66
Data processing equipment repairers . . . . .	44	61
Medical records technicians . . . . .	28	60
Medical secretaries . . . . .	120	58
Physical therapists . . . . .	39	57
Surgical technologists . . . . .	20	56
Operations research analysts . . . . .	30	55

<sup>a</sup>BLS moderate growth scenario.

SOURCE: George Silvestri and John Lukaszewicz, "Projections of Occupational Employment, 1988-2000," *Monthly Labor Review*, November 1989, table 6, p. 60.

program. Moreover, training will be more demanding in terms of task-specific technical skills than for most of the occupations listed in table 3A-3. Rapidly growing occupations like those listed in table 3A-4 are the ones most likely to see labor shortages. These are the kinds of jobs for which people who lack basic skills will be unable to qualify (they will not even qualify to enter training programs). The mismatch between jobs and skills will be most acute in such occupations, and in the economic sectors that depend on them.