

How Workers Get Their Training

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Preface

Information on how workers develop the skills required for their jobs is useful in career guidance and in planning education and training programs. However, there has been a lack of comprehensive information on this subject. To add to basic knowledge on how workers obtain their job skills, the Employment and Training Administration provided funds to the Bureau of Labor Statistics for a supplement to the January 1983 Current Population Survey. This bulletin presents the results of that survey.

Earlier studies by the Bureau, also funded by the Employment and Training Administration or its predecessor, the Manpower Administration, covered training in manual occupations in selected metalworking indus-

tries and the vocational training background of workers who had completed less than 3 years of college. These findings were published in *Occupational Training in Selected Metalworking Industries, 1974*, Bulletin 1976 (Bureau of Labor Statistics, 1977) and *Formal Occupational Training of Adult Workers*, Manpower/Automation Research Monograph No. 2 (Manpower Administration, 1964).

This bulletin was prepared by Max Carey and Alan Eck under the general direction of Neal H. Rosenthal in the Division of Occupational Outlook.

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Introduction

To obtain more information on how workers get their training, a series of questions was asked as a supplement to the January 1983 Current Population Survey. The supplement was developed around two basic questions: "Did you need specific skills or training to obtain your current (last) job?" and "Since you obtained your present job, did you take any training to improve your skills?" In each case, persons who responded "yes" were asked to identify the source or sources of training. If a source was a school program or a formal company program, further questions addressed subjects such as the type of school program, who paid for the training, how long it lasted, and whether it was completed.

Because the information was obtained from the workers, it represents their perceptions of training needs rather than the views of employers. This distinction is significant for two reasons: The data do not identify qualifications required by employers, and the data are not comparable to those in studies based on the responses of employers.

Another aspect of the data that must be emphasized is that individuals may identify more than one type of training. Thus the number of individuals in an occupation who reported training was needed to obtain their job, or who reported obtaining training to improve their skills, generally was less than the total of the types of training reported. Finally, individuals were not asked to identify the type of training most needed to obtain their jobs or to improve their skills. The relative importance can only be inferred by the frequency with which the type of training was identified.

Statistics from the survey of training should be re-

garded as indicators of general magnitude rather than as precise measures because of sampling and nonsampling errors. Sampling errors occur because a sample is surveyed rather than the universe. Nonsampling errors can result from a variety of causes, such as differences in the interpretation of questions, the unwillingness or inability of respondents to provide correct information, errors in collecting and processing data, and the inability to obtain information about all cases in the sample. (For more detail on sources of error and a standard error table, see the appendix.)

Although the magnitude of all errors cannot be quantified, it is believed that the way individuals interpreted and responded to questions may understate the need for qualifying training. For example, a small percentage of workers in occupations which obviously have strict educational requirements, such as physician and dentist, reported no need for training to get their jobs. In addition, some workers in fields that would seem to require at least informal on-the-job training or previous work experience for entry, such as construction trades, also reported no need for training to obtain their jobs. Despite these problems, the sources of training reported by workers in different occupations seem to follow patterns that agree with general knowledge.

Highlights of the survey are presented in the first section of this report. The second section analyzes data on workers who needed training to qualify for their current job. Data on workers who took training to improve their skills are examined in the third section. The scope and method of the survey are presented in an appendix.

Highlights

- About 55 percent of all workers employed in January 1983 needed specific training to qualify for their current jobs. Since obtaining their current jobs, 35 percent of all workers had taken training to improve their job skills.

- About 72 percent of the workers who needed training to obtain their jobs subsequently trained to improve their skills in these jobs.

- Almost equal proportions of women and men required training to qualify for their job and took skill improvement training.

- The youngest and oldest workers were less likely than others to have had either type of training.

- Among major occupational groups, the proportion of workers who needed qualifying training ranged from 93 percent in professional specialty occupations to 8 percent in private household occupations; the proportion who took skill improvement training ranged from 61 percent in professional specialty occupations to 3 percent in private household occupations.

- About 29 percent of all workers acquired their qualifying training from schools; 28 percent acquired their training informally on the job (OJT). On the other hand, OJT was a source of skill improvement for 14 percent of all workers; school programs, for 12 percent.

- Almost the same proportion of workers (10 to 11 percent) used training from formal company programs to qualify for jobs and to improve skills.

- Relatively few workers acquired qualifying training from correspondence courses, the Armed Forces, or friends and relatives.

- Executive, managers, and administrators were more likely than workers in other occupational groups to have received training to qualify for their jobs from more than one source.

- Of the 28.1 million workers who acquired their qualifying training through school programs, about 7.5 percent took training sponsored by employers, and 3 percent took training sponsored by the government in programs such as those offered under the Job Training Partnership Act (JTPA) and the Comprehensive Employment and Training Act (CETA).

- Forty-one percent of the 11.4 million workers who acquired skill improvement training in schools took training that was sponsored by employers; 3 percent of the workers who acquired skill improvement for their jobs obtained the training in government-sponsored school programs.

- College programs that lasted 4 years or longer were a source of job-qualifying skills for 17 percent of all workers; junior college and technical institute programs, 5 percent; high school vocational programs, 5 percent; private post-high school vocational programs, 2 percent; and public post-high school vocational programs, less than 2 percent. Few workers reported more than one school category.

- College programs that lasted 4 years or longer were a source of skill improvement for 6 percent of all workers; junior colleges and technical institutes, 3 percent; private post-high school vocational programs, 0.8 percent; public post-high school vocational programs, 0.8 percent; and high school vocational programs, 0.4 percent.

- About 70 percent of the workers in the professional specialty occupational group acquired the training needed to obtain their jobs in 4-year or longer college programs; these workers accounted for 56 percent of all workers who qualified for their jobs through these programs.

- Although only 16 percent of the workers in administrative support occupations obtained the training needed to get their jobs in high school vocational programs, they represented 57 percent of the total number of workers who qualified for their jobs with this kind of training; secretaries alone represented 28 percent of the total.

- One-third of the workers who obtained qualifying training from private post-high school vocational programs were hairdressers and cosmetologists, secretaries, or registered nurses.

- Workers in precision production, craft, and repair occupations were more likely than those in other occupational groups to qualify for their jobs through training acquired in formal company programs, and workers in technician and related support occupations were somewhat more likely than others to obtain skill improvement training in these programs.

- About 4.4 percent of the 9.4 million workers who acquired training to qualify for their jobs obtained the training in government-sponsored formal company training programs.

- Formal company training programs to qualify workers for jobs tended to be of relatively short duration. Almost one-half of the workers who reported this training had participated in programs that lasted under 12 weeks, while less than one-fourth had been in those

that took more than 52 weeks.

- Informal on-the-job training (OJT) was the most common source of training for obtaining jobs and improving skills. The distribution of workers who improved their skills through OJT was similar to the distribution of total employment among the occupational groups.

- Informal on-the-job training was a source of qualifying training more frequently than school programs in 8 of the 12 major occupational groups, and more frequently than formal company training in all groups.

- The Armed Forces were a source of qualifying training for about 45 percent of the aircraft engine mechanics

and more than 20 percent of the data processing equipment repairers and electronic repairers of commercial and industrial equipment.

- Almost 11 percent of the workers in farming, forestry, and fishing jobs and 8 percent of those in precision production, craft, and repair occupations obtained qualifying training from friends or relatives or other training unrelated to work.

- Correspondence courses were a source of qualifying skills for about 12 percent of the electronic repairers of commercial and industrial equipment. No other occupation had a higher proportion of workers who acquired their job skills in this manner.

Chapter 1. Qualifying Training

Almost 53.9 million or 55 percent of the 97.3 million persons employed in January 1983 said they needed specific training to obtain their current jobs. The rates for men and women were about the same. Almost 57 percent of the whites needed specific training to qualify for their jobs, compared to less than 44 percent of the blacks (table 1). The youngest and oldest workers were less likely than others to be in jobs that required training. Only 25 percent of workers age 16 to 19 and 41 percent of workers age 65 and over needed any specific preparation for their jobs. As expected, college graduates were more likely to be in jobs that required training than workers with less education. More than 84 percent of the workers who were college graduates needed specific skills or training to qualify for their jobs compared to 42 percent of the workers who had a high school education or less. These variations were largely a reflection of differences in requirements among occupations.

Among 12 major occupational groups used to classify workers in the Current Population Survey, training was most important for obtaining jobs in the professional and technical fields (table 2). About 93 percent of the workers in professional specialty occupations and 85 percent of those in technician and related support occupations needed training to qualify for their jobs. Requirements also were relatively high for workers in the executive, administrative, and managerial group, and those in precision production, craft, and repair jobs. Training was necessary for 57 percent of the workers in administrative support occupations, which was slightly higher than the average of 55 percent for all occupations. In the remaining seven occupational groups, the proportion of workers who required training was lower than the average, ranging from 43 percent of the sales workers to 8 percent of the private household workers.

Because most of the occupational groups with above average training requirements were large, they accounted for a large number of the total who required training to qualify for their jobs (table 3). Administrative support occupations, the largest group in terms of employment, accounted for almost 17 percent of all workers and a similar percentage of the workers who required training. Professional specialty occupations, the second largest group in employment, accounted for 13 percent of all workers and 22 percent of those who required training. More than 14 percent of the total

who needed training were in executive, administrative, and managerial jobs, and about the same proportion were in precision production, craft, and repair jobs, which, in each case, was somewhat more than their employment levels would indicate.

Although a very high proportion of the workers in technician and related support occupations required training, this small occupational group accounted for less than 5 percent of the total who required training. Two large occupational groups with lower than average training requirements had large shares of the training total; sales occupations accounted for 9 percent, and service occupations for 8 percent.

Almost three-fifths of all workers who needed training to qualify for their jobs were in 50 detailed occupations (table 4). The two occupations with the greatest numbers of workers also had the largest numbers who needed preparation. Of the 5.4 million managers and administrators not elsewhere classified, 3.6 million required training to get their jobs, as did 2.7 million of the 3.8 million secretaries. Training was reported by more than 1 million workers in each of the five following occupations: Elementary school teachers; supervisors and proprietors in sales occupations; secondary school teachers; registered nurses; and bookkeepers and accounting and auditing clerks. Altogether, these seven large occupations accounted for almost one-fourth of all workers who needed training to obtain their jobs, which was as much as the next 25 fields combined. In most of the 50 occupations in table 4, the proportion of workers who needed training was greater than the 55-percent average for all occupations; among the exceptions were truckdrivers, cashiers, farmers, cooks, and waiters and waitresses.

Sources of qualifying training

A worker who needed training to get his or her job was asked to identify one or more sources of the training from the following six categories: (1) A program in a high school or a postsecondary school, (2) a formal company program, (3) informal on-the-job training or experience in a previously held job or jobs, (4) the Armed Forces, (5) correspondence courses, and (6) informal training from a friend or relative or other experience unrelated to work.

School programs and informal on-the job training were a source of qualifying training far more frequently than other methods. About 28.1 million workers ac-

quired skills for their jobs in school, and 27.0 million gained them through OJT (table 2). Each of these methods accounted for more training than all other sources combined. Formal company programs were a source of training for 9.4 million workers. About 3.2 million obtained informal training from a friend or relative or other experience unrelated to work. The Armed Forces were a source of training for 1.9 million workers, and correspondence courses, for 0.8 million. Because many workers identified more than one training source, the total of these numbers (70.4 million) is much larger than the total number of workers (53.9 million) who said any kind of training was necessary.

A simple measure of the extent to which workers reported more than one source of training is the ratio of the number of times each source was identified to the number of workers who required any kind of training. The ratio for all occupations was 1.31 (70.4 million divided by 53.9 million). Ratios for the 12 occupational groups ranged from 1.43 for executives, administrators, and managers to 1.13 for handlers, equipment cleaners, helpers, and laborers, which means that, on average, the former indicated more than one source of training more often than the latter (table 5). A comparison of the patterns of training for these two occupational groups shows that workers in the handler group were far more likely to indicate OJT than any other method, while those in the executive group reported school and OJT with about equal frequency.

Some sources of training were more likely than others to be the sole source. The ratio of the number of persons reporting that a given source of training was the only type needed to the total of all types of training measures that tendency. As shown in table 6, school and OJT, with ratios of 0.7 and 0.6, frequently were reported as the sole source of training while correspondence courses, with a ratio of 0.1, generally were cited only in conjunction with other sources of training. For persons citing school training, OJT was identified most frequently as the second source (28 percent). Conversely, for persons citing OJT, school training accounted for most of the second sources reported (29 percent). The remaining types of training—which had smaller proportions of individuals citing one type of training—had less concentrated distributions of additional sources of training.

Workers in professional specialty occupations and technician and related support occupations identified school more frequently than all other sources of qualifying training combined. School also was more important than any other single source for administrative support workers and for executives, administrators, and managers. Workers in the following occupational groups reported OJT more frequently than all other training sources combined: Handlers, equipment cleaners, helpers, and laborers; transportation and material mov-

ing workers; and machine operators, assemblers, and inspectors. OJT also was the most important source of qualifying training for workers in all other occupational groups, except private household workers, who were more likely to learn from friends or relatives or other experience unrelated to work. Frequently, if school was the primary method of training for an occupational group, OJT was second, and vice versa.

School training. Almost 29 percent of all persons employed in January 1983 qualified for their current jobs with training obtained from school programs. The proportion was higher than average in the following four occupational groups: Professional specialty workers, 82 percent; technicians and related support workers, 58 percent; executives, administrators, and managers, 43 percent; and administrative support workers, 33 percent (table 2). These four occupational groups represented almost four-fifths of all workers who used school training to get their jobs, but accounted for little more than two-fifths of total employment. Professional specialty occupations alone accounted for 37 percent of all workers who trained in school programs; administrative support occupations, 19 percent (table 3).

Twenty-five detailed occupations accounted for 55 percent of all workers who qualified for their jobs with skills acquired in school programs (table 7). Occupations from several groups are represented in this list, although professional specialties outnumber those from any other single group. The first 10 occupations on the list included about 39 percent of the workers who got their jobs as a result of school training.

Workers who qualified for their jobs with training acquired in schools also were asked to identify one or more of the following five program categories from which the training was received: (1) High school vocational program, (2) private post-high school vocational program, (3) public post-high school vocational school program, (4) junior or community college or technical institute program, and (5) 4-year or longer college program.

College was a source of qualifying training more frequently than all other types of schools combined. Almost 16.1 million workers got their jobs as a result of training in college programs that lasted 4 or more years (table 8). About 5 million workers acquired their jobs with training from junior colleges and technical institutes. High school vocational training was a source of job qualification for 4.7 million workers. Almost 2.1 million workers trained for their jobs in private post-high school vocational programs, and 1.6 million in public post-high school programs.

Almost 9 out of 10 workers who used training from formal school programs to get their jobs had completed these programs. Differences in completion rates by

school category were very small (table 9). Almost two-thirds of the workers who used training from high schools, junior colleges, and technical institutes to get jobs had obtained it in programs that lasted more than 52 weeks. High school vocational training generally lasted longer than post-high school training.

Relatively few workers who used school training to get their jobs obtained it in programs paid for by employers or in government programs such as JTPA and CETA. Of the 28.1 million workers who used school training, about 7.5 percent attended employer-sponsored training and 3 percent government-sponsored school training. Almost one-half of the employer-sponsored training and about one-third of the government-sponsored training consisted of college programs lasting 4 years or longer. The next largest category of sponsored training—about one-third of both employer- and government-sponsored training—took place in junior colleges and technical institutes.

The occupational distribution of employer- and government-sponsored training was not the same. About 29 percent of employer-sponsored training was taken by workers in professional specialty occupations, compared to 22 percent of government-sponsored training. Workers who obtained employer-sponsored training also were more likely to be in executive, administrative, and managerial occupations, sales occupations, and farming, forestry, and fishing, while workers with government-sponsored training were more likely to be in other occupational groups (table 10).

Although *high school vocational programs* were the source of qualifying training for only 5 percent of all workers, more than 35 percent of the typists and secretaries and about 25 percent of the stenographers and drafters got their jobs through these programs. These vocational programs also helped prepare more than 20 percent of the billing clerks and typesetters and compositors for their jobs. Between 10 and 20 percent of the workers in about a dozen other occupations also trained in these programs—examples are personnel clerks, tool-and-die makers, automobile mechanics, and computer operators.

About 57 percent of the workers who used high school vocational programs as a source of qualifying training were in administrative support occupations, and 13 percent were in precision production, craft, and repair jobs. High schools were more important sources of vocational training than other schools for these occupational groups.

Over two-thirds of the workers who obtained training to qualify for their jobs from high school vocational programs were in 25 detailed occupations (table 11). Secretaries alone accounted for 28 percent of the total—a very large proportion considering that the occupation accounted for less than 4 percent of total employment. Typists represented over 6 percent of the

workers who reported this method of training, and bookkeepers and accounting and auditing clerks, about 7 percent.

Only 2.2 percent of all workers obtained the training required for their jobs in *private post-high school vocational programs*. About 45 percent of the hairdressers and cosmetologists, however, and more than 30 percent of the barbers, received their job training from private vocational schools, as did almost 20 percent of the radiologic technicians. Programs in these schools also were a source of skills for 10 to 15 percent of the registered nurses, personnel clerks, licensed practical nurses, stenographers, and real estate sales workers. About 24 percent of the total of 2.1 million persons who used the training from private post-high school vocational programs to obtain jobs were in administrative support occupations; 21 percent were in service jobs, except private household; and 18 percent were in professional specialties.

Twenty-five detailed occupations accounted for almost two-thirds of the workers who trained in private post-high school vocational programs (table 12). One-third were hairdressers and cosmetologists, secretaries, or registered nurses. Some fields make the list because they are large; the top 10 occupations, for example, include the 5.4 million managers and administrators not elsewhere classified, of whom fewer than 2 percent had private post-high school vocational training.

The number of workers who acquired the training to obtain their jobs in *public post-high school vocational programs* was even smaller than the number who acquired training through private vocational education. Fewer than 1.6 million persons or only 1.6 percent of all workers obtained their job skills in these programs. Nevertheless, these programs were important for some occupations. About 25 percent of the licensed practical nurses and more than 15 percent of the barbers used public post-high school vocational training to get their jobs. It also was used by roughly one-tenth of the data processing equipment repairers, hairdressers and cosmetologists, and heating, air-conditioning, and refrigeration mechanics.

About 23 percent of those who used the training to qualify for their jobs were in administrative support occupations, and 18 percent were in precision production, craft, and repair jobs. Twenty-five occupations represented almost three-fifths of the workers who had public post-high school vocational training (table 13). Secretaries were at the top of the list, with 9 percent of the total, followed by licensed practical nurses, with almost 7 percent. Although fewer than 1 out of 25 secretaries had this kind of training, the size of the occupation—almost 3.8 million persons—helped make it first on the list.

Junior colleges and technical institutes were the source of qualifying training for almost 5 million persons or about 5 percent of all workers. The proportion of workers who used training from junior colleges and technical institutes to get their jobs was much higher than average in technician and related support occupations and higher than average in administrative support, and professional specialty occupations. Junior colleges and technical institutes were major providers of training for workers in many detailed occupations. They were a source of job preparation for almost one-half of the inhalation therapists, almost two-fifths of the radiologic technicians and dental hygienists, and about one-third of the licensed practical nurses. Junior colleges and technical institutes also were a source of training for more than one-fourth of the registered nurses, data processing equipment repairers, and electrical and electronic technicians.

Administrative support occupations led all other groups in the number of workers reporting this training, with 26 percent of the total. Another 18 percent were in professional specialties, and about 11 to 12 percent each were in technician and related support jobs; executive, administrative, and managerial occupations; and precision production, craft, and repair jobs. Twenty-five detailed occupations represented more than one-half of the workers who used training from junior colleges and technical institutes to get their jobs (table 14). Again, secretaries topped the list, accounting for almost 11 percent of the total, followed by registered nurses, with over 7 percent. The first six occupations had almost one-third of the total who reported this kind of training.

College programs that lasted 4 years or longer were the most common type of schooling through which workers obtained their job training. Almost 17 percent of all workers qualified for their jobs through these programs, which was more than the total for all other school programs combined. About 70 percent of the workers in professional specialty occupations qualified with training from college programs, and the proportion was much higher for some detailed occupations in this group. College programs also were a source of qualifying training for 34 percent of the workers in the executive, administrative, and managerial group. The professional specialty group accounted for 56 percent of the 16.1 million workers who needed training from college programs to get their jobs, which was a relatively large proportion since this category accounted for only 13 percent of total employment. Executive, administrative, and managerial occupations represented 23 percent of those who needed college training, although this group accounted for only about 11 percent of total employment. Administrative support and sales occupations each accounted for about 6 percent of the workers who had to have college training, but these two groups had

larger proportions of total employment. Almost 5 percent of those who needed college training were in technician and related support jobs, a group which accounted for about 3 percent of total employment.

Almost two-thirds of the workers who needed college training to obtain their jobs were in 25 occupations (table 15). The largest number were elementary school teachers, followed closely by managers and administrators not elsewhere classified, and secondary school teachers; each of these three fields had more than 1 million workers who required 4 or more years of college. The next four occupations in the ranking were accountants and auditors, registered nurses, lawyers, and physicians. In a few large occupations, the proportion of workers who needed college training was very low. The 270,000 secretaries, for example, who reported they needed this level of education to get their jobs represented only 7 percent of all secretaries. Nevertheless, only 10 occupations were ahead of secretaries in the number of workers reporting college training. Some occupations with high educational requirements were too small to make the list, including biological and life scientists and speech therapists, in which more than 90 percent got their jobs as a result of college training.

Formal company training. About 9.4 million persons or 10 percent of all workers obtained their jobs with skills they learned in formal company (employer) training programs. The proportion of workers who reported this kind of training was higher than average in the following four occupational groups: Precision production, craft, and repair occupations, 17 percent; technician and related support occupations, 14 percent; sales occupations, 12 percent; and executive, administrative, and managerial occupations, 12 percent. Workers who qualified for their jobs with formal company training were not as concentrated in particular occupational groups as those who used training from school.

About 60 percent of all workers who obtained their jobs through formal company training programs were in 25 detailed occupations (table 16). Almost 30 percent of the total was accounted for by only a dozen occupations. In most jobs on the list, the proportion of workers who had company training was greater than the 10-percent average for all workers. Almost one-half of the public service police and detectives qualified for their jobs through formal company training, as did about two-fifths of the workers in insurance sales and real estate occupations. Formal company programs also were a training source for about one-third of the workers in a variety of other occupations, including telephone line installers and repairers, electricians, plumbers, and busdrivers.

Almost 9 out of 10 workers who obtained training from formal company programs had completed the training, which was about the same as the proportion

completing school programs. Completion rates were higher than 85 percent in each of the major occupational groups.

Unlike the school programs, the formal company programs tended to be of short duration. Almost one-half of the programs took under 12 weeks, while less than one-fourth lasted more than 52 weeks. The length of the program varied by occupational group. Programs lasting more than 52 weeks were reported by 44 percent of the precision production, craft, and repair workers who obtained their jobs through this training. Apprenticeship programs, which may require 3 or 4 years of combined training and work experience, are concentrated in this occupational group. Formal company training also was long for professional specialty occupations, with 33 percent of those trained for these occupations reporting more than 52 weeks (table 17).

For almost 59 percent of the workers with formal company training, the training took place away from the job. In most occupational groups, more than one-half of the workers had received the training away from the job. Sales workers were more likely to receive their training away from the job than workers in other occupational groups.

More than 400,000 workers, or about 4.4 percent of all those who qualified for their jobs through formal company training, did so in government-sponsored programs such as CETA or JTPA. About 25 percent of the workers who got jobs through government-sponsored programs were in service occupations; 22 percent were in precision production, craft, and repair occupations; and the remainder were distributed among many other occupational groups (table 18). Compared to other workers with formal company training, workers in government-sponsored programs were much more likely to be in service occupations and much less likely to be in sales occupations.

Informal on-the-job training. About 27 million persons or 28 percent of all workers attributed the skills they needed to obtain their jobs to training acquired informally through previous employment, which was almost as many as the number who learned job skills in school. The proportion of workers who qualified for their jobs through OJT was higher than average in the following four occupational groups: Precision production, craft, and repair occupations, 40 percent; executive, administrative, and managerial occupations, 39 percent; technician and related support occupations, 32 percent; and administrative support occupations, 31 percent. Differences in the importance of OJT among the occupational groups notwithstanding, it was the most widespread type of training. The occupational distribution of workers who used it to qualify for their jobs was more like that of total employment than the distribution of workers who used any other type of training.

OJT was reported more frequently than school in 8 of the 12 major occupational groups, and more frequently than formal company training in all groups. It was the most important source of training for such diverse occupations as legal assistants, actors, upholsterers, editors and reporters, and plumbers—about 50 to 60 percent of the workers in these occupations learned their skills through OJT. Occupations in which relatively few workers used OJT to get jobs also were a very mixed group. Occupations with less than 10 percent of workers reporting this method included, for example, dentists, news vendors, elementary school teachers, and garbage collectors, which reflects the fact that in some cases school is about the only training necessary, while in others, little, if any, training is required.

Almost 47 percent of all workers who qualified for their jobs through OJT were in 25 detailed occupations (table 19) which represented 36 percent of total employment in all occupations. The first four occupations on this list also are the four largest. Moreover, 19 of the occupations are among the top 25 both in the total number of workers and the number reporting OJT.

Training in the Armed Forces. Only 1.9 million persons, or 2 percent of all workers, received training in military service that provided them with the skills needed to get their jobs. Almost one-third of the workers who used this training were in the precision production, craft, and repair group. However, these workers represented only 5 percent of employment in the occupational group. Training in the military services was most important for aircraft engine mechanics—about 45 percent of these workers acquired their skills in the service. The Armed Forces also were a source of skills for more than 20 percent of the data processing equipment repairers and the electronic repairers of commercial and industrial equipment.

Twenty-five detailed occupations accounted for almost one-half of all workers who used Armed Forces training in obtaining their jobs (table 20). Three of the top five occupations on the list are large managerial and supervisory categories which had relatively small proportions of workers reporting training in the military services.

Correspondence schools. Correspondence courses were the least significant method of job training. Approximately three-quarters of a million persons obtained their jobs through correspondence school training, which was less than 1 percent of all workers. Correspondence school training, however, was a source of training for more than 12 percent of the electronic repairers of commercial and industrial equipment, the largest proportion for any occupation. More than one-half of the persons who used correspondence training to obtain their jobs were in 25 occupations (table 21), and one-third were in the top 10 occupations. Some of these occupations

ranked high because of their large size; they did not have a large proportion of workers reporting the training. The largest occupation, managers and administrators not elsewhere classified, also had the largest number of workers reporting correspondence schools, but they represented only 1.2 percent of the total employment in the occupation.

Other training. About 3.2 million persons, or 3 percent of all workers, got their jobs because of informal training from a friend or relative or other experience unrelated to work. This category of training was reported by almost 11 percent of the persons in farming, forestry, and fishing jobs; 8 percent of those in precision production, craft, and repair jobs; and 5 percent of those in private household occupations. Almost one-third of all workers who reported it were in precision production, craft, and repair jobs.

Twenty-five detailed occupations accounted for more than one-half of all workers who obtained their jobs as a result of training unrelated to work (table 22); over one-fourth were in the first five occupations. A relatively high proportion of workers in some large occupations, such as farmer, carpenter, and automobile mechanic, learned their skills from relatives and friends and through other methods unrelated to work. The proportion of workers with this kind of training was relatively low, however, for some of the largest occupations on the list.

Occupational patterns

Executive, administrative, and managerial occupations. Specific training was a prerequisite for the jobs of 71 percent of the 10.8 million workers in the executive, administrative, and managerial group. Generally, persons in this group were more likely than those in other occupational groups to report more than one way of qualifying for their jobs, which seems reasonable since many of these positions require a broad background of education and work experience. Formal schools were a source of needed skills for 43 percent of all workers in the group, informal on-the-job training for 39 percent, and formal company training programs for 12 percent. The Armed Forces, correspondence schools, and training unrelated to work provided job skills for a small percentage of these workers (table 23).

College programs that lasted 4 years or longer were the principal source of formal schooling for almost all occupations in the managerial group. These programs provided training needed to obtain 34 percent of the jobs in the group. In comparison, 45 percent of the workers in the group had completed 4 or more years of college. Because advancement to many managerial positions requires years of work experience, managers may tend to attribute their jobs to experience

instead of education. Nevertheless, the college programs were a very significant source of training in some occupations. Three-fourths of the education administrators and two-thirds of the accountants and auditors received needed job training in these programs, as well as almost one-half of the financial managers, management analysts, and medical and health administrators. Relatively few managerial workers acquired skills for their jobs in other formal schools such as junior colleges and technical institutes.

OJT was an important source of managerial skills. In many occupations, the number of workers reporting OJT and the number reporting school were fairly close, each category usually representing about two-fifths to three-fifths of total employment in the occupation. OJT, however, was more important for construction inspectors, business and promotion agents, purchasing agents, buyers, and managers not elsewhere classified. Some workers in all managerial occupations had received formal company training. About one-fourth of the protective service administrators and inspectors and compliance officers (except construction) learned job skills in formal company programs. A small proportion of the workers in these two occupational categories also obtained training for their jobs in the Armed Forces. In every managerial occupation, however, school and OJT accounted for far more of the training than formal company programs or the Armed Forces.

Professional specialty occupations. About 93 percent of the 12.7 million workers in these occupations needed specific training to qualify for their jobs, the largest proportion of any occupation group. Almost 82 percent of the workers in the professional group learned the necessary skills in formal school, compared to only 29 percent of the workers in all occupations. OJT was a source of qualifying skills for 22 percent of the professional group, which was somewhat lower than the average for all workers. The proportion of professionals trained by other methods was about average.

About 70 percent of all workers in the professional group needed 4 years of college training or more to obtain their jobs. In comparison, almost 75 percent of all workers in the group had completed 4 years of college or more. Academic preparation usually was most important in professional fields that require a high degree of specialized and theoretical knowledge. College was a source of training for almost all workers in many of these fields, including physicians, lawyers, psychologists, elementary and secondary school teachers, and biological and life scientists. College generally was less important for workers in professional fields that require artistic talent and creative ability, such as photographers, designers, actors, and musicians. Only 7 percent of all professional workers trained for their jobs in junior colleges and technical institutes, but these schools

accounted for almost one-half of the inhalation therapists and almost one-third of the registered nurses, since associate degrees are sufficient for many jobs in these two occupations. Other methods of schooling were reported by relatively few professional workers.

OJT was a source of qualifying skills for more than one-half of the actors, economists, and editors and reporters, and almost one-half of the photographers, public relations specialists, and computer systems analysts and scientists. In several of these occupations, the number of workers who had had OJT was nearly equal to those who had trained in school. OJT was mentioned more frequently than college programs by photographers, actors, and public relations workers. Formal company training programs provided qualifying skills for almost one-third of the operations systems researchers and analysts.

Technician and related occupations. Specific training was necessary for the jobs of almost 85 percent of the 3 million workers in the technician group. About 58 percent of the technicians qualified for their jobs in schools, which was almost twice the average for all workers. Among the occupational groups, technicians were second only to the professional group in the proportion of workers trained in schools. OJT was a source of qualifying skills for 32 percent of the technicians, slightly higher than the average for all workers. Technicians also were more likely than other workers to get their jobs with skills acquired in formal company training programs and the Armed Forces.

The schooling necessary for obtaining jobs in technician and related occupations was concentrated in postsecondary schools. College programs that lasted 4 years or longer were a source of training for 24 percent of the workers in the technician group; programs in junior colleges and technical institutes, for 20 percent. Post-high school vocational programs in public schools and those in private schools each provided qualifying training for about 5 to 6 percent of the technicians. Also, about 5 percent of the technicians obtained needed training in high school vocational programs.

College programs lasting 4 years or longer were the primary source of school for many workers in the technician and related occupation group—dental hygienists, computer programmers, and biological technicians are some examples. Junior colleges and technical institutes were the principal source of school for radiologic technicians, licensed practical nurses, and electrical and electronic technicians. In many cases, however, more than one kind of school was an important training ground for workers in an occupation. Junior colleges and technical institutes, for example, were not far behind 4-year colleges in the number of dental hygienists trained. Similarly, a large proportion of licensed practical nurses were trained in public post-high school vo-

ational programs, and a substantial number of radiologic technicians prepared for their jobs in private post-high school vocational programs.

OJT was second in importance to school in almost all occupations in the technician group. Legal assistants were an exception—almost three-fifths of these workers learned qualifying skills informally on the job, and two-fifths were trained in school. OJT was reported by relatively large numbers of computer programmers, drafters, and electrical and electronic technicians. Formal company programs also were important sources of qualifying training for workers in some of these occupations. About one-sixth of the electrical and electronic technicians used training from the Armed Forces to get their jobs.

Sales occupations. About 43 percent of the 11.2 million sales workers needed specific training to qualify for their jobs. OJT was a source of skills for 28 percent of the workers in sales occupations, the same as the average for all workers. Only 15 percent of the sales workers acquired training for their jobs in formal school, however, compared to 29 percent of all workers. The proportion of sales workers who learned skills for their jobs through other methods was about average.

Training was most important for persons who sold complex services or products. Qualifying training was needed by nine-tenths of the real estate sales workers and more than three-fourths of the sales engineers and workers who sold insurance or securities and financial services. School, OJT, and formal company programs all were significant for these occupations. Almost one-third of the sales engineers and securities sales persons needed 4 years of college or more.

Training usually was less important for obtaining jobs in retail sales, but requirements varied in different jobs. Only one-fifth of the workers who sold apparel and shoes needed specific training to get their jobs, for example, compared to about two-fifths of those who sold motor vehicles and boats. The skills needed for retail sales are learned primarily through OJT. School and formal company programs were sources of preparation for small proportions of workers in some retail sales occupations.

Administrative support occupations, including clerical. In this occupational group, 57 percent of the 16.1 million workers needed specific training to qualify for their jobs, slightly more than the average for all workers. Requirements varied greatly by occupation within the administrative support group; only 1 out of 8 messengers had to have training, for example, compared to 7 out of 8 stenographers. The proportions of administrative support workers who received the training in school (33 percent) and through OJT (31 percent) also were slightly higher than average, while the proportions who learned job skills in other ways were lower.

School was the principal source of training for secretaries, stenographers, and typists. In these occupations combined, 57 percent of the workers were trained in school and 31 percent picked up skills informally on the job. School also was the most important training method for personnel clerks, billing clerks, teachers' aides, and social welfare eligibility clerks. OJT was a source of qualifying skills for more workers than school in almost all other administrative support occupations. Forty percent or more of the workers in the following occupations acquired needed skills through OJT: General office supervisors, financial records processing supervisors, computer operators, data-entry keyers, bank tellers, and investigators and adjusters, except insurance. In many cases, however, the number of workers who reported OJT and the number reporting school did not differ greatly.

More than one-fourth of the transportation and ticket agents needed training in formal company programs to obtain their jobs. These programs also were relatively important for telephone operators, computer operators, order clerks, and general office supervisors.

Workers in the administrative support group were more likely than those in other groups to get their jobs through training in high school vocational programs. More than 16 percent of the administrative workers acquired qualifying skills in these programs, which was about three times the proportion for all workers. The high school programs were the principal source of training for two of the largest occupations in the group—secretary and typist. Over one-third of the secretaries and typists prepared for their jobs in high school vocational programs, as well as relatively large numbers of stenographers, personnel clerks, billing clerks, and bookkeepers and accounting and auditing clerks. Many workers in these and other administrative support occupations also were trained in postsecondary school programs.

Private household occupations. Only 8 percent of the 1.6 million workers in this group needed specific training to get their jobs, the lowest proportion of any occupational group. About 5 percent of the private household workers learned needed skills from friends or relatives or through other methods unrelated to work, and 4 percent learned informally on the job. A few reported formal training. One-half of the workers in the group were private household cleaners and servants, and most of the remainder were child care workers. A small proportion of the workers in the private household group were launderers, cooks, housekeepers, and butlers. Persons in these occupations were more likely to need specific training than child care workers and household cleaners and servants.

Service workers, except private household. About 36 percent of the 12.4 million workers in this occupational

group needed specific training to qualify for their jobs. This relatively low figure indicates that skills are not generally required for entry into food preparation and service occupations and cleaning and building service occupations, which together accounted for almost 3 out of 5 workers in the group. Specific training was necessary for 24 percent of the food workers and 14 percent of the cleaning workers. In contrast, it was necessary for 62 percent of the health service workers, 56 percent of the protective service workers, and 52 percent of the personal service workers.

Entry food service jobs—such as counter worker and short-order cook—usually could be obtained without specific training. About one-half of the supervisors, one-third of the cooks, and one-fourth of the waiters and waitresses needed specific skills. Most workers acquired their skills informally on the job. Some food service supervisors also were trained in schools and formal company programs. Few cleaning and building service workers other than supervisors needed training to obtain their jobs. Health service workers usually qualified for their jobs through school and/or OJT. Junior colleges and technical institutes and post-high school vocational programs provided most of the formal schooling. Some nursing aides, orderlies, and attendants qualified for their jobs through formal company programs.

Specific training usually was necessary for police and detectives. Formal company programs were reported by these workers as a source of training more frequently than school and OJT although all methods were important. The main types of school training for police and detectives were college programs that lasted 4 years or longer and programs in junior colleges and technical institutes. More than one-half of the persons in firefighting occupations and more than one-third of all guards had to have specific skills to get their jobs. Formal company programs were the main source of job preparation for firefighters, while OJT was more prevalent for guards. About 6 percent of all workers in protective service occupations learned skills in the Armed Forces, compared to 2 percent of the workers in all occupations.

Training was very important for obtaining jobs in some personal service occupations. It was necessary for almost all of the hairdressers and barbers, and almost three-fourths of the public transportation attendants. Schools were the most important source of job preparation for hairdressers and barbers, particularly postsecondary vocational schools and junior colleges and technical institutes. Public transportation attendants learned their skills mostly in formal company programs.

Farming, forestry, and fishing occupations. About 28 percent of the 3.1 million persons in this group needed specific training to qualify for their jobs, about one-half the average for all workers. The proportions who re-

ported OJT (16 percent) and school (8 percent) also were lower than average. On the other hand, 11 percent of the workers in the farming, forestry, and fishing groups learned job skills from friends or relatives or through ways unrelated to work, which was much greater than the percentage of workers in all occupations who learned jobs skills through this method.

Workers in farming jobs accounted for more than three-fourths of the employment in the occupation group. Person in related agricultural occupations, such as gardeners and animal caretakers, made up most of the remainder; relatively small numbers of workers were in forestry and fishing occupations.

About 31 percent of the farm operators and managers and 21 percent of the other farm workers needed specific training for their jobs. Persons in farming learned their skills mostly through informal methods. Schools provided skills for 11 percent of the operators and managers, however, and many were trained in college programs that lasted 4 years or longer. Qualifying skills were needed by 29 percent of the workers in related agricultural occupations, 32 percent of the workers in forestry and logging occupations, and 42 percent of the fishers, hunters, and trappers.

Precision production, craft, and repair occupations. About 65 percent of the 11.7 million persons employed in this diverse occupational group needed specific training to get their jobs, somewhat more than the average for all workers. The proportion of these workers exceeded the average for all workers in each category of training, except school. OJT was a source of skills for 40 percent of the occupation group, formal company programs for 17 percent, and school for 16 percent. About 8 percent of the group learned job skills from friends or relatives or other experience unrelated to work, and 5 percent were trained for their jobs in the Armed Forces.

Training was very important for some mechanics and repairers. About nine-tenths of the data processing equipment repairers and the office machine repairers needed it to qualify for their jobs. Among the building trades, it was most important for electricians and plumbers. Training also was a requirement for relatively large proportions of tool-and-die makers, machinists, upholsterers, and power plant operators. On the other hand, most electrical and electronic equipment assemblers did not need special skills to get their jobs.

OJT was the most common method of qualifying for jobs for most workers in the occupational group. Among individual occupations, the proportion of workers who acquired their training informally on the job usually ranged between 30 percent and 50 percent. This was the predominant method of training for workers in a wide variety of occupations—carpenters, plumbers, upholsterers, and oil well drillers are a few examples. OJT

also was important for supervisory jobs in the occupation group. On the other hand, formal company programs were the principal method of training for telephone installers and repairers, structural metal workers, powerplant operators, telephone line installers and repairers, and miscellaneous electrical and electronic equipment repairers. School was the most significant method of training for data processing equipment mechanics. The Armed Forces were the primary source of qualifications for aircraft engine mechanics. Dressmakers were most likely to learn their job skills from friends or relatives or other experience not related to work.

More than 5 percent of all workers in the precision production, craft, and repair group learned qualifying skills for their jobs in high school vocational programs, and almost 5 percent learned them in junior colleges and technical institutes. Public and private post-high school vocational programs provided training for about 4 percent of all workers in the occupation group. Junior college and technical institutes were sources of training for about one-fourth of the data processing equipment repairers and one-fifth of the office machine repairers. Many workers in these occupations also were trained in public and private post-high school vocational programs. High school vocational programs were significant sources of training for tool-and-die makers and automobile mechanics. A small proportion of the supervisory workers in the occupation group qualified for their jobs through college programs that lasted 4 years or longer.

Machine operators, assemblers and inspectors. Although almost 37 percent of the 7.4 million workers in this occupational group needed specific training to qualify for their jobs, this proportion was lower than the average for all workers. Workers in the machine operator, assembler, and inspector group were about as likely as all workers to acquire their jobs as a result of OJT or learning skills from friends and relatives, but were less likely to obtain their jobs through other training. OJT was a source of skills for 26 percent of the workers in the group, school and formal company training programs each were a source of skills for 6 percent, and almost 3 percent learned from friends or relatives or through other methods unrelated to work.

OJT was the principal method of acquiring qualifying skills in almost every occupation in the group. In most cases, about one-fifth to two-fifths of the workers in each occupation reported that they obtained their skills informally on the job. The proportion was somewhat higher among typesetters and compositors, photographic processing machine operators, and winding and twisting machine operators; and lower for graders and sorters, sawing machine operators, and packaging and filling machine operators. High school vocational pro-

grams were a source of training for about one-fifth of the typesetters and compositors and one-seventh of the printing machine operators. Postsecondary vocational schools and junior colleges and technical institutes trained small proportions of lathe and turning machine operators and welders. Formal company and school programs frequently were sources of qualifying skills for the same occupations.

Transportation and material moving occupations. Training requirements for the 4 million workers in this occupational group were similar to those for workers in the machine operator, assembler, and inspector group. In both, about 36 to 37 percent of the workers had to have specific training to qualify for their jobs, 26 percent acquired it informally on the job, and formal training methods generally were of secondary importance. Workers in transportation and material moving occupations, however, were a little more likely to learn their skills in formal company programs and through friends or relatives, and less likely to learn them in school.

Almost three-fourths of the workers in this group were in motor vehicle operator occupations, and most of the remainder were material moving equipment operators. Small proportions of the group were in rail and water transportation occupations, which had relatively high training requirements.

About 35 percent of the motor vehicle operators needed specific training to qualify for their jobs. It was more necessary for busdrivers than truck and taxi drivers. Formal company programs provided skills for almost one-third of the busdrivers. Workers in other

driving occupations learned their skills mostly through OJT. A small proportion of heavy-truck drivers picked up skills from friends and relatives. Specific training was necessary for 37 percent of the material moving equipment operators. Workers in these occupations learned their skills primarily through OJT. Crane and tower operators needed preparation more than industrial truck and tractor equipment operators.

About three-fourths of the workers in water transportation occupations and one-half of those in rail transportation occupations needed specific training to obtain their jobs. Although skills were learned informally on the job more than by other means, formal company programs also were significant in these fields. The Armed Forces and school also were training sources for some workers in water transportation occupations.

Handlers, equipment cleaners, helpers, and laborers. Only 16 percent of the 3.7 million workers in this occupation group had to have specific training to get their jobs. Among the occupational groups, only private household workers required less preparation. About 13 percent of the workers in the handler group learned their skills informally on the job. Other methods of training generally were insignificant.

One-fourth or more of the construction trades helpers, machine feeders, and production helpers needed specific skills to obtain their jobs. Requirements were lower for workers in other occupations, such as garbage collectors, stock handlers and baggers, and vehicle washers and equipment cleaners.

Chapter 2. Skill Improvement Training

Training or skills to qualify for jobs constitutes one aspect of training; another is training to improve job skills for workers who are already employed. In January 1983, 33.9 million persons (35 percent of all employed persons) reported they obtained skill improvement training on their current job.

Skill improvement training was most common among professional specialty occupations; 61 percent of employees in these occupations obtained such training (table 24). Workers in occupations in this group, such as teachers and medical and other technical specialists, need to update their professional techniques and knowledge or face obsolescence. Large proportions of employees in executive, administrative, and managerial occupations and in technician and related support occupations (47 percent and 52 percent, respectively) also obtained skill improvement training. The proportions of workers acquiring training in all other occupation groups did not exceed the 35-percent average for all employees. Private household workers obtained the smallest proportion (3 percent).

Workers in professional specialties also constituted the largest proportion (23 percent) of all workers who took skill improvement training, a result attributable both to the large number of employees in this group and the much higher than average proportion of employees who obtained this training (table 25). Executive, managerial, and administrative occupations and administrative support occupations each had the second largest proportion (15 percent). These three occupational groups accounted for over one-half of all workers who reported skill improvement training.

At the other extreme, private household occupations; farming, forestry, and fishing occupations; transportation and material moving occupations; and equipment cleaners, helpers, and laborers accounted for a small proportion of all workers who took training to improve skills needed for their current job. Workers in these occupations generally perform simple tasks that must be diligently repeated but seldom are changed to such an extent that training is required.

Table 26 presents the 50 occupations having the largest number of employees who acquired skill improvement training. These 50 occupations accounted for 57 percent of all workers with such training but 42

percent of employment. Only 17 of the 50 occupations were executive, administrative, and managerial occupations or professional specialty occupations. Some of the occupations appear in table 25 solely because of their size. For example, only 19 percent of cashiers—compared with an average of 35 percent—obtained training. Because this is a large occupation, however, it is near the top of the list when ranked by number.

Skill improvement training frequently is related to whether employees in the occupation are required to possess specific training or skills in order to obtain the job. Overall, 72 percent of the persons who were required to possess skills to qualify for their jobs also acquired training to improve their skills. Thus, it is not surprising that 41 of the 50 occupations with the most employees obtaining skill training were among the 50 occupations with the most employees reporting that training or skills were needed to qualify for their job.

Another perspective on acquired training is provided by table 27, which presents the 50 occupations having the largest proportions of all workers in that occupation who obtained skill improvement training. In table 27, professional specialty occupations and executive, administrative, and managerial occupations account for 32, rather than 17, of the 50 occupations identified in table 26 as having the most skill improvement training and emphasizes the significance of skill improvement training within these occupation groups.

Differences in skill improvement training between occupations reflect differences in the characteristics of employees and requirements of the occupations. Data by age, sex, and education provide insights into the differences. Almost three-fifths of acquired training was received by persons 25 to 34 and 35 to 44 years old (table 28). This is only slightly more than the proportion of employed persons in those age groups. The proportion of women who acquired skill improvement training was similar to that for men.

The proportion of workers who took skill improvement training varied significantly by education. College graduates obtained 34 percent of all such training although they accounted for only 22 percent of total employment. Persons with some college education obtained slightly more training than their proportion of employment would indicate (23 percent vs. 19 percent),

while individuals with a high school education or less received only 43 percent of the training but accounted for 59 percent of total employment. This pattern was the same for men and women. Skill improvement training appears to be closely related to formal education. For example, a college degree is required to obtain most teaching, engineering, and other professional specialty jobs. And, once employed in those occupations, workers need training to improve job skills for continued success.

In contrast, jobs that require the least education to qualify for employment have little need for skill improvement training. Waiters and waitresses or construction laborers, for example, require little formal education or previous training and, due to the repetitive nature of the work, have little need for training to improve work skills. New technology and other factors that contribute to a need for training are insignificant for most of these workers.

Sources of skill improvement training

In addition to being asked whether they acquired training to improve skills used on their current job, individuals were asked to identify the source of the training as either school, formal company, informal on-the-job (OJT), or other. Because many workers selected more than one source, the total number of responses (39.9 million) was 18 percent higher than the total number of workers (33.9 million) who reported any kind of skill improvement training. Table 29 presents the ratio of total reports of training to numbers of individuals. Executives, managers, and administrators reported more than one type of training most frequently. Conversely, workers in transportation and material moving occupations and handlers, equipment cleaners, helpers, and laborers were least likely to report more than one source of training.

Except for the category "other", the ratio of the number of persons reporting only one type of skill improvement training to the total reporting that type of training was the same for all categories (0.7). Significantly, the ratio for the "other" category was 0.0: "Other" types of training was cited only in conjunction with another category of training.

School training. A total of 11.4 million individuals—12 percent of employed persons—acquired skill improvement training in schools (table 24). This proportion was slightly larger than the proportion who obtained skill improvement training from a formal company program (11 percent), slightly less than for OJT (14 percent), but significantly larger than for other types of skill improvement training (4 percent). The proportion of workers who trained in school was higher than the 12-percent average in professional specialty occupations, technician and related support occupations, and executive, administrative, and managerial occupations (table 30). While these occupational groups accounted for only

27 percent of all workers, they accounted for about 60 percent of those who obtained training in school.

Table 31 presents the 25 occupations having the largest number acquiring skill improvement training in schools. The training was concentrated among teachers: Elementary and secondary school teachers accounted for 16 percent of the total who took skill improvement training but only 3 percent of total employment. The concentration results both because of the occupation's size and because the proportion of teachers who reported training in schools (63 percent) was far above the 12-percent average for all employees. On the other hand, the occupations listed below had a lower than average proportion of workers who trained in schools, but they appear in table 31 because of their size—all have over 1 million employees. They also may be prominent among those with information about different types of schools and in tables that rank occupations obtaining training in different types of schools.

- Secretaries
- Bookkeepers and accounting and auditing clerks
- Supervisors and proprietors, sales occupations
- Supervisors, production occupations
- Nursing aides, orderlies, and attendants
- Sales representatives; mining, manufacturing, and wholesale trade
- Farmers, except horticultural

As indicated in the discussion which follows, the ranking of teachers and other occupations in table 31 also reflects the dominance of school training acquired in junior colleges, technical institutes, and 4-year colleges.

Except for that obtained in 4-year colleges, most skill improvement training in schools lasted less than 26 weeks (table 32). This is consistent with the assumption that many workers who do not require college training to obtain their job train to improve a specific job skill. For example, secretaries may enroll in a junior college course to learn word processing and not pursue other courses. In contrast, about three-fifths of training acquired in 4-year colleges lasted 26 or more weeks. The longer time required for college training probably reflects the tendency to work towards a degree. A history teacher, for example, may have returned to school part time to obtain an advanced degree—a process that could take years. Such an explanation is consistent with data on completions by length of training presented in table 32. About 90 percent of training lasting less than 12 weeks was completed; the comparable proportion for training lasting 53 or more weeks was about 65 percent. The difference is probably attributable to the fact that individuals are still enrolled in a degree program.

Overall, the proportion of employer-sponsored skill improvement training obtained in schools was substan-

tial. Approximately 4.6 million persons—41 percent of those pursuing skill training in schools—indicated employers sponsored it. Employer sponsorship was over 10 times as common as government-sponsored school training: Government-sponsored training was reported by only 375,000 persons, or 3 percent of all individuals acquiring skill improvement training in schools.

As shown in table 33, school training sponsored by employers or the government was distributed among the major occupational groups in much the same way as all skill improvement training in schools. Workers in professional specialties—who acquired the most skill improvement training in schools—also accounted for the largest percentage of sponsored training. It is noteworthy that, within this group, secondary and elementary school teachers alone acquired 8 percent of all employer-sponsored school training. However, the proportion of employer- and government-sponsored school training accounted for by professional specialty occupations (30 to 28 percent, respectively) was slightly lower than the proportion of total skill improvement training acquired in schools (38 percent). Service workers, except private household, accounted for 14 percent of government-sponsored school training compared with 7 percent of total skills improvement training acquired in schools. However, the absolute numbers are small, and the differences may not be significant.

High school vocational education was not a significant source of skill improvement training. Only 353,000 persons—0.4 percent of all employed persons—identified high school vocational education programs as a source of this training (table 30). High school vocational training was a source in only one-third of the occupations with over 50,000 employees. (The highest proportion of employees reporting in any occupation was only 4 percent.) Table 34 identifies the occupations with the largest numbers. The top two—secretaries and book-keeping clerks—accounted for 18 percent of the total who took skill improvement training in high school vocational education programs, although they accounted for only 6 percent of total employment.

Although the number of persons acquiring skill improvement training in *private post-high school vocational programs* was twice that for high schools, the total was still relatively small. The 803,000 persons constituted only 0.8 percent of total employment (table 30). Table 35 presents the 25 occupations with the largest numbers of employees reporting private post-high school vocational education programs. The top two occupations—managers and administrators not elsewhere classified, and supervisors and proprietors in sales occupations—accounted for 11 percent of reported training, an amount approximately equivalent to their proportion of total employment.

Among hairdressers and cosmetologists, real estate sales occupations, public service police and detectives,

and computer operators, private post-high school vocational education was reported by 5 percent of employees (the maximum for any occupation was 9 percent). Despite the smaller size of these occupations, the proportion of workers obtaining skill improvement training was sufficient to include them among the top occupations.

The number of individuals acquiring skill improvement training in *public post-high school vocational courses*, 774,000 or 0.8 percent of all employees, also was relatively small and almost identical to that for similar private schools (table 30). The 25 occupations presented in table 36 represent 52 percent of all workers who took skill improvement training in public post-high school vocational programs, but account for only 29 percent of total employment. Secretaries—with 10 percent of the training — head the list. About half of the occupations also were among the top 25 in private post-high school vocational programs.

The largest proportion of employees acquiring training in this category was 6 percent among millwrights, an occupation which, because of its small size, does not appear in table 36.

Although not as common a source of skill improvement training as 4-year colleges, *junior colleges and technical institutes* were a significant source. The 3.3 million persons with this training constituted 3 percent of total employment, 10 percent of individuals who took training, and 29 percent of those acquiring training in schools (table 30). Although only 3 percent of all workers took skill improvement training in these schools, the proportion was higher in technician and related support occupations; executive, administrative and managerial occupations; professional specialty occupations; and administrative support occupations.

Twenty-five occupations accounted for almost 50 percent of the training (table 37). With managers and administrators and secretaries at the top, the list is again dominated by large occupations. However, junior college training is a much more significant source of skill improvement training for secretaries than other school programs. The proportion of secretaries acquiring skill improvement training in junior colleges (5.6 percent) was only one-half their proportion in all types of school programs combined.

Training acquired in *college programs that last 4 years or longer* was by far the most significant source of skill improvement training acquired in schools. The 5.4 million persons with such training accounted for 6 percent of employment, 16 percent of those obtaining training, and 48 percent of all who acquired it in schools. The proportion of workers who trained in college programs to improve their skills was higher than average in professional specialty occupations; executive, administrative, and managerial occupations; and technician and related support occupations (table 30).

About one-fourth of all workers in professional specialty occupations improved their job skills in college programs; they accounted for about 59 percent of the total number of workers who improved their skills in these programs. A total of 28 percent were elementary and secondary school teachers (table 38), about nine times their proportion of total employment. The prominence of teachers reflects the fact that over half obtained skill improvement training in 4-year or longer college programs. Some occupations—secretaries, for example—appear in table 38 because of their size, while others reflect the unique contribution of colleges. Physicians, clergy, social workers, counselors, lawyers, and librarians all require the highest levels of academic training available.

Formal company training. A total of 10.6 million individuals—11 percent of all employees with skill improvement training—identified formal company programs as the source of their training (table 24). This proportion was slightly less than that for training obtained in schools (12 percent), less than that from informal on-the-job (OJT) training (14 percent), but over twice that obtained by ‘other’ methods (4 percent).

While only 11 percent of all workers improved their job skills through formal company programs, this training was acquired by 18 percent of the workers in technician and related support occupations and 17 percent of those in executive, administrative, and managerial occupations. Ratios also were higher than average for professional specialty occupations; precision production, craft, and repair occupations; and sales occupations. These five occupational groups accounted for about one-half of all workers and about 70 percent of those who improved their skills in formal company programs.

Table 39 identifies the 25 occupations with the largest numbers of employees obtaining training. Together they accounted for 45 percent of training but only 30 percent of employment. These occupations appear to have little in common other than size. Occupations in which a large number reported but a lower than average proportion obtained formal company training were: Secretaries, elementary school teachers, secondary school teachers, and bookkeepers and accounting and auditing clerks.

Companies provide formal training to ensure that specific technical or other information is provided employees. The occupations for which this type of training was most important are identified in table 40, which ranks the proportion of workers in each acquiring formal company training. With the possible exception of forestry and conservation scientists, the top 10 occupations in this ranking must be thoroughly familiar with their employers’ products or services: Repairers need to know the product they are to fix; police and fire-

fighters must know the latest methods for protecting citizens and property; and insurance sales and reservation personnel must know how to provide detailed information to customers quickly and accurately.

Formal company training generally was limited—72 percent lasted less than 12 weeks, while only 8 percent lasted more than 52 weeks (table 41). The overall completion rate was 87 percent, considerably above the 71 percent for all school training. Since shorter school courses also had a higher completion rate, the difference in the completion rates for schools and formal company programs is probably due to the length of training rather than the source.

Government programs, such as CETA, sponsored 4 percent of formal company skill improvement training. The largest number in government-sponsored programs were in professional specialty occupations, but the largest proportion of those receiving training were service workers, except private household, with 8 percent (table 41).

Informal on-the-job training. With 13.6 million persons—14 percent of all employees and 40 percent of those reporting training—informal on-the-job training (OJT) was the largest category through which workers acquired skill improvement (table 24). OJT was more widespread among occupations than other sources of skill improvement. The distribution of workers with this training was very similar to the distribution of total employment among the occupational groups. The relationship also can be seen in the ranking of detailed occupations. The top 25 occupations presented in table 42 accounted for 36 percent of OJT and 36 percent of employment. This distribution was the same for all occupations, indicating that OJT was more closely correlated with employment than were other forms of training. The proportion of employees in an occupation reporting OJT fell within a narrow range: The highest proportion was 37 percent compared with 63 percent for formal schools.

Other training. Training acquired to improve job skills by methods other than in formal school or company programs, or by informal on-the-job training, was much less common than each of these more traditional methods. The “other” category was reported by 4.3 million persons or 4 percent of the total and 13 percent of the workers reporting skill improvement training (table 24). Table 43 presents the 25 occupations with the largest numbers of persons acquiring training from other sources. The top two occupations—managers and administrators not elsewhere classified, and supervisors and proprietors in sales occupations—appear primarily because of their size. Size also explains the presence of secretaries; bookkeepers and auditing and accounting clerks; supervisors in production occupations; nursing aides, orderlies, and attendants; and sales representa-

tives in mining, manufacturing, and wholesale trade. The reason for the relatively high ranking of such diverse occupations as physicians, hairdressers and cosmetologists, and musicians and composers is less clear. One explanation may be the diversity of training included in the "other" category. Table 44 ranks occupations by the proportion acquiring other training. Those at the top—dentists, physicians, lawyers, pharmacists, and hairdressers—probably reported training acquired at professional seminars during conventions. Musicians, on the other hand, are likely to improve their skills by private lessons from individuals that may not be associated with schools. In occupations such as electronic repairers, designers, and registered nurses, the primary source of other training may be seminars sponsored by professional societies, or journals.

Occupational patterns

Overall, 33.9 million individuals—35 percent of all employees—obtained skill improvement training. School, formal company training, and informal OJT were reported with almost equal frequency (12, 11, and 14 percent of employees, respectively). Other types of training (4 percent) were much less common. The following discussion analyzes the occupational differences in the types of training acquired that are presented in table 45. Table 45 also presents data for various types of schooling, but these data are not specifically discussed since only training obtained in a junior college, technical institute, or 4-year college program is significant: School training may be considered synonymous with those types of schooling. The numbers do not add to the total, as indicated earlier, because individuals may have reported more than one type of training.

Executive, administrative, and managerial occupations. These occupations had a higher than average proportion of employees who took skill improvement training (47 vs. 35 percent). Like the total for all employees, training was distributed almost equally between school (18 percent), formal company (17 percent), and informal OJT (16 percent). "Other" training was reported by 8 percent of employees, about half the proportion for the other categories.

Administrators in education and related fields were a notable exception to the general pattern. In this occupation, school was a source of training for 47 percent of employees, while the next largest category—OJT—was a source for only 13 percent.

Professional specialty occupations. These occupations had the largest proportion of employees reporting skill improvement training (61 percent). With 34 percent, school training was the largest category. This was 2 - 3 times the amount for formal company (15 percent), OJT (14 percent), or other types (11 percent). The large proportion of school training results from the influence

of two large occupations—elementary and secondary school teachers. In these occupations, almost two-thirds had school training; together they accounted for 40 percent of schooling reported in professional specialty occupations. In other large occupations, the pattern was closer to the average for all employed persons. For example, among registered nurses, skill improvement training was distributed as follows: 23 percent, formal school; 28 percent, formal company training; 20 percent, OJT; and 12 percent, other.

Technician and related support occupations. These occupations had the second highest proportion of employees with skill improvement training (52 percent). The distribution of employees—20 percent reporting school, 18 percent formal company, 19 percent OJT, and 5 percent other—was much the same as that for all employees, but the levels were lower. In addition, there was little variation among the detailed occupations.

Sales occupations. The proportion of employees in sales occupations with skill training was 32 percent, little different from the average for all employees. However, the distribution differed significantly. The proportion reporting school was much lower—7 percent vs. 18 percent for all employees—while the proportions reporting formal company (13 percent) and OJT (15 percent) were higher. At 4 percent, those reporting other training was the same. Sales job skills most frequently are improved by specific training obtained at the work location rather than by less specific training that is acquired in schools. The only exception among sales occupations was real estate sales workers, for whom school training, with 31 percent of the employees, was the largest category.

Administrative support occupations. An average number of individuals in administrative support occupations acquired training (32 percent), but the distribution—10 percent school, 10 percent formal company, 15 percent OJT, and 2 percent other—showed a greater than average concentration in OJT. Among the detailed occupations, a higher proportion of supervisors had skill improvement training, and there was a greater emphasis on formal company training. This probably results from mandatory company training in performing newly acquired supervisory responsibilities. A larger than average proportion of secretaries and bookkeepers and accounting and auditing clerks had acquired training in school.

Private household occupations. Among private household occupations, only 3 percent of employees had skill improvement training. The absence of training probably reflects the lack of incentive for improvement in the work of launderers, cooks, housekeepers, and child care workers in private households.

Service workers, except private household. With 25 percent of employees reporting skill improvement training, service workers, except private household, were slightly below the average for all employees in acquiring training. The distribution also differed somewhat from the average, with the proportions reporting school (7 percent) and formal company training (8 percent) lower than the average.

However, the pattern varied among the detailed occupations in the group. Within the protective service occupations, a much higher proportion of employees had skill improvement training (55 percent) than in the service worker group as a whole (25 percent). Protective service workers also had relatively more school and formal company training and relatively less OJT and other training. The training acquired by guards and police, except public service, was much less than that for other protective service occupations, and it was concentrated in OJT.

In contrast, in the food preparation and cleaning and building service subgroups, relatively few had skill improvement training (15 and 11 percent). Most of the training was concentrated in OJT. On the other hand, 41 percent of workers in health service occupations reported such training; the most prevalent type of training again was OJT. Since OJT is the easiest training to obtain, its prevalence in occupations requiring few skills is not surprising.

Farming, forestry, and fishing occupations. The proportion with skill improvement training in these occupations, 16 percent, was below the average for all employees. School was reported by 5 percent of these workers; formal company, 2 percent; OJT, 7 percent; and other, 5 percent. Almost all the school training was concentrated among farmers and reflects the need for greater skills resulting from management responsibilities. For the other occupations, about three-fourths of reported training was informal—either OJT or other.

Precision production, craft, and repair occupations. Among these occupations, 35 percent had skill improvement training, the same as the average for all occupations, but the distribution of training showed less emphasis on school (7 percent). Among the other categories, formal company training (14 percent) and OJT (16 percent) were slightly higher, while the “other” category (3 percent) was slightly lower than the average. The emphasis on OJT is actually greater for most occupations because the average for the group includes a few occupations with high levels of formal training.

Within the subgroup mechanics and repairers, those who were employed as data processing equipment re-

pairers, telephone line installers and repairers, and telephone installers and repairers had a much higher proportion of skill improvement training (67, 67, and 73 percent, respectively). The additional training consisted largely of formal company training; this category was reported by 58, 57, and 55 percent of employees in these occupations. Telephone and data processing equipment is complex and unique to the manufacturer. Thus, formal company training of repairers represents the efforts of companies to service the complex equipment they provide customers. The extensive formal company training of telephone and data processing equipment repairers, combined with that of supervisors, raised the proportion of employees with training in the formal company category for the subgroup mechanics and repairers to 22 percent. In contrast, the other large subgroups had much lower proportions: Construction trades, 7 percent; and precision production occupations, 13 percent.

Precision production, craft, and repair occupations other than telephone and data processing equipment repairers generally identified OJT as being by far the most significant type of acquired training.

Machine operators, assemblers, and inspectors. A lower than average number of machine operators, assemblers, and inspectors had skill improvement training (22 percent); OJT was reported by 16 percent of employees and was by far the most significant. Relatively few persons reported school (3 percent), formal company (4 percent), or other types of training (1 percent). There was little variation from these patterns among the detailed occupations.

Transportation and material moving occupations. The pattern of training for these workers was similar to that for operators. At 18 percent, the proportion of persons with training was low—about one-half the average for all employees—and training was concentrated in the OJT category (9 percent), compared with 2 percent in school, 6 percent in formal company programs, and 1 percent in other. The concentration in OJT for the group was reduced by the large number of busdrivers with formal company training. In other detailed occupations, a much greater proportion of training was acquired informally.

Handlers, equipment cleaners, helpers, and laborers. Except for private household, these occupations had the lowest proportion of employees with training (14 percent). OJT was the only significant type of training; this method was reported by 10 percent of employees compared with 2 percent for schools, 2 percent for formal company, and none for other. No detailed occupations deviated significantly from the pattern of the group.

Table 1. Qualifying training: Workers who needed training as a percent of total employed by sex, age, education, and race

Characteristic	Percent of total employed
Total, age 16 and over:	
Total	55
Male	56
Female	54
Age group:	
Age 16-19:	
Total	25
Male	20
Female	30
Age 20-24:	
Total	47
Male	44
Female	51
Age 25-34:	
Total	62
Male	62
Female	62
Age 35-44:	
Total	62
Male	65
Female	59
Age 45-54:	
Total	57
Male	61
Female	53
Age 55-64:	
Total	52
Male	55
Female	49
Age 65 and over:	
Total	41
Male	42
Female	40
Highest grade completed:	
High school or less:	
Total	42
Male	43
Female	42
Some college:	
Total	62
Male	60
Female	64
College graduate:	
Total	84
Male	84
Female	84
Race:	
White:	
Total	57
Male	58
Female	55
Black:	
Total	44
Male	41
Female	47
Other:	
Total	54
Male	52
Female	56

Table 2. Qualifying training: Sources of training by occupational group

Occupational group	Workers who needed training ¹	Source of training					
		School	Formal company program	Informal on-the-job training	Armed Forces	Correspondence course	Friend or relative or other nonwork-related training
Total, age 16 and over:							
Number (in thousands)	53,890	28,075	9,418	27,004	1,902	777	3,205
Percent of total employment	55	29	10	28	2	1	3
Executive, administrative, and managerial:							
Number (in thousands)	7,738	4,674	1,346	4,242	314	140	341
Percent of occupational employment	71	43	12	39	3	1	3
Professional specialty:							
Number (in thousands)	11,797	10,397	1,184	2,767	281	118	331
Percent of occupational employment	93	82	9	22	2	1	3
Technicians and related support:							
Number (in thousands)	2,579	1,759	422	962	152	54	47
Percent of occupational employment	85	58	14	32	5	2	2
Sales occupations:							
Number (in thousands)	4,867	1,643	1,315	3,148	90	113	330
Percent of occupational employment	43	15	12	28	1	1	3
Administrative support, including clerical:							
Number (in thousands)	9,157	5,262	1,198	4,945	136	101	198
Percent of occupational employment	57	33	7	31	1	1	1
Private household occupations:							
Number (in thousands)	81	15	10	36	-	-	45
Percent of occupational employment	8	2	1	4	-	-	5
Service workers, except private household:							
Number (in thousands)	4,397	1,604	1,104	2,233	141	23	216
Percent of occupational employment	36	13	9	18	1	(²)	2
Farming, forestry, and fishing:							
Number (in thousands)	862	259	41	507	7	5	335
Percent of occupational employment	28	8	1	16	(²)	(²)	11
Precision production, craft, and repair:							
Number (in thousands)	7,603	1,817	1,945	4,710	599	188	939
Percent of occupational employment	65	16	17	40	5	2	8
Machine operators, assemblers, and inspectors:							
Number (in thousands)	2,742	479	476	1,957	81	22	186
Percent of occupational employment	37	6	6	26	1	(²)	3
Transportation and material moving occupations:							
Number (in thousands)	1,462	97	311	1,028	80	7	185
Percent of occupational employment	36	2	8	26	2	(²)	5
Handlers, equipment cleaners, helpers, and laborers:							
Number (in thousands)	605	69	68	468	20	7	54
Percent of occupational employment	16	2	2	13	1	(²)	1

¹ Data are less than the sum of sources of training because many workers reported more than one source of training.

² Value less than 0.5.
- No data reported.

Table 3. Qualifying training: Percent distribution of training by occupational group

Occupational group	Workers who needed training	Source of training					
		School	Formal company program	Informal on-the-job training	Armed Forces	Correspondence course	Friend or relative or other nonwork-related training
Total, age 16 and over:							
Number (in thousands) ¹	53,890	28,075	9,418	27,004	1,902	778	3,205
Percent	100	100	100	100	100	100	100
Executive, administrative, and managerial	14	17	14	16	16	18	11
Professional specialty	22	37	13	10	15	15	10
Technicians and related support	5	6	4	4	8	7	1
Sales occupations	9	6	14	12	5	14	10
Administrative support, including clerical	17	19	13	18	7	13	6
Private household occupations	(²)	(²)	(²)	(²)	(²)	(²)	1
Service workers, except private household	8	6	12	8	7	3	7
Farming, forestry, and fishing	2	1	(²)	2	(²)	1	10
Precision production, craft, and repair	14	6	21	17	31	24	29
Machine operators, assemblers, and inspectors	5	2	5	7	4	3	6
Transportation and material moving occupations	3	(²)	3	4	4	1	6
Handlers, equipment cleaners, helpers, and laborers	1	(²)	1	2	1	1	2

¹ Data are less than the sum of sources of training because many workers reported more than one source of training.

² Value less than 0.5.
NOTE: Because of rounding, individual items may not add to totals.

Table 4. Qualifying training: Fifty occupations with the largest numbers of workers who needed training

Occupation	Number who needed training (thousands)	Percent of -	
		Total employment in occupation	Total who needed training
Managers and administrators, n.e.c.	3,639	67.2	6.8
Secretaries	2,746	72.8	5.1
Teachers, elementary school	1,554	98.1	2.9
Supervisors and proprietors, sales occupations	1,392	50.1	2.6
Teachers, secondary school	1,280	96.7	2.4
Registered nurses	1,262	97.9	2.3
Bookkeepers, accounting and auditing clerks	1,195	59.8	2.2
Accountants and auditors	962	88.9	1.8
Nursing aides, orderlies, and attendants	790	63.6	1.5
Sales representatives, mining, manufacturing, and wholesale	697	53.8	1.3
Supervisors, production occupations	676	56.3	1.3
Carpenters	639	64.6	1.2
Typists	593	70.0	1.1
Truck drivers, heavy	574	36.1	1.1
Hairdressers and cosmetologists	570	96.5	1.1
Automobile mechanics	549	70.0	1.0
Lawyers	548	94.8	1.0
Cashiers	544	27.8	1.0
Physicians	482	98.4	.9
Electricians	465	84.8	.9
Real estate sales occupations	431	89.1	.8
Insurance sales occupations	421	76.1	.8
Licensed practical nurses	419	95.3	.8
Cooks, except short order	412	29.9	.8
Computer operators	408	75.2	.8
Farmers, except horticultural	406	30.5	.8
Electrical and electronic engineers	404	92.4	.8
Administrators, education and related fields	400	86.2	.7
Other financial officers	389	78.7	.7
Computer programmers	371	91.1	.7
Welders and cutters	355	67.5	.7
Machinists	342	74.4	.6
Managers, marketing, advertising, and public relations	337	74.3	.6
Teachers, n.e.c.	331	88.8	.6
Sales workers, other commodities	328	23.9	.6
Social workers	316	85.7	.6
Administrators and officials, public administration	312	71.4	.6
Financial managers	310	82.6	.6
Industrial machinery repairers	308	63.3	.6
Police and detectives, public service	303	80.1	.6
Plumbers, pipefitters, and steamfitters	299	77.5	.6
Waiters and waitresses	299	23.7	.6
Receptionists	285	46.2	.5
Clergy	284	92.6	.5
Teachers, prekindergarten and kindergarten	281	86.0	.5
Miscellaneous machine operators, n.e.c.	280	36.1	.5
General office clerks	274	51.4	.5
Administrative support occupations, n.e.c.	273	53.9	.5
Bank tellers	266	59.2	.5
Designers	266	80.4	.5

NOTE: N.e.c. stands for "not elsewhere classified".

Table 5. Qualifying training: Ratio of number of workers who needed training to total of training sources identified by occupational group

Occupational group	Number who needed training (thousands)	Total of training sources identified (thousands)	Ratio
Total, age 16 and over	53,890	70,380	1.31
Executive, administrative, and managerial	7,738	11,056	1.43
Professional specialty	11,797	15,077	1.28
Technicians and related support	2,579	3,397	1.32
Sales occupations	4,867	6,639	1.36
Administrative support, including clerical	9,157	11,839	1.29
Private household occupations	81	105	1.30
Service workers, except private household	4,397	5,321	1.21
Farming, forestry, and fishing	862	1,154	1.34
Precision production, craft, and repair	7,603	10,196	1.34
Machine operators, assemblers, and inspectors	2,742	3,201	1.17
Transportation and material moving occupations	1,462	1,707	1.17
Handlers, equipment cleaners, helpers, and laborers	605	686	1.13

NOTE: Because of rounding, individual items may not add to totals.

Table 6. Qualifying training: Ratio of number of workers with only one source of training to total reporting this training

Source of training	Workers with only one source of training (thousands)	Total reporting this source of training ¹ (thousands)	Ratio
School	18,196	28,075	0.65
Formal company program	4,335	9,418	.46
On-the-job training or previous work experience	15,775	27,004	.58
Armed Forces	587	1,902	.31
Correspondence courses	110	777	.14
Friend or relative or other nonwork-related training	1,345	3,205	.42

¹ Includes individuals reporting no other source of training and those who reported more than one source.

Table 7. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized training obtained in school programs

Occupation	Number who needed school training (thousands)	Percent of -	
		Total employment in occupation	Total who needed school training
Secretaries	2,224	59.0	7.9
Managers and administrators, n.e.c.	1,867	34.5	6.6
Teachers, elementary school	1,519	95.9	5.4
Teachers, secondary school	1,236	93.4	4.4
Registered nurses	1,158	89.9	4.1
Accountants and auditors	823	76.1	2.9
Bookkeepers, accounting and auditing clerks	707	35.4	2.5
Lawyers	533	92.2	1.9
Supervisors and proprietors, sales occupations	495	17.8	1.8
Physicians	469	95.7	1.7
Hairdressers and cosmetologists	439	74.3	1.6
Typists	423	49.9	1.5
Administrators, education and related fields	367	79.0	1.3
Nursing aides, orderlies, and attendants	360	29.0	1.3
Licensed practical nurses	348	79.2	1.2
Electrical and electronic engineers	312	71.2	1.1
Sales representatives, mining, manufacturing, and wholesale	289	22.3	1.0
Real estate sales occupations	263	54.4	.9
Computer programmers	262	64.5	.9
Social workers	262	71.0	.9
Teachers, prekindergarten and kindergarten	256	78.3	.9
Clergy	254	82.8	.9
"Other" financial officers	241	48.7	.9
Teachers, n.e.c.	218	58.5	.8
Financial managers	203	54.1	.7

NOTE: N.e.c. stands for "not elsewhere classified".

Table 8. Qualifying training: Sources of school training by occupational group

Occupational group	Total with school training ¹	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program
Total, age 16 and over:						
Number (in thousands)	28,075	4,692	2,098	1,586	4,965	16,078
Percent of total employment	29	5	2	2	5	17
Executive, administrative, and managerial:						
Number (in thousands)	4,674	333	169	134	581	3,638
Percent of total employment	43	3	2	1	5	34
Professional specialty:						
Number (in thousands)	10,397	208	367	213	906	8,961
Percent of total employment	82	2	3	2	7	70
Technicians and related support:						
Number (in thousands)	1,759	149	168	185	600	744
Percent of total employment	58	5	5	6	20	24
Sales occupations:						
Number (in thousands)	1,643	185	163	90	356	941
Percent of total employment	15	2	1	1	3	8
Administrative support, including clerical:						
Number (in thousands)	5,262	2,659	506	367	1,282	976
Percent of total employment	33	16	3	2	8	6
Private household occupations:						
Number (in thousands)	15	9	2	-	-	4
Percent of total employment	2	1	(²)	-	-	(²)
Service workers, except private household:						
Number (in thousands)	1,604	207	442	195	461	316
Percent of total employment	13	2	4	2	4	3
Farming, forestry, and fishing:						
Number (in thousands)	259	75	15	16	58	128
Percent of total employment	8	2	(²)	1	2	4
Precision production, craft, and repair:						
Number (in thousands)	1,817	606	193	280	568	282
Percent of total employment	16	5	2	2	5	2
Machine operators, assemblers, and inspectors:						
Number (in thousands)	479	196	45	79	115	69
Percent of total employment	6	3	1	1	2	1
Transportation and material moving occupations:						
Number (in thousands)	97	34	23	10	18	10
Percent of total employment	2	1	1	(²)	(²)	(²)
Handlers, equipment cleaners, helpers, and laborers:						
Number (in thousands)	69	30	6	16	21	7
Percent of total employment	2	1	(²)	(²)	1	(²)

¹ Data do not equal the sum of all sources of schooling because some workers reported more than one source and some did not provide information on the source of schooling.

² Value less than 0.5.
- No data reported.

Table 9. Qualifying training: Number of workers who acquired training through school programs and percent who completed training by length of program

Type of program	Total, all school programs		Length of program ¹							
	Number of workers (thousands)	Completion rate	Under 12 weeks		13-25 weeks		26-52 weeks		More than 52 weeks	
			Number of workers (thousands)	Completion rate	Number of workers (thousands)	Completion rate	Number of workers (thousands)	Completion rate	Number of workers (thousands)	Completion rate
High school vocational education	4,692	90	262	97	327	90	860	93	3,063	93
Private post-high school vocational education	2,098	90	225	94	171	97	663	92	944	94
Public post-high school vocational education	1,586	89	208	96	171	89	452	93	703	90
Junior college or technical institute	4,965	87	381	97	381	90	917	91	3,158	88
4-year college	16,078	89	200	97	92	98	268	78	15,027	92

¹ Because some workers did not indicate the length of training programs, individual items may not add to totals.

Table 10. Qualifying training: Workers who received sponsored training in school programs by occupational group

Occupational group	Employer-sponsored training		Government-sponsored training	
	Workers (thousands)	Percent distribution	Workers (thousands)	Percent distribution
Total, age 16 and over	2,093	100	847	100
Executive, administrative, and managerial	395	19	110	13
Professional specialty	608	29	182	22
Technicians and related support	123	6	79	9
Sales occupations	165	8	45	5
Administrative support, including clerical	279	13	153	18
Private household occupations	2	-	(¹)	(¹)
Service workers, except private household	185	9	99	12
Farming, forestry, and fishing	34	2	8	1
Precision production, craft, and repair	221	11	119	14
Machine operators, assemblers, and inspectors	61	3	38	5
Transportation and material moving occupations	13	1	7	1
Handlers, equipment cleaners, helpers, and laborers	5	-	5	1

¹ Value less than 0.5.
- No data reported.

NOTE: Because of rounding, individual items may not add to totals.

Table 11. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized high school vocational training

Occupation	Number with high school vocational training (thousands)	Percent of -	
		Total employment in occupation	Total with high school vocational training
Secretaries	1,323	35.1	28.2
Bookkeepers, accounting and auditing clerks	341	17.1	7.3
Typists	306	36.1	6.5
Managers and administrators, n.e.c.	165	3.0	3.5
Automobile mechanics	101	12.8	2.1
Receptionists	84	13.6	1.8
General office clerks	68	12.8	1.4
Drafting occupations	64	24.9	1.4
Computer operators	62	11.4	1.3
Carpenters	52	5.3	1.1
Electricians	51	9.3	1.1
Nursing aides, orderlies, and attendants	50	4.1	1.1
Accountants and auditors	49	4.5	1.0
Cashiers	48	2.4	1.0
Machinists	44	9.6	.9
Farmers, except horticultural	43	3.2	.9
Supervisors and proprietors, sales occupations	42	1.5	.9
Printing machine operators	41	13.7	.9
Hairdressers and cosmetologists	41	7.0	.9
Billing clerks	39	21.9	.8
Data-entry keyers	37	12.4	.8
Bank tellers	35	7.7	.7
Supervisors, production occupations	33	2.8	.7
Administrative support occupations, n.e.c.	33	6.5	.7
Welders and cutters	31	5.9	.7

NOTE: N.e.c. stands for "not elsewhere classified".

Table 12. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized private post-high school vocational training

Occupation	Number with private post-high school vocational training (thousands)	Percent of -	
		Total employment in occupation	Total with private post-high school vocational training
Hairdressers and cosmetologists	266	45.0	12.7
Secretaries	231	6.1	11.0
Registered nurses	180	14.0	8.6
Managers and administrators, n.e.c.	74	1.4	3.5
Bookkeepers, accounting and auditing clerks	71	3.6	3.4
Nursing aides, orderlies, and attendants	65	5.2	3.1
Licensed practical nurses	55	12.5	2.6
Real estate sales occupations	54	11.1	2.6
Supervisors and proprietors, sales occupations	45	1.6	2.2
Barbers	34	30.8	1.6
Electrical and electronic technicians	26	8.7	1.2
Automobile mechanics	24	3.1	1.2
Typists	24	2.8	1.2
Computer operators	22	4.0	1.0
Accountants and auditors	20	1.9	1.0
Radiologic technicians	20	18.6	1.0
Insurance sales occupations	19	3.5	.9
Electricians	18	3.3	.9
Teachers, n.e.c.	18	4.7	.8
Welders and cutters	17	3.2	.8
Health aides, except nursing	17	5.2	.8
Carpenters	16	1.6	.8
"Other" financial officers	15	3.1	.7
Clergy	15	4.9	.7
Administrative support occupations, n.e.c.	15	2.9	.7

NOTE: N.e.c. stands for "not elsewhere classified".

Table 13. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized public post-high school vocational training

Occupation	Number with public post-high school vocational training (thousands)	Percent of -	
		Total employment in occupation	Total with public post-high school vocational training
Secretaries	144	3.8	9.1
Licensed practical nurses	108	24.5	6.8
Nursing aides, orderlies, and attendants	67	5.4	4.2
Hairdressers and cosmetologists	64	10.8	4.0
Managers and administrators, n.e.c.	49	.9	3.1
Bookkeepers, accounting and auditing clerks	49	2.4	3.1
Registered nurses	43	3.4	2.7
Typists	36	4.2	2.3
Automobile mechanics	33	4.2	2.1
Electricians	32	5.9	2.0
Welders and cutters	27	5.1	1.7
Supervisors and proprietors, sales occupations	26	.9	1.6
Real estate sales occupations	24	5.1	1.5
Accountants and auditors	23	2.1	1.4
Machinists	22	4.7	1.4
Teachers, secondary school	19	1.4	1.2
Heating, air conditioning, and refrigeration mechanics	18	9.4	1.1
Barbers	17	15.7	1.1
Data-entry keyers	17	5.6	1.1
Drafting occupations	16	6.4	1.0
Carpenters	16	1.6	1.0
Designers	15	4.6	1.0
Computer programmers	15	3.7	.9
Supervisors, production occupations	14	1.2	.9
Receptionists	14	2.2	.9

NOTE: N.e.c. stands for "not elsewhere classified".

Table 14. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized junior college or technical institute training

Occupation	Number with junior college or technical institute training (thousands)	Percent of -	
		Total employment in occupation	Total with junior college or technical institute training
Secretaries	530	14.1	10.7
Registered nurses	372	28.9	7.5
Managers and administrators, n.e.c.	242	4.5	4.9
Bookkeepers, accounting and auditing clerks	172	8.6	3.5
Licensed practical nurses	148	33.7	3.0
Nursing aides, orderlies, and attendants	136	11.0	2.7
Real estate sales occupations	113	23.3	2.3
Accountants and auditors	91	8.4	1.8
Supervisors and proprietors, sales occupations	89	3.2	1.8
Computer operators	80	14.8	1.6
Computer programmers	75	18.5	1.5
Electrical and electronic technicians	75	25.3	1.5
Hairdressers and cosmetologists	73	12.3	1.5
Clinical laboratory technologists and technicians	65	23.9	1.3
Typists	63	7.4	1.3
Drafting occupations	57	22.0	1.1
Automobile mechanics	55	7.0	1.1
Supervisors, production occupations	49	4.1	1.0
Receptionists	48	7.8	1.0
Electricians	45	8.2	.9
Administrative support occupations, n.e.c.	42	8.3	.9
Radiologic technicians	42	39.0	.8
Teachers, elementary school	42	2.6	.8
Teachers' aides	40	10.9	.8
Dental hygienists	39	37.7	.8

NOTE: N.e.c. stands for "not elsewhere classified".

Table 15. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized training in 4-year or longer college programs

Occupation	Number with 4-year college program training (thousands)	Percent of -	
		Total employment in occupation	Total with 4-year college program training
Teachers, elementary school	1,469	92.7	9.1
Managers and administrators, n.e.c.	1,401	25.9	8.7
Teachers, secondary school	1,194	90.2	7.4
Accountants and auditors	678	62.7	4.2
Registered nurses	585	45.4	3.6
Lawyers	524	90.6	3.3
Physicians	454	92.8	2.8
Administrators, education and related fields	343	73.8	2.1
Supervisors and proprietors, sales occupations	314	11.3	2.0
Electrical and electronic engineers	275	62.9	1.7
Secretaries	270	7.1	1.7
Social workers	240	65.2	1.5
Sales representatives, mining, manufacturing, and wholesale trade	226	17.4	1.4
Clergy	223	72.6	1.4
Teachers, prekindergarten and kindergarten	219	67.1	1.4
"Other" financial officers	189	38.2	1.2
Managers; marketing, advertising, and public relations	173	38.3	1.1
Financial managers	164	43.7	1.0
Computer programmers	161	39.6	1.0
Pharmacists	160	88.5	1.0
Teachers, n.e.c.	158	42.5	1.0
Administrators and officials, public administration	157	36.0	1.0
Bookkeepers, accounting and auditing clerks	149	7.5	.9
Counselors, educational and vocational	148	84.5	.9
Librarians	144	69.0	.9

Table 16. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized formal company training

Occupation	Number who needed formal company training (thousands)	Percent of -	
		Total employment in occupation	Total who needed formal company training
Managers and administrators, n.e.c.	674	12.5	7.2
Supervisors and proprietors, sales occupations	310	11.2	3.3
Insurance sales occupations	231	41.9	2.5
Nursing aides, orderlies, and attendants	220	17.7	2.3
Registered nurses	185	14.4	2.0
Police and detectives, public service	183	48.3	1.9
Real estate sales occupations	179	37.0	1.9
Electricians	174	31.6	1.8
Secretaries	151	4.0	1.6
Sales representatives, mining, manufacturing, and wholesale trade	149	11.5	1.6
Supervisors, production occupations	148	12.4	1.6
Hairdressers and cosmetologists	132	22.3	1.4
Bus drivers	124	31.0	1.3
Plumbers, pipefitters, and steamfitters	119	30.9	1.3
Automobile mechanics	115	14.7	1.2
Machinists	108	23.5	1.1
Bookkeepers, accounting and auditing clerks	97	4.8	1.0
Managers; marketing, advertising, and public relations	96	21.1	1.0
Cashiers	91	4.6	1.0
Telephone installers and repairers	90	34.9	1.0
Accountants and auditors	90	8.3	1.0
Welders and cutters	87	16.5	.9
Industrial machinery repairers	86	17.8	.9
Computer operators	84	15.4	.9
"Other" financial officers	81	16.3	.9

NOTE: N.e.c. stands for "not elsewhere classified".

Table 17. Qualifying training: Workers who utilized training from formal company programs by length of program and occupational group

Occupational group	Total, all company programs	Length of program ¹			
		Under 12 weeks	13-25 weeks	26-52 weeks	More than 52 weeks
Total, age 16 and over:					
Number (in thousands)	9,418	4,608	1,020	979	2,202
Percent distribution	100	49	11	10	23
Executive, administrative, and managerial:					
Number (in thousands)	1,346	660	140	139	325
Percent distribution	100	49	10	10	24
Professional specialty:					
Number (in thousands)	1,184	429	126	116	387
Percent distribution	100	36	11	10	33
Technicians and related support:					
Number (in thousands)	422	157	49	80	109
Percent distribution	100	37	12	19	26
Sales occupations:					
Number (in thousands)	1,315	845	141	115	158
Percent distribution	100	64	11	9	12
Administrative support, including clerical:					
Number (in thousands)	1,198	789	137	96	98
Percent distribution	100	66	11	8	8
Private household occupations:					
Number (in thousands)	10	10	(²)	(²)	(²)
Percent distribution	100	100	(²)	(²)	(²)
Service workers, except private household:					
Number (in thousands)	1,104	539	159	187	122
Percent distribution	100	49	14	17	11
Farming, forestry, and fishing:					
Number (in thousands)	41	20	4	8	5
Percent distribution	100	50	10	20	13
Precision production, craft, and repair:					
Number (in thousands)	1,945	633	170	183	851
Percent distribution	100	33	9	9	44
Machine operators, assemblers, and inspectors:					
Number (in thousands)	476	229	65	45	117
Percent distribution	100	48	14	9	25
Transportation and material moving occupations:					
Number (in thousands)	311	243	23	10	23
Percent distribution	100	78	7	3	7
Handlers, equipment cleaners, helpers, and laborers:					
Number (in thousands)	68	54	7	1	6
Percent distribution	100	80	10	1	9

¹ Because some workers did not indicate the length of training programs, individual items may not add to totals.

² Value less than 0.5.

Table 18. Qualifying training: Workers who received government-sponsored training in formal company programs by occupational group

Occupational group	Number of workers (thousands)	Percent distribution
Total, age 16 and over	415	100
Executive, administrative, and managerial	42	10
Professional specialty	44	11
Technicians and related support	14	3
Sales occupations	16	4
Administrative support, including clerical	49	12
Private household occupations	(¹)	(¹)
Service workers, except private household	104	25
Farming, forestry, and fishing	(¹)	(¹)
Precision production, craft, and repair	92	22
Machine operators, assemblers, and inspectors	37	9
Transportation and material moving occupations	13	3
Handlers, equipment cleaners, helpers, and laborers	3	1

¹ Value less than 0.5.

NOTE: Because of rounding, individual items may not add to totals.

Table 19. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized informal on-the-job training

Occupation	Number with informal on-the-job training (thousands)	Percent of -	
		Total employment in occupation	Total with informal on-the-job training
Managers and administrators, n.e.c.	2,253	41.6	8.3
Secretaries	1,172	31.1	4.3
Supervisors and proprietors, sales occupations	957	34.5	3.5
Bookkeepers, accounting and auditing clerks	721	36.1	2.7
Sales representatives, mining, manufacturing, and wholesale trade	485	37.5	1.8
Supervisors, production occupations	468	39.0	1.7
Carpenters	448	45.3	1.7
Cashiers	428	21.9	1.6
Truck drivers, heavy	404	25.4	1.5
Accountants and auditors	354	32.7	1.3
Cooks, except short order	332	24.1	1.2
Nursing aides, orderlies, and attendants	324	26.1	1.2
Automobile mechanics	299	38.2	1.1
Waiters and waitresses	265	21.0	1.0
Typists	246	29.0	.9
Sales workers, other commodities	243	17.8	.9
Electricians	241	43.9	.9
Computer operators	238	43.9	.9
Miscellaneous machine operators, n.e.c.	216	28.0	.8
Insurance sales occupations	214	38.7	.8
"Other" financial officers	214	43.3	.8
Farmers, except horticultural	211	15.9	.8
Managers; marketing, advertising, and public relations	208	45.9	.8
Registered nurses	206	16.0	.8
Supervisors, n.e.c.	199	54.1	.7

NOTE: N.e.c. stands for "not elsewhere classified".

Table 20. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized training in the Armed Forces

Occupation	Number with Armed Forces training (thousands)	Percent of -	
		Total employment in occupation	Total with Armed Forces training
Managers and administrators, n.e.c.	153	2.8	8.1
Electricians	66	12.0	3.5
Supervisors, production occupations	53	4.4	2.8
Electrical and electronic technicians	51	17.2	2.7
Supervisors and proprietors, sales occupations	48	1.7	2.5
Automobile mechanics	47	5.9	2.4
Aircraft engine mechanics	43	44.8	2.3
Guards and police, except public service	42	7.0	2.2
Truck drivers, heavy	41	2.6	2.2
Electrical and electronic engineers	38	8.6	2.0
Electronic repairers, communications and industrial equipment	37	21.4	1.9
Supervisors, mechanics and repairers	33	11.1	1.7
Industrial machinery repairers	27	5.5	1.4
Teachers, secondary school	26	2.0	1.4
Police and detectives, public service	25	6.5	1.3
Bus, truck, and stationary engine mechanics	24	8.7	1.2
Specified mechanics and repairers, n.e.c.	22	6.6	1.1
Accountants and auditors	22	2.0	1.1
Stock and inventory clerks	21	4.0	1.1
Data processing equipment repairers	21	22.1	1.1
Machinists	21	4.6	1.1
Administrators and officials, public administration	20	4.6	1.1
Telephone installers and repairers	18	6.9	.9
Industrial engineers	18	7.7	.9
Welders and cutters	17	3.3	.9

NOTE: N.e.c. stands for "not elsewhere classified".

Table 21. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized training from correspondence courses

Occupation	Number with training from correspondence courses (thousands)	Percent of -	
		Total employment in occupation	Total with training from correspondence courses
Managers and administrators, n.e.c.	67	1.2	8.6
Insurance sales occupations	33	6.0	4.2
Supervisors and proprietors, sales occupations	30	1.1	3.8
Electronic repairers, commercial and industrial equipment	21	12.4	2.8
Secretaries	20	.5	2.6
Electrical and electronic technicians	20	6.7	2.6
Electrical and electronic engineers	19	4.3	2.4
Teachers, secondary school	18	1.4	2.3
Administrators and officials, public administration	17	3.8	2.1
Supervisors, production occupations	14	1.2	1.9
Securities and financial services sales occupations	14	7.4	1.8
Supervisors, mechanics and repairers	13	4.3	1.7
Bookkeepers, accounting and auditing clerks	12	.6	1.6
Investigators and adjusters, except insurance	12	4.3	1.5
Electricians	11	2.0	1.4
Managers, marketing, advertising, and public relations	10	2.3	1.3
Accountants and auditors	10	.9	1.3
Stock and inventory clerks	9	1.7	1.2
Sales representatives, mining, manufacturing, and wholesale trade	9	.7	1.2
Specified mechanics and repairers, n.e.c.	9	2.7	1.1
Real estate sales occupations	9	1.8	1.1
Telephone installers and repairers	9	3.3	1.1
Stationary engineers	8	7.5	1.1
Drafting occupations	8	3.2	1.0
Teachers, elementary school	8	.5	1.0

NOTE: N.e.c. stands for "not elsewhere classified".

Table 22. Qualifying training: Twenty-five occupations with the largest numbers of workers who utilized training from friends or relatives or other experience unrelated to work

Occupation	Number with training from friends or relatives (thousands)	Percent of -	
		Total employment in occupation	Total with training from friends or relatives
Managers and administrators, n.e.c.	237	4.4	7.4
Farmers, except horticultural	204	15.4	6.4
Carpenters	174	17.6	5.4
Automobile mechanics	120	15.3	3.7
Supervisors and proprietors, sales occupations	120	4.3	3.7
Truck drivers, heavy	113	7.1	3.5
Farm workers	59	6.8	1.8
Secretaries	55	1.5	1.7
Cooks, except short order	48	3.5	1.5
Sales representatives, mining, manufacturing, and wholesale trade	47	3.6	1.5
Teachers, n.e.c.	43	11.6	1.3
Textile sewing machine operators	42	5.5	1.3
Musicians and composers	38	26.4	1.2
Supervisors, n.e.c.	38	10.4	1.2
Bookkeepers, accounting and auditing clerks	37	1.9	1.2
Sales workers, other commodities	37	2.7	1.2
Welders and cutters	37	7.0	1.1
Bus, truck, and stationary engine mechanics	36	13.2	1.1
Plumbers, pipefitters, and steamfitters	35	9.0	1.1
Dressmakers	34	31.6	1.1
Industrial machinery repairers	33	6.9	1.0
Child care workers, private household	33	7.6	1.0
Janitors and cleaners	31	1.6	1.0
Automobile body and related repairers	30	17.0	.9
Groundskeepers and gardeners, except farm	30	9.0	.9

NOTE: N.e.c. stands for "not elsewhere classified".

Table 23. Qualifying training: Sources of training by occupation

Occupation ¹	Workers who needed training		Source of training (percent of total employment in occupation)										
	Number (thousands)	Percent of total employment in occupa- tion ²	School						Formal company training	Informal on-the- job training	Armed Forces	Corres- pond- ence courses	Friends or relatives or other nonwork- related training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program					
Total, age 16 and over	53,890	55	29	5	2	2	5	17	10	28	2	1	3
Executive, administrative, and managerial occupations	7,738	71	43	3	2	1	5	34	12	39	3	1	3
Executives, officials, and managers, public administration	329	70	47	3	1	2	5	37	14	35	4	4	3
Administrators and officials, public administration	312	71	46	3	1	2	5	36	14	35	5	4	3
Executives, officials, and managers, except public administration	5,135	69	39	3	1	1	5	31	13	40	3	1	4
Financial managers	310	83	54	2	1	1	6	44	17	46	2	1	2
Personnel and labor relations managers	83	76	41	2	-	-	6	35	7	39	6	-	6
Purchasing managers	60	67	40	2	-	-	-	38	10	37	4	-	-
Managers, marketing, advertising, and public relations	337	74	44	(*)	2	1	3	38	21	46	3	2	2
Administrators, education and related fields	400	86	79	2	(*)	1	3	74	3	21	(*)	(*)	1
Managers, medicine and health	96	78	61	1	6	6	4	47	18	30	(*)	-	2
Managers, properties and real estate	124	49	25	2	1	1	9	14	7	30	1	1	5
Managers and administrators, n.e.c.	3,639	67	34	3	1	1	4	26	12	42	3	1	4
Management related occupations	2,274	77	52	4	2	2	7	40	11	38	3	1	2
Accountants and auditors	962	89	76	4	2	2	8	63	8	33	2	1	1
Other financial officers	389	79	49	5	3	1	4	38	16	43	2	1	1
Management analysts	108	75	54	4	2	2	7	43	10	37	6	-	1
Personnel, training, and labor relations specialists	251	74	38	1	(*)	2	5	30	11	43	5	-	1
Buyers, wholesale and retail trade, except farm products	106	51	23	2	-	-	3	18	6	33	3	1	3
Purchasing agents and buyers, n.e.c.	118	55	28	4	5	1	12	12	11	37	6	2	2
Business and promotion agents	33	56	18	5	-	4	3	9	10	41	-	3	7
Construction inspectors	40	61	14	4	-	1	9	7	21	47	12	2	5
Inspectors and compliance officers, except construction	110	73	38	-	(*)	-	5	32	24	29	8	-	3
Management related occupations, n.e.c.	127	77	50	15	4	3	14	19	14	48	1	-	3
Professional specialty	11,797	93	82	2	3	2	7	70	9	22	2	1	3
Engineers, architects, and surveyors	1,491	90	73	2	3	2	6	64	14	33	6	2	2
Architects	91	94	91	-	7	4	5	81	13	31	1	-	3
Engineers	1,373	90	73	2	2	2	6	63	14	33	7	3	2
Aerospace engineers	94	100	79	-	2	-	4	73	18	31	14	-	4
Chemical engineers	69	95	92	-	3	-	5	84	13	19	3	-	-
Civil engineers	175	85	78	3	-	3	5	68	5	30	1	3	4
Electrical and electronic engineers	404	92	71	4	3	1	4	63	18	32	9	4	3
Industrial engineers	199	85	54	1	1	2	3	50	15	41	8	3	1
Mechanical engineers	198	89	76	3	3	3	10	58	12	32	4	3	1
Engineers, n.e.c.	145	90	76	1	3	-	7	68	14	39	7	-	-
Mathematical and computer scientists	395	90	66	4	3	1	9	51	26	41	5	1	1
Computer systems analysts and scientists	243	94	70	4	2	1	9	52	27	45	5	1	2
Operations and systems researchers and analysts	117	85	57	3	5	1	9	44	30	34	7	1	(*)
Natural scientists	394	97	91	(*)	1	2	5	86	9	26	2	1	1
Chemists, except biochemists	106	96	87	-	-	-	9	80	4	24	-	1	-
Geologists and geodesists	70	97	97	-	-	5	2	90	9	39	-	-	3
Biological and life scientists	51	100	100	-	5	-	5	94	2	14	-	-	-
Health diagnosing occupations	704	98	96	-	2	1	(*)	93	10	7	3	-	1
Physicians	482	98	96	-	2	(*)	1	93	12	7	3	-	(*)
Dentists	123	97	97	-	-	2	-	97	3	3	6	-	2
Health assessment and treating occupations	1,785	97	88	1	11	3	24	52	13	16	2	(*)	(*)
Registered nurses	1,262	98	90	1	14	3	29	45	14	16	1	(*)	(*)
Pharmacists	180	99	96	-	1	2	4	89	7	14	-	-	(*)
Dietitians	55	76	51	-	7	-	3	45	13	12	5	2	-
Therapists	254	96	83	2	3	1	16	62	12	20	2	-	(*)
Inhalation therapists	76	94	70	5	6	3	46	16	13	25	3	-	-
Physical therapists	55	96	92	-	-	-	12	84	14	23	-	-	1
Speech therapists	65	100	96	-	-	-	-	93	3	11	-	-	-
Teachers, college and university	605	95	89	(*)	1	1	3	86	4	12	1	-	1
Teachers, except college and university	3,458	95	89	1	1	1	4	84	6	12	1	1	2
Teachers, prekindergarten and kindergarten	281	86	78	1	-	3	11	67	6	19	-	1	2
Teachers, elementary school	1,554	98	96	(*)	1	1	3	93	4	8	-	(*)	1
Teachers, secondary school	1,280	97	93	2	1	1	2	90	5	10	2	1	2
Teachers, n.e.c.	331	89	58	5	5	3	8	43	19	32	4	1	12
Counselors, educational and vocational	164	93	88	-	(*)	1	1	85	4	26	3	3	3

See footnotes at end of table.

Table 23. Qualifying training: Sources of training by occupation—Continued

Occupation ¹	Workers who needed training		Source of training (percent of total employment in occupation)										
	Number (thousands)	Percent of total employment in occupa- tion ²	School						Formal company training	Informal on-the- job training	Armed Forces	Corres- pond- ence courses	Friends or relatives or other nonwork- related training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program					
Librarians, archivists, and curators	177	79	68	1	-	-	1	66	2	27	(⁴)	1	-
Librarians	169	81	72	1	-	-	1	69	2	26	(⁴)	1	-
Social scientists and urban planners	219	93	83	1	-	2	5	77	4	39	1	-	3
Economists	75	88	64	2	-	4	2	53	4	53	3	-	-
Psychologists	121	98	98	-	-	-	7	93	5	32	-	-	5
Social, recreation, and religious workers	692	88	74	2	2	1	3	66	14	28	1	1	3
Social workers	316	86	71	1	(⁴)	2	1	65	11	32	(⁴)	(⁴)	2
Recreation workers	43	85	61	3	4	-	5	49	18	25	-	4	-
Clergy	284	93	83	2	5	-	4	73	13	21	1	2	3
Religious workers, n.e.c.	49	81	59	-	1	-	6	53	28	32	3	2	11
Lawyers and judges	572	93	91	(⁴)	1	1	(⁴)	89	3	16	1	-	(⁴)
Lawyers	548	95	92	(⁴)	(⁴)	1	(⁴)	91	3	17	(⁴)	-	(⁴)
Writers, artists, entertainers, and athletes	1,141	82	56	5	2	3	8	42	7	41	2	1	10
Authors	54	83	62	-	-	(⁴)	9	52	-	33	1	2	6
Designers	266	80	54	4	2	5	11	36	9	39	1	2	9
Musicians and composers	126	87	56	14	1	1	5	46	7	33	-	-	26
Actors and directors	60	93	58	6	3	4	12	45	11	58	3	-	3
Painters, sculptors, craft-artists, and artist printmakers	121	83	67	5	4	7	18	36	5	33	-	3	7
Photographers	99	81	41	8	6	6	6	21	13	42	5	3	20
Editors and reporters	181	84	61	1	3	-	5	55	7	53	6	1	1
Public relations specialists	84	71	48	5	2	1	1	41	6	48	4	-	6
Athletes	48	86	53	4	-	-	3	53	(⁴)	27	-	-	25
Technicians and related support occupations ..	2,579	85	58	5	5	6	20	24	14	32	5	2	2
Health technologists and technicians	1,011	90	69	2	9	11	28	20	14	21	2	1	1
Clinical laboratory technologists and technicians	240	88	71	1	4	3	24	40	9	25	2	-	1
Dental hygienists	96	93	89	-	3	2	38	48	3	9	2	-	-
Radiologic technicians	99	92	69	-	19	3	39	11	24	15	-	-	2
Licensed practical nurses	419	95	79	4	12	25	34	4	14	15	1	-	(⁴)
Health technologists and technicians, n.e.c.	145	78	34	(⁴)	4	2	9	19	24	37	3	2	1
Technologists and technicians, except health	1,568	82	51	7	4	3	15	27	14	38	7	2	2
Engineering and related technologists and technicians	719	82	49	11	4	4	19	17	13	38	8	4	2
Electrical and electronic technicians	260	88	48	6	9	3	25	11	19	39	17	7	2
Engineering technicians, n.e.c.	185	73	42	5	1	3	13	20	11	38	5	2	(⁴)
Drafting occupations	218	85	66	25	4	6	22	22	9	33	3	3	3
Science technicians	126	64	44	3	4	2	5	31	7	28	3	1	3
Biological technicians	40	73	49	-	3	-	7	38	4	26	-	-	10
Chemical technicians	53	63	50	7	4	5	5	32	11	21	3	-	-
Science technicians, n.e.c.	32	56	30	-	4	-	2	24	5	40	5	2	1
Technicians, except health, engineering, and science	724	86	54	3	3	2	13	36	16	40	7	1	2
Computer programmers	371	91	64	1	4	4	19	40	19	41	3	1	1
Legal assistants	85	79	42	8	-	2	8	30	3	59	-	-	2
Technicians, n.e.c.	179	80	53	2	4	1	7	42	9	30	6	2	2
Sales occupations	4,867	43	15	2	1	1	3	8	12	28	1	1	3
Supervisors and proprietors, sales occupations	1,392	50	18	2	2	1	3	11	11	34	2	1	4
Sales representatives, finance and business services	1,294	75	34	2	5	2	10	17	33	35	1	3	3
Insurance sales occupations	421	76	26	2	3	1	5	16	42	39	(⁴)	6	3
Real estate sales occupations	431	89	54	2	11	5	23	17	37	28	1	2	1
Securities and financial services sales occupations	146	77	37	1	2	1	5	31	38	34	1	7	3
Advertising and related sales occupations ..	62	50	22	4	3	3	-	14	13	33	1	-	2
Sales occupations, other business services	236	64	20	3	1	1	5	14	18	39	1	(⁴)	3
Sales representatives, commodities except retail	738	55	24	1	1	1	3	18	12	38	1	1	4
Sales engineers	42	78	53	3	5	-	20	29	27	49	3	3	-
Sales representatives, mining, manufacturing and wholesale	697	54	22	1	1	1	3	17	12	37	1	1	4
Sales workers, retail and personal services ..	1,418	27	5	2	(⁴)	(⁴)	1	2	5	20	(⁴)	(⁴)	2
Sales workers, motor vehicles and boats ..	64	38	6	(⁴)	-	-	2	3	9	32	2	-	2
Sales workers, apparel	84	21	4	1	-	-	1	2	2	17	-	-	2
Sales workers, shoes	28	22	4	-	2	-	(⁴)	2	4	18	-	-	2

See footnotes at end of table.

Table 23. Qualifying training: Sources of training by occupation—Continued

Occupation ¹	Workers who needed training		Source of training (percent of total employment in occupation)										
	Number (thousands)	Percent of total employment in occupa- tion ²	School						Formal company training	Informal on-the- job training	Armed Forces	Corres- pond- ence courses	Friends or relatives or other nonwork- related training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program					
Sales workers, furniture and home furnishings	57	37	12	5	1	1	2	4	3	22	-	-	5
Sales workers; radio, television, hi-fi, and appliances	58	42	14	4	-	1	3	6	14	27	2	-	8
Sales workers, hardware and building supplies	56	28	4	(⁴)	(⁴)	-	1	3	8	21	-	1	5
Sales workers, parts	58	37	2	(⁴)	-	-	1	-	6	27	-	-	7
Sales workers, other commodities	328	24	4	1	(⁴)	(⁴)	1	2	4	18	-	(⁴)	3
Sales counter clerks	27	23	7	-	-	2	1	4	4	13	-	-	2
Cashiers	544	28	5	2	(⁴)	(⁴)	1	1	5	22	(⁴)	(⁴)	1
Street and door-to-door sales workers	108	28	2	-	1	-	(⁴)	2	11	19	-	1	2
News vendors	7	5	1	-	-	-	-	1	(⁴)	3	-	-	-
Administrative support occupations, including clerical	9,157	57	33	16	3	2	8	6	7	31	1	1	1
Supervisors, administrative support occupations	380	59	25	4	2	1	6	13	13	37	3	2	1
Supervisors, general office	228	65	26	5	2	(⁴)	7	12	17	41	3	1	2
Supervisors, financial records processing	61	70	37	2	1	3	3	29	8	43	3	1	2
Supervisors; distribution, scheduling, and adjusting clerks	70	40	12	1	1	2	4	4	7	27	2	2	-
Computer equipment operators	410	74	34	11	4	2	14	7	15	43	2	-	1
Computer operators	408	75	35	11	4	2	15	7	15	44	2	-	1
Secretaries, stenographers, and typists	3,426	73	57	35	6	4	13	7	4	31	(⁴)	1	1
Secretaries	2,746	73	59	35	6	4	14	7	4	31	(⁴)	1	1
Stenographers	87	88	67	25	11	4	15	15	11	28	-	2	4
Typists	593	70	50	36	3	4	7	3	5	29	1	1	1
Information clerks	529	45	20	10	2	2	6	5	8	25	(⁴)	1	1
Interviewers	72	49	25	5	3	1	10	10	11	25	-	1	1
Hotel clerks	24	47	12	4	1	-	1	5	4	35	-	-	-
Transportation ticket and reservation agents	61	54	11	2	3	-	3	4	27	22	2	2	1
Receptionists	285	46	25	14	2	2	8	4	5	27	-	(⁴)	1
Information clerks, n.e.c.	88	37	11	7	1	1	-	3	7	22	-	1	4
Records processing occupations, except financial	375	41	19	8	2	1	4	5	8	26	(⁴)	(⁴)	1
Order clerks	101	50	13	4	-	1	3	5	15	38	-	1	1
Personnel clerks, except payroll and timekeeping	43	57	42	19	13	5	7	6	12	38	-	1	-
Library clerks	33	24	13	5	-	-	5	5	3	11	-	-	1
File clerks	87	33	17	11	1	2	3	1	3	18	(⁴)	-	-
Records clerks	105	51	22	8	2	1	4	10	11	29	(⁴)	(⁴)	1
Financial records processing occupations	1,488	59	33	16	4	2	8	6	5	35	(⁴)	1	2
Bookkeepers, accounting and auditing clerks	1,195	60	35	17	4	2	9	7	5	36	(⁴)	1	2
Payroll and timekeeping clerks	118	58	29	11	4	2	11	3	4	36	2	1	1
Billing clerks	99	56	35	22	6	-	4	4	8	28	-	-	(⁴)
Cost and rate clerks	52	44	5	(⁴)	-	(⁴)	4	2	7	34	2	2	-
Duplicating, mail and other office machine operators	34	44	6	3	-	-	-	4	5	38	-	-	-
Communications equipment operators	122	51	7	3	-	1	1	1	19	33	1	-	-
Telephone operators	119	51	7	3	-	1	1	1	20	33	1	-	-
Mail and message distributing occupations ..	186	24	1	(⁴)	-	-	(⁴)	(⁴)	8	16	1	(⁴)	(⁴)
Postal clerks, except mail carriers	73	31	1	-	-	-	1	-	12	21	(⁴)	1	(⁴)
Mail carriers, postal service	59	22	1	-	-	-	-	(⁴)	6	14	3	-	-
Mail clerks, except postal service	40	23	3	1	-	-	1	-	7	17	-	-	1
Messengers	15	13	-	-	-	-	-	-	3	11	-	-	-
Material recording, scheduling, and distributing clerks n.e.c.	535	34	9	3	1	1	3	2	4	24	2	1	1
Dispatchers	59	40	7	4	-	-	4	-	5	30	2	-	2
Production coordinators	117	60	22	9	4	1	4	6	8	38	3	1	1
Traffic, shipping, and receiving clerks	99	23	4	1	(⁴)	-	1	2	2	17	(⁴)	(⁴)	1
Stock and inventory clerks	168	31	9	4	1	1	3	2	4	23	4	2	-
Weighers, measurers, and checkers	27	33	10	2	-	-	8	-	6	16	-	-	3
Expeditors	45	37	12	6	2	-	2	5	6	22	-	-	(⁴)
Adjusters and investigators	400	61	30	8	2	1	6	14	16	37	2	2	1
Insurance adjusters, examiners, and investigators	132	66	27	7	(⁴)	2	4	14	25	35	-	1	-
Investigators and adjusters, except insurance	179	64	35	9	3	1	6	19	18	41	5	4	2
Eligibility clerks, social welfare	40	59	38	10	-	3	16	9	6	35	-	-	1
Bill and account collectors	50	48	17	5	(⁴)	-	4	5	4	36	-	-	-

See footnotes at end of table.

Table 23. Qualifying training: Sources of training by occupation—Continued

Occupation ¹	Workers who needed training		Source of training (percent of total employment in occupation)										
	Number (thousands)	Percent of total employment in occupa- tion ²	School						Formal company training	Informal on-the- job training	Armed Forces	Corres- pond- ence courses	Friends or relatives or other nonwork- related training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program					
Miscellaneous administrative support occupations	1,269	56	26	9	2	3	7	7	10	33	1	(⁴)	2
General office clerks	274	51	26	13	2	3	5	4	6	29	(⁴)	1	2
Bank tellers	266	59	16	8	2	2	4	3	17	41	(⁴)	(⁴)	1
Data-entry keyers	213	71	31	12	4	6	9	2	14	41	1	(⁴)	1
Statistical clerks	54	67	30	9	5	3	6	10	11	36	3	-	3
Teachers aides	170	47	28	6	(⁴)	3	11	12	7	18	-	(⁴)	3
Administrative support occupations, n.e.c.	273	54	29	7	3	3	8	10	9	33	2	(⁴)	1
Private household occupations	81	8	2	1	(⁴)	-	-	(⁴)	1	4	-	-	5
Launderers, cooks, housekeepers, and butlers	12	20	3	-	3	-	-	-	3	14	-	-	3
Child care workers, private household	41	10	2	2	-	-	-	-	1	3	-	-	8
Private household cleaners and servants	28	6	1	(⁴)	-	-	-	1	(⁴)	3	-	-	2
Service workers, except private household	4,397	36	13	2	4	2	4	3	9	18	1	(⁴)	2
Protective service occupations	912	56	18	1	1	1	6	8	29	24	6	(⁴)	1
Supervisors, protective service occupations	83	58	24	-	2	(⁴)	8	14	26	34	3	-	-
Supervisors, police and detectives	42	57	20	-	3	1	7	10	33	31	5	-	-
Firefighting and fire prevention occupations	113	59	13	1	1	2	9	-	40	22	6	1	2
Firefighting occupations	93	55	9	1	1	-	7	-	41	18	5	-	2
Police and detectives	471	75	30	2	3	1	10	14	44	28	6	(⁴)	1
Police and detectives, public service	303	80	32	2	3	1	10	17	48	27	7	(⁴)	1
Sheriffs, bailiffs, and other law enforcement officers	67	70	34	2	4	2	15	13	38	27	9	-	1
Correctional institution officers	101	64	22	1	2	-	4	9	38	29	3	-	(⁴)
Guards	246	36	7	1	-	1	2	3	11	20	6	1	2
Guards and police, except public service	227	37	7	1	-	1	2	3	12	20	7	1	1
Food preparation and service occupations ...	1,108	24	2	1	(⁴)	(⁴)	1	(⁴)	3	20	1	(⁴)	2
Supervisors, food preparation and service occupations	113	53	13	2	2	-	6	4	11	33	2	2	3
Bartenders	111	36	3	1	1	-	1	-	4	30	1	-	2
Waiters and waitresses	299	24	1	(⁴)	-	(⁴)	(⁴)	-	2	21	-	-	1
Cooks, except short order	412	30	4	1	1	(⁴)	1	1	3	24	1	-	3
Short-order cooks	9	12	3	3	-	-	3	-	3	12	-	-	-
Food counter, fountain and related occupations	31	12	-	-	-	-	-	-	1	10	-	-	(⁴)
Kitchen workers, food preparation	27	18	-	-	-	-	-	-	4	14	1	-	2
Waiters and waitresses assistants	36	11	1	1	-	-	-	1	1	9	-	-	1
Miscellaneous food preparation occupations	70	11	2	1	(⁴)	-	(⁴)	-	(⁴)	9	(⁴)	-	(⁴)
Health service occupations	1,057	62	29	4	5	4	11	5	15	27	1	(⁴)	1
Dental assistants	96	73	39	6	6	1	19	6	6	38	5	-	2
Health aides, except nursing	171	53	27	2	5	2	9	10	7	28	1	(⁴)	2
Nursing aides, orderlies, and attendants ...	790	64	29	4	5	5	11	3	18	26	(⁴)	(⁴)	1
Cleaning and building service occupations, except private household	357	14	3	1	(⁴)	1	(⁴)	1	2	10	(⁴)	(⁴)	1
Supervisors, cleaning and building service workers	51	41	7	-	-	-	3	6	7	30	-	-	3
Maids and housemen	57	12	1	(⁴)	(⁴)	-	(⁴)	(⁴)	1	10	-	-	1
Janitors and cleaners	237	12	3	1	(⁴)	1	(⁴)	(⁴)	1	8	(⁴)	(⁴)	2
Personal service occupations	962	52	34	4	17	5	6	4	12	12	(⁴)	-	3
Barbers	97	88	65	2	31	16	20	-	10	16	2	-	6
Hairdressers and cosmetologists	570	96	74	7	45	11	12	(⁴)	22	11	-	-	1
Attendants, amusement and recreation facilities	39	32	7	2	2	(⁴)	3	-	4	18	-	-	11
Welfare service aides	22	26	13	6	-	-	8	-	3	10	-	-	3
Child care workers, except private household	116	18	7	2	1	(⁴)	1	4	4	9	-	-	3
Personal service occupations, n.e.c.	48	32	10	1	(⁴)	2	1	7	10	12	(⁴)	-	2
Farming, forestry, and fishing occupations	862	28	8	2	(⁴)	1	2	4	1	16	(⁴)	(⁴)	11
Farm operators and managers	441	31	11	3	1	1	2	6	1	17	(⁴)	(⁴)	14
Farmers, except horticultural	406	31	11	3	1	1	2	6	(⁴)	16	(⁴)	(⁴)	15
Managers, farms, except horticultural	26	38	16	1	-	-	-	16	3	30	-	-	1
Farm occupations, except managerial	201	21	5	2	-	(⁴)	2	2	1	14	(⁴)	(⁴)	7
Farm workers	164	19	4	2	-	(⁴)	1	1	1	12	-	(⁴)	7
Related agricultural occupations	159	29	7	2	1	1	2	2	4	18	(⁴)	-	9

See footnotes at end of table.

Table 23. Qualifying training: Sources of training by occupation—Continued

Occupation ¹	Workers who needed training		Source of training (percent of total employment in occupation)										
	Number (thousands)	Percent of total employment in occupa- tion ²	School						Formal company training	Informal on-the- job training	Armed Forces	Corres- pond- ence courses	Friends or relatives or other nonwork- related training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program					
Supervisors, related agricultural occupations	25	32	9	5	-	6	5	3	7	27	-	-	7
Groundskeepers and gardeners, except farm	75	23	4	2	(*)	-	1	1	1	14	(*)	-	9
Animal caretakers, except farm	59	52	15	2	4	2	2	5	10	28	-	-	10
Forestry and logging occupations	37	32	10	-	-	-	6	4	4	19	-	-	4
Timber cutting and logging occupations	24	27	3	-	-	-	2	1	4	20	-	-	5
Fishers, hunters, and trappers	24	42	7	-	-	-	(*)	7	4	24	(*)	-	18
Precision production, craft, and repair occupations	7,603	65	16	5	2	2	5	2	17	40	5	2	8
Mechanics and repairers	2,795	68	19	7	2	3	7	1	18	39	8	3	9
Supervisors, mechanics and repairers	202	68	15	4	2	2	3	4	22	43	11	4	3
Mechanics and repairers, except supervisors	2,593	67	19	7	2	3	7	1	18	38	8	3	9
Vehicle and mobile equipment mechanics and repairers	1,085	68	21	9	2	4	7	1	13	40	8	1	14
Automobile mechanics	549	70	26	13	3	4	7	1	15	38	6	1	15
Bus, truck, and stationary engine mechanics	177	65	14	5	1	3	6	(*)	8	43	9	-	13
Aircraft engine mechanics	79	82	34	6	5	7	17	3	20	39	45	5	10
Automobile body and related repairers	118	66	13	4	2	2	5	1	8	43	2	-	17
Heavy equipment mechanics	101	62	14	5	(*)	2	7	(*)	14	39	2	1	10
Industrial machinery repairers	308	63	14	6	1	3	5	1	18	40	6	1	7
Electrical and electronic equipment repairers	494	70	20	5	2	3	8	2	29	29	14	5	4
Electronic repairers, communications and industrial equipment	129	75	24	6	3	2	10	2	17	28	21	12	6
Data processing equipment repairers	89	92	57	8	3	12	25	8	31	30	22	3	1
Telephone line installers and repairers	51	74	6	2	2	-	1	-	37	33	10	-	4
Telephone installers and repairers	147	57	8	3	1	(*)	3	1	35	27	7	3	1
Miscellaneous electrical and electronic equipment repairers	46	70	17	8	-	3	6	(*)	30	26	19	3	5
Heating, air conditioning, and refrigeration mechanics	140	75	33	6	3	9	15	2	17	40	7	3	8
Miscellaneous mechanics and repairers	547	66	16	6	2	2	6	2	20	42	6	4	6
Office machine repairers	62	87	34	8	5	-	20	5	41	46	11	2	6
Millwrights	50	60	13	2	1	7	3	-	23	37	7	4	1
Specified mechanics and repairers, n.e.c.	211	64	14	7	1	3	4	2	15	45	7	3	5
Not specified mechanics and repairers	126	59	13	9	1	-	7	(*)	15	37	4	2	9
Construction trades	2,543	66	11	4	2	2	3	2	16	44	3	1	11
Supervisors, construction occupations	321	70	17	3	2	2	4	7	13	55	4	2	11
Supervisors, n.e.c.	249	68	16	4	1	2	3	8	10	54	2	1	10
Construction trades, except supervisors	2,221	66	11	4	2	2	3	1	17	42	3	1	11
Brickmasons and stonemasons	94	69	12	3	2	7	-	-	20	43	1	-	11
Carpet installers	75	70	4	2	1	1	-	2	23	44	2	2	9
Carpenters	639	65	11	5	2	2	2	2	8	45	1	(*)	18
Drywall installers	60	72	4	-	-	2	2	-	14	49	-	-	13
Electricians	465	85	28	9	3	6	8	2	32	44	12	2	5
Electrical power installers and repairers	57	53	6	3	2	1	1	-	24	34	8	-	-
Painters, construction and maintenance	161	48	3	1	1	-	2	(*)	9	36	1	-	7
Plumbers, pipefitters, and steamfitters	299	78	8	3	2	2	2	(*)	31	49	3	2	9
Roofers	56	55	1	-	-	-	-	1	9	44	2	-	8
Structural metal workers	41	66	11	3	8	-	-	-	31	29	-	-	4
Construction trades, n.e.c.	56	30	2	1	(*)	-	-	-	3	26	(*)	(*)	3
Extractive occupations	117	56	4	1	-	-	2	2	13	48	1	3	1
Supervisors, extractive occupations	48	62	7	1	-	-	4	1	14	55	-	8	-
Drillers, oil well	25	43	4	-	-	-	-	4	6	41	-	-	1
Precision production occupations	2,149	61	17	5	1	2	5	4	15	38	3	1	5
Supervisors, production occupations	676	56	16	3	1	1	4	8	12	39	4	1	2
Precision metalworking occupations	681	75	22	10	1	4	7	2	23	41	4	(*)	5
Tool and die makers	138	85	25	16	1	4	5	2	35	44	1	-	3
Machinists	342	74	22	10	-	5	7	1	23	43	5	1	4
Sheet metal workers	87	67	15	7	4	3	4	-	13	43	8	-	1
Precision woodworking occupations	56	62	17	10	4	-	2	-	6	42	-	-	11
Precision textile, apparel, and furnishings machine workers	165	63	16	7	1	2	3	3	3	36	(*)	1	21
Dressmakers	64	59	19	10	2	-	(*)	8	7	28	-	-	32
Upholsterers	53	80	16	3	3	3	7	-	(*)	57	1	5	11

See footnotes at end of table.

Table 23. Qualifying training: Sources of training by occupation—Continued

Occupation ¹	Workers who needed training		Source of training (percent of total employment in occupation)										
	Number (thousands)	Percent of total employment in occupa- tion ²	School						Formal company training	Informal on-the- job training	Armed Forces	Corres- pond- ence courses	Friends or relatives or other nonwork- related training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program					
Precision workers, assorted materials	131	50	14	1	2	2	7	4	10	29	2	-	2
Optical goods workers	35	65	26	-	4	1	13	8	17	30	3	-	-
Dental laboratory and medical appliance technicians	39	74	19	-	4	7	8	4	17	37	4	-	3
Electrical and electronic equipment assemblers	17	21	5	-	-	-	2	3	7	14	-	-	-
Precision food production occupations	209	49	6	3	2	1	1	-	10	35	1	(⁴)	5
Butchers and meat cutters	144	50	6	2	2	1	1	-	13	35	1	-	4
Bakers	55	45	9	6	2	1	-	-	2	33	3	1	6
Precision inspectors, testers, and related workers	101	70	14	2	-	-	8	3	32	39	5	3	3
Inspectors, testers, and graders	93	69	14	2	-	-	9	2	32	38	5	3	4
Plant and system operators	130	65	21	3	3	3	9	5	19	35	7	6	(⁴)
Stationary engineers	75	67	26	5	3	5	12	3	13	33	8	8	-
Machine operators, assemblers, and inspectors	2,742	37	6	3	1	1	2	1	6	26	1	(⁴)	3
Machine operators and tenders, except precision	1,771	36	5	3	(⁴)	1	1	1	5	27	1	(⁴)	2
Metalworking and plastic working machine operators	206	46	6	2	-	1	2	1	7	37	1	(⁴)	1
Lathe and turning machine operators	45	60	20	7	-	8	8	-	8	42	5	2	-
Punching and stamping press machine operators	27	26	3	2	-	-	-	1	3	24	2	-	-
Grinding, abrading, buffing and polishing machine operators	56	36	3	1	-	-	2	-	5	28	-	-	2
Metal and plastic processing machine operators	42	26	2	-	-	1	-	2	5	24	-	-	-
Molding and casting machine operators ..	20	23	2	-	-	2	-	2	4	21	-	-	-
Woodworking machine operators	25	20	3	3	-	-	2	-	3	13	-	-	2
Sawing machine operators	15	18	5	5	-	-	2	-	-	12	-	-	2
Printing equipment operators	272	61	20	14	2	3	3	1	11	40	2	-	3
Printing machine operators	187	62	20	14	1	3	3	1	12	38	2	-	3
Typesetters and compositors	52	72	25	21	3	-	1	1	7	49	3	-	5
Textile, apparel, and furnishings machine operators	446	32	2	1	(⁴)	(⁴)	(⁴)	-	2	27	(⁴)	(⁴)	4
Winding and twisting machine operators ..	53	51	-	-	-	-	-	-	4	46	-	-	2
Textile sewing machine operators	252	33	3	2	1	(⁴)	(⁴)	-	2	26	(⁴)	-	6
Shoe machine operators	23	28	-	-	-	-	-	-	-	27	-	1	1
Pressing machine operators	33	26	3	-	-	3	-	-	2	23	-	-	1
Laundering and dry cleaning machine operators	45	24	1	1	-	-	-	-	3	20	1	-	3
Miscellaneous textile machine operators	17	22	-	-	-	-	-	-	-	19	-	-	3
Machine operators, assorted materials	772	32	4	2	(⁴)	(⁴)	1	1	6	24	1	(⁴)	2
Packaging and filling machine operators	51	14	1	-	-	(⁴)	-	1	1	12	(⁴)	-	-
Separating, filtering, and clarifying machine operators	26	43	3	3	-	-	-	-	19	24	-	-	3
Painting and paint spraying machine operators	80	43	7	5	2	(⁴)	1	1	5	31	(⁴)	3	8
Furnace, kiln, and oven operators, except food	66	52	5	(⁴)	-	-	3	(⁴)	7	38	7	-	2
Slicing and cutting machine operators	50	24	-	-	-	-	-	-	3	20	1	-	2
Photographic process machine operators	74	69	19	4	-	2	6	7	13	46	2	-	6
Miscellaneous machine operators, n.e.c.	280	36	6	2	1	1	2	1	8	28	(⁴)	(⁴)	1
Machine operators, not specified	73	28	5	2	-	1	2	1	5	19	1	1	-
Fabricators, assemblers, and handworking occupations	679	41	9	3	1	2	2	(⁴)	9	24	2	(⁴)	4
Welders and cutters	355	68	20	6	3	5	6	-	16	33	3	1	7
Assemblers	229	24	4	2	(⁴)	1	(⁴)	(⁴)	4	18	1	(⁴)	1
Miscellaneous handworking occupations	35	67	9	8	-	-	1	-	10	41	3	-	28
Production inspectors, testers, samplers, and weighers	292	39	8	1	(⁴)	-	2	4	8	27	2	(⁴)	1
Production inspectors, checkers, and examiners	222	38	7	1	(⁴)	-	2	3	8	27	3	(⁴)	(⁴)
Production testers	53	70	26	3	-	-	4	19	11	40	5	3	3
Graders and sorters, except agricultural ..	11	13	-	-	-	-	-	-	2	11	-	-	-
Transportation and material moving occupations	1,462	36	2	1	1	(⁴)	(⁴)	(⁴)	8	26	2	(⁴)	5
Motor vehicle operators	1,006	35	2	1	1	(⁴)	(⁴)	(⁴)	8	23	2	(⁴)	6
Truck drivers, heavy	574	36	2	(⁴)	1	(⁴)	1	(⁴)	4	25	3	(⁴)	7
Truck drivers, light	83	20	2	1	-	1	-	-	2	13	1	-	3
Driver-sales workers	60	28	1	-	1	-	-	(⁴)	4	22	(⁴)	-	3

See footnotes at end of table.

Table 23. Qualifying training: Sources of training by occupation—Continued

Occupation ¹	Workers who needed training		Source of training (percent of total employment in occupation)										
	Number (thousands)	Percent of total employment in occupa- tion ²	School						Formal company training	Informal on-the- job training	Armed Forces	Corres- pond- ence courses	Friends or relatives or other nonwork- related training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program					
Bus drivers	231	58	4	3	1	(*)	-	-	31	28	2	-	4
Taxi cab drivers and chauffeurs	33	18	2	2	-	-	(*)	-	3	14	-	-	2
Transportation occupations, except motor vehicle	103	59	7	1	1	1	1	3	21	42	4	-	2
Rail transportation occupations	60	51	3	1	-	-	-	2	18	37	-	-	-
Locomotive operating occupations	33	61	-	-	-	-	-	-	24	47	-	-	-
Water transportation occupations	43	76	16	-	2	3	4	7	25	53	12	-	6
Material moving equipment operators	353	37	2	1	(*)	(*)	(*)	(*)	6	31	2	(*)	2
Operating engineers	55	46	7	3	-	-	2	2	5	44	-	(*)	3
Crane and tower operators	55	59	1	1	-	-	-	-	9	46	7	2	4
Excavating and loading machine operators Grader, dozer, and scraper operators	40	43	-	-	-	-	-	-	6	34	2	-	5
Industrial truck and tractor equipment operators	39	50	1	-	-	1	(*)	-	3	47	4	-	3
Miscellaneous material moving equipment operators	105	30	1	-	-	-	-	-	6	24	1	-	1
45	25	4	1	2	-	1	-	5	20	-	1	-	-
Handlers, equipment cleaners, helpers and laborers	605	16	2	1	(*)	(*)	1	(*)	2	13	1	(*)	1
Helpers, construction and extractive occupations	43	27	7	5	1	1	-	-	2	17	1	-	4
Helpers, construction trades	35	25	8	5	1	1	-	-	2	15	-	-	4
Construction laborers	88	20	3	2	(*)	(*)	-	-	1	15	(*)	1	4
Production helpers	18	28	7	-	-	2	4	-	1	21	-	-	2
Freight, stock, and material movers, hand	173	12	1	(*)	(*)	1	1	-	2	10	(*)	(*)	(*)
Garbage collectors	6	8	3	3	-	3	3	-	5	8	-	-	2
Stock handlers and baggers	91	12	2	(*)	(*)	(*)	1	-	1	10	(*)	-	-
Machine feeders and offbearers	24	27	2	-	-	2	-	-	6	25	-	-	-
Freight, stock, and material movers, hand, n.e.c.	51	11	(*)	(*)	-	-	-	-	1	9	(*)	(*)	(*)
Garage and service station related occupations	45	16	2	1	-	(*)	(*)	1	3	11	(*)	-	1
Vehicle washers and equipment cleaners	20	14	(*)	-	-	(*)	-	-	1	9	-	-	5
Hand packers and packagers	46	17	1	-	-	1	-	-	2	14	-	-	1
Laborers, except construction	158	17	2	(*)	-	-	1	1	2	13	1	(*)	2

¹ Includes only detailed occupations with January 1983 employment of 50,000 or more.
² Percent is less than the sum of sources of training because many workers reported more than one source of training.
³ Percent does not equal the sum of all sources of schooling because some workers reported more than one source and some did not provide information on the source of

schooling.
⁴ Value less than 0.5.
 - No data reported.
 NOTE: N.e.c. stands for "not elsewhere classified."

Table 24. Skill improvement training: Sources of training by occupational group

Occupational group	Workers who took training ¹	Source of training			
		School	Formal company program	Informal on-the-job training	Other
Total, age 16 and over:					
Number (in thousands)	33,901	11,404	10,625	13,606	4,301
Percent of total employed	35	12	11	14	4
Executive, administrative, and managerial:					
Number (in thousands)	5,098	1,916	1,884	1,688	836
Percent of occupational employment	47	18	17	16	8
Professional specialty:					
Number (in thousands)	7,802	4,352	1,936	1,756	1,408
Percent of occupational employment	61	34	15	14	11
Technicians and related support:					
Number (in thousands)	1,588	600	550	585	166
Percent of occupational employment	52	20	18	19	5
Sales occupations:					
Number (in thousands)	3,578	769	1,411	1,642	487
Percent of occupational employment	32	7	13	15	4
Administrative support, including clerical:					
Number (in thousands)	5,152	1,547	1,565	2,423	392
Percent of occupational employment	32	10	10	15	2
Private household occupations:					
Number (in thousands)	33	10	7	14	10
Percent of occupational employment	3	1	1	1	1
Service workers, except private household:					
Number (in thousands)	3,151	814	955	1,528	360
Percent of occupational employment	25	7	8	12	3
Farming, forestry, and fishing:					
Number (in thousands)	500	164	51	203	142
Percent of occupational employment	16	5	2	7	5
Precision production, craft, and repair:					
Number (in thousands)	4,133	863	1,654	1,860	353
Percent of occupational employment	35	7	14	16	3
Machine operators, assemblers, and inspectors:					
Number (in thousands)	1,639	228	286	1,151	78
Percent of occupational employment	22	3	4	16	1
Transportation and material moving occupations:					
Number (in thousands)	706	84	235	376	50
Percent of occupational employment	18	2	6	9	1
Handlers, equipment cleaners, helpers, and laborers:					
Number (in thousands)	520	57	92	381	19
Percent of occupational employment	14	2	2	10	(²)

¹ Data are less than the sum of sources of training because many workers reported more than one source of training.

² Value less than 0.5.

Table 25. Skill improvement training: Percent distribution of training by occupational group

Occupational group	Any source of training	Source of training			
		School	Formal company program	Informal on-the-job training	Other
Total employed, age 16 and over:					
Number ¹	33,901	11,404	10,625	13,606	4,301
Percent distribution	100	100	100	100	100
Executive, administrative, and managerial	15	17	18	12	19
Professional specialty	23	38	18	13	33
Technicians and related support	5	5	5	4	4
Sales occupations	11	7	13	12	11
Administrative support, including clerical	15	14	15	18	9
Private household occupations	(²)	(²)	(²)	(²)	(²)
Service workers, except private household	9	7	9	11	8
Farming, forestry, and fishing	1	1	(²)	1	3
Precision production, craft, and repair	12	8	16	14	8
Machine operators, assemblers, and inspectors	5	2	3	8	2
Transportation and material moving occupations	2	1	2	3	1
Handlers, equipment cleaners, helpers, and laborers	2	(²)	1	3	(²)

¹ Data are less than the sum of sources of training because many workers reported more than one source of training.

² Value less than 0.5.

NOTE: Because of rounding, individual items may not add to totals.

Table 26. Skill improvement training: Fifty occupations with the largest numbers of workers who took training

Occupation	Number who took training (thousands)	Percent of -	
		Total employment in occupation	Total who took training
Managers and administrators, n.e.c.	2,152	39.7	6.3
Teachers, elementary school	1,171	73.9	3.5
Secretaries	1,059	28.1	3.1
Teachers, secondary school	952	72.0	2.8
Supervisors and proprietors, sales occupations	936	33.7	2.8
Registered nurses	882	68.4	2.6
Accountants and auditors	589	54.4	1.7
Bookkeepers, accounting and auditing clerks	539	27.0	1.6
Supervisors, production occupations	527	43.9	1.6
Nursing aides, orderlies, and attendants	514	41.3	1.5
Sales representatives, mining, manufacturing, and wholesale trade	509	39.3	1.5
Insurance sales occupations	393	71.0	1.2
Cashiers	379	19.4	1.1
Physicians	353	72.1	1.0
Lawyers	320	55.4	.9
Real estate sales occupations	314	65.0	.9
Administrators, education and related fields	310	66.7	.9
Hairdressers and cosmetologists	300	50.8	.9
Police and detectives, public service	292	77.3	.9
Automobile mechanics	292	37.2	.9
"Other" financial officers	287	57.9	.8
Administrators and officials, public administration	286	65.4	.8
Electrical and electronic engineers	283	64.7	.8
Cooks, except short order	271	19.7	.8
Electricians	261	47.6	.8
Social workers	250	67.9	.7
Computer programmers	249	61.3	.7
Sales workers, other commodities	249	18.2	.7
Computer operators	247	45.5	.7
Farmers, except horticultural	242	18.2	.7
Managers; marketing, advertising, and public relations	235	51.8	.7
Licensed practical nurses	232	52.6	.7
Financial managers	216	57.4	.6
Typists	214	25.3	.6
Teachers, n.e.c.	214	57.5	.6
Janitors and cleaners	206	10.7	.6
Bank tellers	206	45.8	.6
Personnel, training, and labor relations specialists	205	60.2	.6
Teachers, prekindergarten and kindergarten	199	61.0	.6
Administrative support occupations, n.e.c.	195	38.5	.6
Assemblers	193	19.9	.6
Telephone installers and repairers	188	72.7	.6
Miscellaneous machine operators, n.e.c.	185	23.8	.5
Clergy	183	59.7	.5
Supervisors, general office	180	51.2	.5
Industrial machinery repairers	178	36.5	.5
Production inspectors, checkers, and examiners	175	30.2	.5
Supervisors, mechanics and repairers	171	57.8	.5
Guards and police, excluding public service	171	28.2	.5
Bus drivers	166	41.6	.5

NOTE: N.e.c. stands for "not elsewhere classified".

Table 27. Skill improvement training: Fifty occupations with the largest proportions of workers who took training

Occupation	Number who took training (thousands)	Percent of -	
		Total employment in occupation	Total who took training
Firefighting occupations	149	87.3	0.4
Supervisors, police and detectives	59	80.1	.2
Police and detectives, public service	292	77.3	.9
Forestry and conservation scientists	40	75.9	.1
Physical therapists	43	75.8	.1
Teachers, elementary school	1,171	73.9	3.5
Recreation workers	38	73.8	.1
Aerospace engineers	69	73.0	.2
Telephone installers and repairers	188	72.7	.6
Physicians	353	72.1	1.0
Teachers, secondary school	952	72.0	2.8
Insurance sales occupations	393	71.0	1.2
Counselors, educational and vocational	123	70.0	.4
Operations and systems researchers and analysts	94	68.5	.3
Registered nurses	882	68.4	2.6
Social workers	250	67.9	.7
Dentists	85	67.3	.3
Telephone line installers and repairers	46	67.3	.1
Data processing equipment repairers	65	67.1	.2
Postsecondary teachers, subject not specified	84	66.9	.2
Inspectors and compliance officers, excluding construction	101	66.8	.3
Administrators, education and related fields	310	66.7	.9
Administrators and officials, public administration	286	65.4	.8
Psychologists	81	65.4	.2
Real estate sales occupations	314	65.0	.9
Electrical and electronic engineers	283	64.7	.8
Speech therapists	42	64.1	.1
Managers, medicine and health	78	63.7	.2
Computer systems analysts and scientists	165	63.7	.5
Chemical technicians	53	62.7	.2
Computer programmers	249	61.3	.7
Teachers, prekindergarten and kindergarten	199	61.0	.6
Sales engineers	33	60.6	.1
Personnel, training, and labor relations specialists	205	60.2	.6
Construction inspectors	39	60.2	.1
Electrical power installers and repairers	65	60.0	.2
Clergy	183	59.7	.5
Chemical engineers	43	59.0	.1
Inhalation therapists	48	58.7	.1
"Other" financial officers	287	57.9	.8
Correctional institution officers	91	57.8	.3
Supervisors, mechanics and repairers	171	57.8	.5
Teachers, n.e.c.	214	57.5	.6
Financial managers	216	57.4	.6
Office machine repairers	41	57.3	.1
Transportation ticket and reservation agents	64	57.0	.2
Purchasing managers	52	56.8	.2
Securities and financial services sales occupations	107	56.6	.3
Dental laboratory and medical appliance technicians	30	56.3	.1
Sheriffs, bailiffs, and other law enforcement officers	54	56.2	.2

NOTE: N.e.c. stands for "not elsewhere classified".

Table 28. Skill improvement training: Percent distribution of workers who took training and of total employed by sex, age, education, and race

Characteristic	Workers who took training	Total employed
Total, age 16 and over	100	100
Male	57	56
Female	43	44
Age group:		
Age 16-19:		
Total	3	6
Male	1	3
Female	2	3
Age 20-24:		
Total	11	13
Male	6	7
Female	5	6
Age 25-34:		
Total	32	29
Male	18	16
Female	14	13
Age 35-44:		
Total	25	22
Male	15	12
Female	11	10
Age 45-54:		
Total	17	16
Male	10	9
Female	7	7
Age 55-64:		
Total	10	12
Male	6	7
Female	4	5
Age 65 and over:		
Total	2	3
Male	1	2
Female	1	1
Highest grade completed:		
High school or less:		
Total	43	59
Male	23	32
Female	20	27
Some college:		
Total	23	19
Male	12	10
Female	10	9
College graduate:		
Total	34	22
Male	21	14
Female	13	8
Race:		
White:		
Total	90	88
Male	52	50
Female	38	38
Black:		
Total	7	9
Male	3	5
Female	4	5
Other:		
Total	2	3
Male	1	1
Female	1	1

NOTE: Because of rounding, individual items may not add to totals.

Table 29. Skill improvement training: Ratio of number of workers who took training to total of training sources identified by occupational group

Occupational group	Number who took training (thousands)	Total of training sources identified (thousands)	Ratio
Total, age 16 and over	33,901	39,938	1.18
Executive, administrative, and managerial	5,098	6,324	1.24
Professional specialty	7,802	9,453	1.21
Technicians and related support	1,588	1,902	1.20
Sales occupations	3,578	4,309	1.20
Administrative support, including clerical	5,152	5,927	1.15
Private household occupations	33	41	1.23
Service workers, except private household	3,151	3,657	1.16
Farming, forestry, and fishing	500	560	1.12
Precision production, craft, and repair	4,133	4,730	1.14
Machine operators, assemblers, and inspectors	1,639	1,743	1.06
Transportation and material moving occupations	706	744	1.05
Handlers, equipment cleaners, helpers, and laborers	520	548	1.05

NOTE: Because of rounding, individual items may not add to totals.

Table 30. Skill improvement training: Sources of school training by occupational group

Occupational group	Total who took training ¹	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program
Total, age 16 and over:						
Number (in thousands)	11,404	353	803	774	3,272	5,428
Percent of total employed	12	(²)	1	1	3	6
Executive, administrative, and managerial:						
Number (in thousands)	1,916	24	113	83	537	1,017
Percent of occupational employment	18	(²)	1	1	5	9
Professional specialty:						
Number (in thousands)	4,352	25	152	105	554	3,202
Percent of occupational employment	34	(²)	1	1	4	25
Technicians and related support:						
Number (in thousands)	600	7	32	40	238	242
Percent of occupational employment	20	(²)	1	1	8	8
Sales occupations:						
Number (in thousands)	769	29	117	59	280	242
Percent of occupational employment	7	(²)	1	1	2	2
Administrative support, including clerical:						
Number (in thousands)	1,547	126	107	159	684	381
Percent of occupational employment	10	1	1	1	4	2
Private household occupations:						
Number (in thousands)	10	4	(²)	1	3	2
Percent of occupational employment	1	(²)	-	(²)	(²)	(²)
Service workers, except private household:						
Number (in thousands)	814	39	112	83	375	144
Percent of occupational employment	7	(²)	1	1	3	1
Farming, forestry, and fishing:						
Number (in thousands)	164	19	6	36	62	35
Percent of occupational employment	5	1	(²)	1	2	1
Precision production, craft, and repair:						
Number (in thousands)	863	42	130	134	403	107
Percent of occupational employment	7	(²)	1	1	3	1
Machine operators, assemblers, and inspectors:						
Number (in thousands)	228	16	11	54	84	43
Percent of occupational employment	3	(²)	(²)	1	1	1
Transportation and material moving occupations:						
Number (in thousands)	84	10	14	9	31	11
Percent of occupational employment	2	(²)	(²)	(²)	1	(²)
Handlers, equipment cleaners, helpers, and laborers:						
Number (in thousands)	57	11	8	11	20	(²)
Percent of occupational employment	2	(²)	(²)	(²)	1	(²)

¹ Data do not equal the sum of all sources of schooling because some workers reported more than one source and some did not provide information on the source of schooling.

² Value less than 0.5.
- No data reported.

Table 31. Skill improvement training: Twenty-five occupations with the largest numbers of workers who took school training

Occupation	Number who took school training (thousands)	Percent of -	
		Total employment in occupation	Total who took school training
Teachers, elementary school	1,003	63.3	8.8
Teachers, secondary school	837	63.3	7.3
Managers and administrators, n.e.c.	710	13.1	6.2
Secretaries	448	11.9	3.9
Registered nurses	294	22.8	2.6
Accountants and auditors	277	25.6	2.4
Bookkeepers, accounting and auditing clerks	224	11.2	2.0
Administrators, education and related fields	220	47.3	1.9
Supervisors and proprietors, sales occupations	208	7.5	1.8
Physicians	160	32.6	1.4
Real estate sales occupations	151	31.3	1.3
Teachers, prekindergarten and kindergarten	141	43.2	1.2
Supervisors, production occupations	140	11.6	1.2
Police and detectives, public service	124	32.7	1.1
"Other" financial officers	115	23.2	1.0
Clergy	108	35.3	.9
Nursing aides, orderlies, and attendants	108	8.7	.9
Sales representatives, mining, manufacturing, and wholesale trade	106	8.2	.9
Electrical and electronic engineers	106	24.1	.9
Electricians	102	18.5	.9
Computer programmers	100	24.5	.9
Administrators and officials, public administration	100	22.8	.9
Farmers, except horticultural	98	7.3	.9
Social workers	96	25.9	.8
Insurance sales occupations	91	16.5	.8

NOTE: N.e.c. stands for "not elsewhere classified".

Table 32. Skill improvement training: Number of workers who took training in school programs and percent who completed training by length of program

Type of program	Total all school programs		Length of program ¹							
	Number of workers (thousands)	Completion rate	Under 12 weeks		13-25 weeks		26-52 weeks		More than 52 weeks	
			Number of workers (thousands)	Completion rate	Number of workers (thousands)	Completion rate	Number of workers (thousands)	Completion rate	Number of workers (thousands)	Completion rate
High school vocational education	353	74	144	87	60	80	56	54	92	60
Private post-high school vocational education	803	87	439	94	108	86	101	82	137	71
Public post-high school vocational education	774	82	384	92	144	78	100	74	132	71
Junior college or technical institute	3,272	75	1,221	92	618	82	512	73	885	48
4-year college	5,428	75	1,297	94	620	86	642	81	2,766	63

¹ Because some workers did not indicate the length of training programs, individual items may not add to totals.

Table 33. Skill improvement training: Workers who received sponsored training in school programs by occupational group

Occupational group	Total	Employer-sponsored training	Government-sponsored training
Total, age 16 and over:			
Number (in thousands)	11,404	4,564	375
Percent distribution	100	100	100
Executive, administrative, and managerial	16	20	12
Professional specialty	38	30	28
Technicians and related support	5	6	5
Sales occupations	6	6	4
Administrative support, including clerical	13	14	16
Private household occupations	(¹)	(¹)	(¹)
Service workers, except private household	7	7	14
Farming, forestry, and fishing	1	1	3
Precision production, craft, and repair	7	9	8
Machine operators, assemblers, and inspectors	2	2	3
Transportation and material moving occupations	(¹)	(¹)	1
Handlers, equipment cleaners, helpers, and laborers	(¹)	(¹)	1

¹ Value less than 0.5.

NOTE: Because of rounding, individual items may not add to totals.

Table 34. Skill improvement training: Twenty-five occupations with the largest numbers of workers who took high school vocational training

Occupation	Number who took high school vocational training (thousands)	Percent of -	
		Total employment in occupation	Total who took high school vocational training
Secretaries	39	1.0	11.0
Bookkeepers, accounting and auditing clerks	24	1.2	6.9
Managers and administrators, n.e.c.	17	.3	4.8
Cashiers	14	.7	4.1
Typists	14	1.6	4.0
Janitors and cleaners	11	.6	3.1
Farm workers	9	1.1	2.6
Farmers, except horticultural	8	.6	2.4
Bus drivers	8	2.0	2.3
Welders and cutters	7	1.3	1.9
Teachers, elementary school	6	.4	1.8
Electricians	6	1.2	1.8
Teachers' aides	6	1.7	1.8
Cooks, except short order	6	.4	1.7
Receptionists	6	.9	1.7
Teachers, secondary school	6	.4	1.6
Laborers, except construction	6	.6	1.6
Supervisors and proprietors, sales occupations	6	.2	1.6
General office clerks	5	1.0	1.6
File clerks	4	1.7	1.3
Child care workers, private household	4	.9	1.1
Computer operators	4	.7	1.1
Nursing aides, orderlies, and attendants	4	.3	1.1
Administrative support occupations, n.e.c.	4	.7	1.0
Sales representatives, mining, manufacturing, and wholesale trade	4	.3	1.0

NOTE: N.e.c. stands for "not elsewhere classified".

Table 35. Skill improvement training: Twenty-five occupations with the largest numbers of workers who took private post-high school vocational training

Occupation	Number who took private post-high school vocational training (thousands)	Percent of -	
		Total employment in occupation	Total who took private post-high school vocational training
Managers and administrators, n.e.c.	52	1.0	6.5
Supervisors and proprietors, sales occupations	39	1.4	4.9
Hairdressers and cosmetologists	35	5.9	4.4
Secretaries	31	.8	3.8
Real estate sales occupations	24	5.1	3.0
Bookkeepers, accounting and auditing clerks	18	.9	2.3
Electricians	17	3.1	2.2
Police and detectives, public service	17	4.5	2.1
Automobile mechanics	15	1.9	1.8
Teachers, elementary school	14	.9	1.8
Supervisors, production occupations	14	1.2	1.7
"Other" financial officers	13	2.6	1.6
Insurance sales occupations	13	2.3	1.6
Accountants and auditors	12	1.1	1.5
Teachers, n.e.c.	11	3.1	1.4
Licensed practical nurses	11	2.5	1.4
Tool and die makers	10	6.2	1.3
Registered nurses	10	.8	1.3
Operations and systems researchers and analysts	10	7.3	1.2
Receptionists	9	1.5	1.2
Nursing aides, orderlies, and attendants	9	.7	1.1
Teachers, secondary school	8	.6	1.0
Computer operators	8	1.5	1.0
Managers; marketing, advertising, and public relations	8	1.7	1.0
Securities and financial services sales occupations	8	4.1	1.0

NOTE: N.e.c. stands for "not elsewhere classified".

Table 36. Skill improvement training: Twenty-five occupations with the largest numbers of workers who took public post-high school vocational training

Occupation	Number who took public post-high school vocational training (thousands)	Percent of -	
		Total employment in occupation	Total who took public post-high school vocational training
Secretaries	75	2.0	9.6
Managers and administrators, n.e.c.	46	.8	5.9
Farmers, except horticultural	28	2.1	3.6
Electricians	21	3.8	2.7
Teachers, elementary school	20	1.2	2.5
Carpenters	16	1.6	2.1
Teachers, secondary school	16	1.2	2.0
Supervisors and proprietors, sales occupations	11	.4	1.5
Police and detectives, public service	11	3.0	1.5
Accountants and auditors	11	1.0	1.4
Insurance sales occupations	11	1.9	1.4
Cooks, except short order	11	.8	1.4
Real estate sales occupations	11	2.2	1.4
Bookkeepers, accounting and auditing clerks	10	.5	1.3
Plumbers, pipefitters, and steamfitters	10	2.7	1.3
Printing machine operators	10	3.3	1.3
Electrical and electronic technicians	10	3.3	1.3
Teachers, prekindergarten and kindergarten	10	3.0	1.3
Firefighting occupations	10	5.8	1.3
Receptionists	10	1.6	1.2
Industrial machinery repairers	9	1.9	1.2
Teachers' aides	9	2.5	1.2
Payroll and timekeeping clerks	9	4.4	1.1
Nursing aides, orderlies, and attendants	8	.7	1.1
Welders and cutters	8	1.5	1.0

NOTE: N.e.c. stands for "not elsewhere classified".

Table 37. Skill improvement training: Twenty-five occupations with the largest numbers of workers who took junior college or technical institute training

Occupation	Number who took junior college or technical institute training (thousands)	Percent of -	
		Total employment in occupation	Total who took junior college or technical institute training
Managers and administrators, n.e.c.	229	4.2	7.0
Secretaries	211	5.6	6.4
Bookkeepers, accounting and auditing clerks	111	5.5	3.4
Registered nurses	101	7.8	3.1
Accountants and auditors	73	6.7	2.2
Supervisors and proprietors, sales occupations	68	2.5	2.1
Supervisors, production occupations	65	5.5	2.0
Real estate sales occupations	64	13.3	2.0
Teachers, secondary school	57	4.3	1.7
Nursing aides, orderlies, and attendants	54	4.3	1.6
Police and detectives, public service	54	14.1	1.6
Teachers, elementary school	52	3.3	1.6
Electricians	51	9.3	1.6
Computer programmers	40	9.9	1.2
"Other" financial officers	37	7.4	1.1
Licensed practical nurses	35	8.0	1.1
Computer operators	33	6.1	1.0
Sales representatives, mining, manufacturing, and wholesale trade	32	2.4	1.0
Insurance sales occupations	32	5.7	1.0
Teachers, prekindergarten and kindergarten	31	9.5	1.0
Firefighting occupations	31	18.2	.9
Teachers' aides	30	8.2	.9
Farmers, except horticultural	30	2.2	.9
Financial managers	29	7.8	.9
Hairdressers and cosmetologists	28	4.7	.9

NOTE: N.e.c. stands for "not elsewhere classified".

Table 38. Skill improvement training: Twenty-five occupations with the largest numbers of workers who took training in 4-year or longer college programs

Occupation	Number who took 4-year college program training (thousands)	Percent of -	
		Total employment in occupation	Total who took 4-year college program training
Teachers, elementary school	814	51.4	15.0
Teachers, secondary school	716	54.1	13.2
Managers and administrators, n.e.c.	350	6.5	6.4
Administrators, education and related fields	172	37.1	3.2
Registered nurses	160	12.4	3.0
Accountants and auditors	138	12.8	2.5
Physicians	133	27.2	2.5
Teachers, prekindergarten and kindergarten	93	28.5	1.7
Clergy	87	28.2	1.6
Supervisors and proprietors, sales occupations	80	2.9	1.5
Secretaries	74	2.0	1.4
Social workers	71	19.2	1.3
Counselors, educational and vocational	65	37.0	1.2
Electrical and electronic engineers	64	14.7	1.2
Lawyers	63	10.9	1.2
Administrators and officials, public administration	62	14.3	1.1
"Other" financial officers	57	11.4	1.0
Postsecondary teachers, subject not specified	55	43.8	1.0
Bookkeepers, accounting and auditing clerks	53	2.7	1.0
Teachers, n.e.c.	48	12.8	.9
Supervisors, production occupations	48	4.0	.9
Librarians	46	21.9	.8
Sales representatives, mining, manufacturing, and wholesale trade	45	3.5	.8
Computer programmers	44	10.8	.8
Financial managers	42	11.2	.8

NOTE: N.e.c. stands for "not elsewhere classified".

Table 39. Skill improvement training: Twenty-five occupations with the largest numbers of workers who took formal company training

Occupation	Number who took formal company training (thousands)	Percent of -	
		Total employment in occupation	Total who took formal company training
Managers and administrators, n.e.c.	772	14.3	7.3
Supervisors and proprietors, sales occupations	370	13.3	3.5
Registered nurses	366	28.4	3.4
Sales representatives, mining, manufacturing, and wholesale	266	20.5	2.5
Secretaries	258	6.8	2.4
Insurance sales occupations	231	41.8	2.2
Supervisors, production occupations	221	18.4	2.1
Accountants and auditors	198	18.3	1.9
Police and detectives, public service	171	45.3	1.6
Nursing aides, orderlies, and attendants	155	12.5	1.5
Electrical and electronic engineers	153	35.1	1.4
Automobile mechanics	147	18.8	1.4
Administrators and officials, public administration	146	33.5	1.4
Telephone installers and repairers	142	55.0	1.3
"Other" financial officers	138	27.9	1.3
Teachers, elementary school	118	7.5	1.1
Supervisors, mechanics and repairers	112	37.7	1.1
Computer programmers	108	26.6	1.0
Managers, marketing, advertising, and public relations	108	23.7	1.0
Teachers secondary school	107	8.1	1.0
Bookkeepers, accounting and auditing clerks	103	5.1	1.0
Real estate sales occupations	102	21.0	1.0
Social workers	97	26.5	.9
Computer systems analysts and scientists	97	37.4	.9
Bank tellers	95	21.2	.9

NOTE: N.e.c. stands for "not elsewhere classified".

Table 40. Skill improvement training: Twenty-five occupations with the largest proportions of workers who took formal company training

Occupation	Number who took formal company training (thousands)	Percent of -	
		Total employment in occupation	Total who took formal company training
Data processing equipment repairers	56	58.1	0.5
Telephone line installers and repairers	39	57.4	.4
Telephone installers and repairers	142	55.0	1.3
Firefighting occupations	86	50.6	.8
Office machine repairers	35	49.3	.3
Police and detectives, public service	171	45.3	1.6
Insurance sales occupations	231	41.8	2.2
Forestry and conservation scientists	21	39.7	.2
Transportation ticket and reservation agents	44	39.4	.4
Operations and systems researchers and analysts	53	38.4	.5
Supervisors, mechanics and repairers	112	37.7	1.1
Computer systems analysts and scientists	97	37.4	.9
Aerospace engineers	35	37.2	.3
Chemical engineers	27	36.9	.3
Electrical and electronic engineers	153	35.1	1.4
Administrators and officials, public administration	146	33.5	1.4
Inspectors and compliance officers, excluding construction	50	33.2	.5
Supervisors, police and detectives	24	33.2	.2
Managers, medicine and health	40	32.2	.4
Economists	27	32.2	.3
Engineers, n.e.c.	50	30.7	.5
Correctional institution officers	48	30.5	.5
Sales engineers	16	29.8	.2
Geologists and geodesists	21	29.4	.2
Electrical power installers and repairers	31	28.8	.3

NOTE: N.e.c. stands for "not elsewhere classified".

Table 41. Skill improvement training: Workers who took training in formal company programs by length of program, completion rate, and government sponsorship by occupational group

Occupational group	Workers who took formal company training		Percent of workers by length of program ¹				Percent completing program	Percent government sponsored
	Number (thousands)	Percent of total employment in occupation	Under 12 weeks	13-25 weeks	26-52 weeks	More than 52 weeks		
Total, age 16 and over	10,625	11	72	8	5	8	87	4
Executive, administrative, and managerial	1,884	17	71	8	6	7	87	4
Professional specialty	1,936	15	70	8	6	8	87	5
Technicians and related support	550	18	69	11	6	8	86	3
Sales occupations	1,411	13	76	7	5	5	89	1
Administrative support, including clerical	1,565	10	79	7	4	5	88	2
Private household occupations	7	1	100	(²)	(²)	(²)	100	5
Service workers, except private household	955	8	68	10	3	9	86	8
Farming, forestry, and fishing	51	2	73	6	(²)	4	75	8
Precision production, craft, and repair	1,654	14	66	7	6	13	85	3
Machine operators, assemblers, and inspectors	286	4	73	7	6	7	87	2
Transportation and material moving occupations	235	6	88	4	1	(²)	93	4
Handlers, equipment cleaners, helpers, and laborers ...	92	2	79	2	(²)	4	79	1

¹ Because some workers did not indicate the length of training programs, individual items may not add to totals.

² Value less than 0.5.

Table 42. Skill improvement training: Twenty-five occupations with the largest numbers of workers who took informal on-the-job training

Occupation	Number who took informal on-the-job training (thousands)	Percent of -	
		Total employment in occupation	Total who took informal on-the-job training
Managers and administrators, n.e.c.	748	13.8	5.5
Secretaries	387	10.2	2.8
Supervisors and proprietors, sales occupations	380	13.7	2.8
Cashiers	286	14.6	2.1
Registered nurses	262	20.4	1.9
Nursing aides, orderlies, and attendants	254	20.5	1.9
Supervisors, production occupations	228	19.0	1.7
Bookkeepers, accounting and auditing clerks	221	11.1	1.6
Sales representatives, mining, manufacturing, and wholesale trade	221	17.1	1.6
Cooks, except short order	182	13.2	1.3
Accountants and auditors ²	162	15.0	1.2
Assemblers	150	15.4	1.1
Miscellaneous machine operators, n.e.c.	143	18.5	1.1
Sales workers, other commodities	141	10.3	1.0
Computer operators	139	25.6	1.0
Janitors and cleaners	129	6.7	.9
Insurance sales occupations	127	23.0	.9
Teachers, elementary school	126	7.9	.9
Administrators and officials, public administration	117	26.7	.9
Social workers	109	29.5	.8
Typists	108	12.7	.8
"Other" financial officers	106	21.4	.8
Production inspectors, checkers, and examiners	103	17.7	.8
Laborers, except construction	102	11.0	.8
Bank tellers	101	22.5	.7

NOTE: N.e.c. stands for "not elsewhere classified".

Table 43. Skill improvement training: Twenty-five occupations with the largest numbers of workers who took training from other sources

Occupation	Number who took training from other sources (thousands)	Percent of -	
		Total employment in occupation	Total who took training from other sources
Managers and administrators, n.e.c.	424	7.8	9.8
Supervisors and proprietors, sales occupations	161	5.8	3.7
Physicians	159	32.4	3.7
Lawyers	157	27.2	3.7
Registered nurses	149	11.5	3.5
Hairdressers and cosmetologists	131	22.2	3.0
Secretaries	104	2.8	2.4
Teachers, elementary school	100	6.3	2.3
Farmers, except horticultural	98	7.4	2.3
Accountants and auditors	91	8.4	2.1
Real estate sales occupations	81	16.7	1.9
Insurance sales occupations	77	13.9	1.8
Teachers, secondary school	75	5.7	1.7
Teachers, n.e.c.	51	13.8	1.2
Dentists	49	38.7	1.1
Bookkeepers, accounting and auditing clerks	46	2.3	1.1
Supervisors, production occupations	46	3.8	1.1
Nursing aides, orderlies, and attendants	45	3.6	1.0
Sales representatives, mining, manufacturing, and wholesale trade	45	3.4	1.0
Pharmacists	44	24.4	1.0
Clergy	43	13.9	1.0
Designers	41	12.3	.9
Financial managers	37	9.9	.9
Other financial officers	34	6.9	.8
Administrators, education and related fields	33	7.0	.8

NOTE: N.e.c. stands for "not elsewhere classified".

Table 44. Skill improvement training: Twenty-five occupations with the largest proportions of workers who took training from other sources

Occupation	Number who took training from other sources (thousands)	Percent of -	
		Total employment in occupation	Total who took training from other sources
Dentists	49	38.7	1.1
Physicians	159	32.4	3.7
Lawyers	157	27.2	3.7
Pharmacists	44	24.4	1.0
Hairdressers and cosmetologists	131	22.2	3.0
Musicians and composers	30	20.4	.7
Dental laboratory and medical appliance technicians	9	17.5	.2
Real estate sales occupations	81	16.7	1.9
Supervisors, police and detectives	12	16.5	.3
Religious workers, n.e.c.	9	15.4	.2
Managers, medicine and health	18	15.1	.4
Electronic repairers, communications and industrial equipment	26	14.9	.6
Psychologists	18	14.5	.4
Insurance sales occupations	77	13.9	1.8
Clergy	43	13.9	1.0
Teachers, n.e.c.	51	13.8	1.2
Recreation workers	7	13.6	.2
Business and promotion agents	8	13.1	.2
Dental hygienists	13	12.8	.3
Sales engineers	7	12.8	.2
Designers	41	12.3	.9
Camera, watch, and musical instrument repairers	7	12.0	.2
Photographers	15	11.9	.3
Personnel and labor relations managers	13	11.9	.3
Librarians	25	11.8	.6

NOTE: N.e.c. stands for "not elsewhere classified".

Table 45. Skill improvement training: Sources of training by occupation

Occupation ¹	Workers who took training		Source of training (percent of total employment in occupation)								
	Number (thousands)	Percent of total employment in occupation ²	School						Formal company training	Informal on-the- job training	Other types of training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program			
Total, age 16 and over	33,901	35	12	(⁴)	1	1	3	6	11	14	4
Executive, administrative, and managerial occupations	5,098	47	18	(⁴)	1	1	5	9	17	16	8
Executives, officials, and managers, public administration	304	65	23	-	1	1	4	15	32	27	7
Administrators and officials, public administration	286	65	23	-	1	1	4	14	33	27	7
Executives, officials, and managers, except public administration	3,263	44	17	(⁴)	1	1	4	9	15	14	8
Financial managers	216	57	22	(⁴)	1	1	8	11	21	19	10
Personnel and labor relations managers	61	55	15	-	-	1	4	9	23	17	12
Purchasing managers	52	57	25	-	2	-	4	17	24	29	2
Managers, marketing, advertising, and public relations	235	52	16	-	2	-	5	8	24	21	7
Administrators, education and related fields	310	67	47	-	(⁴)	(⁴)	3	37	10	13	7
Managers, medicine and health	78	64	24	-	-	1	5	16	32	6	15
Managers, properties and real estate	83	33	15	1	3	1	5	4	7	9	9
Managers and administrators, n.e.c.	2,152	40	13	(⁴)	1	1	4	6	14	14	8
Management related occupations	1,532	52	20	(⁴)	1	1	6	9	20	17	7
Accountants and auditors	589	54	26	(⁴)	1	1	7	13	18	15	8
Other financial officers	287	58	23	-	3	1	7	11	28	21	7
Management analysts	66	45	12	-	(⁴)	-	5	7	19	14	10
Personnel, training, and labor relations specialists	205	60	18	1	(⁴)	1	5	10	26	23	5
Buyers, wholesale and retail trade, except farm products	55	26	5	-	1	-	3	1	9	13	3
Purchasing agents and buyers, n.e.c.	97	45	17	-	1	-	9	5	16	12	6
Business and promotion agents	10	16	3	-	-	-	2	1	4	3	13
Construction inspectors	39	60	16	-	-	-	9	4	23	15	6
Inspectors and compliance officers, except construction	101	67	11	-	2	(⁴)	1	5	33	27	7
Management related occupations, n.e.c.	67	41	23	-	1	1	11	8	12	15	2
Professional specialty	7,802	61	34	(⁴)	1	1	4	25	15	14	11
Engineers, architects, and surveyors	918	56	23	-	1	(⁴)	6	14	26	18	7
Architects	40	41	10	-	-	-	4	3	7	23	11
Engineers	863	57	23	-	1	(⁴)	6	14	28	18	7
Aerospace engineers	69	73	36	-	-	-	12	24	37	20	3
Chemical engineers	43	59	23	-	2	-	5	11	37	19	2
Civil engineers	105	51	22	-	2	1	5	15	16	16	10
Electrical and electronic engineers	283	65	24	-	1	-	5	15	35	21	7
Industrial engineers	118	51	21	-	1	-	9	12	23	18	7
Mechanical engineers	116	52	25	-	(⁴)	1	5	16	21	18	7
Engineers, n.e.c.	82	51	19	-	-	-	3	12	31	17	6
Mathematical and computer scientists	284	65	21	-	3	-	5	11	36	24	7
Computer systems analysts and scientists	165	64	16	-	2	-	4	9	37	25	8
Operations and systems researchers and analysts	94	69	31	-	7	-	10	14	38	22	7
Natural scientists	239	59	30	-	3	1	4	19	25	15	9
Chemists, except biochemists	57	51	29	-	3	2	1	18	21	11	8
Geologists and geodesists	39	54	18	-	3	-	6	7	29	18	9
Biological and life scientists	25	49	29	-	-	3	4	18	10	9	8
Health diagnosing occupations	515	72	33	-	2	(⁴)	2	27	8	8	33
Physicians	353	72	33	-	1	-	1	27	8	9	32
Dentists	85	67	32	-	2	3	4	24	4	8	39
Health assessment and treating occupations	1,219	66	24	(⁴)	1	1	7	14	25	20	12
Registered nurses	882	68	23	(⁴)	1	(⁴)	8	12	28	20	12
Pharmacists	97	53	18	-	2	-	-	11	10	9	24
Dietitians	35	48	26	-	-	4	3	16	12	17	4
Therapists	182	68	33	-	1	1	5	27	20	27	9
Inhalation therapists	48	59	9	-	-	3	-	7	14	36	6
Physical therapists	43	76	51	-	3	-	10	41	25	26	11
Speech therapists	42	64	55	-	-	-	7	48	15	6	11
Teachers, college and university	321	50	39	-	(⁴)	1	2	32	3	7	7
Teachers, except college and university	2,545	70	57	(⁴)	1	1	4	46	9	9	7
Teachers, prekindergarten and kindergarten	199	61	43	(⁴)	-	3	10	28	14	10	9
Teachers, elementary school	1,171	74	63	(⁴)	1	1	3	51	7	8	6
Teachers, secondary school	952	72	63	(⁴)	1	1	4	54	8	7	6
Teachers, n.e.c.	214	58	24	1	3	2	3	13	14	17	14
Counselors, educational and vocational	123	70	52	-	4	3	5	37	9	15	10
Librarians, archivists, and curators	113	51	28	(⁴)	-	(⁴)	4	20	8	10	11
Librarians	110	53	30	-	-	(⁴)	4	22	9	9	12
Social scientists and urban planners	139	59	28	1	(⁴)	-	4	24	20	21	12
Economists	46	54	17	-	1	-	5	14	32	28	6
Psychologists	81	65	34	1	-	-	2	30	14	18	15
Social, recreation, and religious workers	501	64	28	-	1	1	4	21	20	21	11
Social workers	250	68	26	-	(⁴)	1	5	19	26	29	8
Recreation workers	38	74	17	-	(⁴)	(⁴)	8	-	27	30	14
Clergy	183	60	35	-	2	-	3	28	12	9	14

See footnotes at end of table.

Table 45. Skill improvement training: Sources of training by occupation—Continued

Occupation ¹	Workers who took training		Source of training (percent of total employment in occupation)								
	Number (thousands)	Percent of total employment in occupation ²	School						Formal company training	Informal on-the- job training	Other types of training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program			
Religious workers, n.e.c.	30	50	13	-	-	-	-	13	15	18	15
Lawyers and judges	341	56	15	-	(*)	1	2	10	10	10	27
Lawyers	320	55	15	-	-	1	2	11	9	10	27
Writers, artists, entertainers, and athletes	544	39	16	(*)	2	1	4	9	6	13	10
Authors	19	28	22	-	-	-	3	16	1	2	9
Designers	134	41	16	-	2	1	6	7	7	16	12
Musicians and composers	64	44	14	2	3	-	5	8	-	14	20
Actors and directors	25	39	21	-	-	-	6	8	6	13	1
Painters, sculptors, craft-artists, and artist printmakers	47	32	20	-	3	3	3	9	1	7	7
Photographers	59	48	19	-	6	-	3	7	6	20	12
Editors and reporters	69	32	14	1	1	2	1	8	6	13	6
Public relations specialists	52	44	15	-	2	-	2	9	16	16	8
Athletes	26	47	19	-	-	-	-	15	11	18	7
Technicians and related support occupations	1,588	52	20	(*)	1	1	8	8	18	19	5
Health technologists and technicians	573	51	18	(*)	2	1	7	6	14	17	8
Clinical laboratory technologists and technicians	147	54	17	1	-	1	7	8	15	24	6
Dental hygienists	47	45	27	-	1	2	13	17	4	2	13
Radiologic technicians	48	44	17	-	-	-	8	4	11	13	10
Licensed practical nurses	232	53	18	(*)	3	1	8	4	18	15	7
Health technologists and technicians, n.e.c.	92	49	14	-	4	1	5	4	13	23	8
Technologists and technicians, except health	1,015	53	21	(*)	1	1	8	9	20	20	4
Engineering and related technologists and technicians	423	48	20	(*)	1	2	8	7	17	17	4
Electrical and electronic technicians	147	50	20	1	-	3	8	4	26	12	7
Engineering technicians, n.e.c.	139	54	20	-	1	3	6	10	18	26	3
Drafting occupations	98	38	21	-	2	-	11	8	8	12	2
Science technicians	109	55	21	-	-	2	7	12	17	24	2
Biological technicians	26	47	7	-	-	-	-	7	14	23	8
Chemical technicians	53	63	27	-	-	2	8	17	26	22	-
Science technicians, n.e.c.	30	51	25	-	-	2	12	8	8	29	-
Technicians, except health, engineering, and science	483	57	22	-	1	1	8	10	24	22	4
Computer programmers	249	61	25	-	1	1	10	11	27	24	5
Legal assistants	38	36	19	-	-	-	10	12	9	12	2
Technicians, n.e.c.	122	54	19	-	-	1	5	10	18	24	2
Sales occupations	3,578	32	7	(*)	1	1	2	2	13	15	4
Supervisors and proprietors, sales occupations	936	34	7	(*)	1	(*)	2	3	13	14	6
Sales representatives, finance and business services	1,000	58	17	(*)	3	2	6	5	27	19	12
Insurance sales occupations	393	71	17	(*)	2	2	6	6	42	23	14
Real estate sales occupations	314	65	31	(*)	5	2	13	7	21	14	17
Securities and financial services sales occupations	107	57	11	-	4	-	2	1	27	24	11
Advertising and related sales occupations	46	37	7	-	1	2	2	2	10	22	6
Sales occupations, other business services	140	38	5	-	1	2	1	1	18	17	5
Sales representatives, commodities except retail	541	40	9	(*)	1	(*)	3	4	21	17	4
Sales engineers	33	61	32	-	4	-	15	9	30	22	13
Sales representatives, mining, manufacturing and wholesale	509	39	8	(*)	1	(*)	2	4	21	17	3
Sales workers, retail and personal services	1,084	20	3	(*)	(*)	(*)	1	1	5	13	1
Sales workers, motor vehicles and boats	51	30	5	-	1	(*)	3	2	13	13	5
Sales workers, apparel	55	14	1	-	-	-	1	-	3	10	(*)
Sales workers, shoes	27	21	3	-	-	-	1	3	5	14	-
Sales workers, furniture and home furnishings	27	17	3	-	-	-	3	-	9	9	1
Sales workers; radio, television, hi-fi, and appliances	43	32	7	-	-	3	3	1	7	19	5
Sales workers, hardware and building supplies	51	25	8	1	1	-	4	3	6	11	1
Sales workers, parts	36	23	3	-	-	-	3	-	7	13	2
Sales workers, other commodities	249	18	2	(*)	1	(*)	1	(*)	6	10	2
Sales counter clerks	22	18	-	-	-	-	-	-	3	16	(*)
Cashiers	379	19	3	1	(*)	(*)	1	(*)	4	15	(*)
Street and door-to-door sales workers	145	38	1	-	-	(*)	-	-	13	22	5
News vendors	(*)	(*)	-	-	-	-	-	-	(*)	-	-
Administrative support occupations, including clerical	5,152	32	10	1	1	1	4	2	10	15	2
Supervisors, administrative support occupations	321	50	16	(*)	(*)	1	8	7	24	16	6
Supervisors, general office	180	51	14	(*)	(*)	1	7	5	26	16	7
Supervisors, financial records processing	47	55	24	(*)	-	3	11	7	26	11	1
Supervisors; distribution, scheduling, and adjusting clerks	76	44	14	(*)	(*)	-	9	8	17	19	7
Computer equipment operators	247	45	13	1	1	1	6	4	16	25	2
Computer operators	247	46	13	1	1	1	6	4	17	26	2
Secretaries, stenographers, and typists	1,309	28	11	1	1	2	5	2	7	11	3
Secretaries	1,059	28	12	1	1	2	6	2	7	10	3
Stenographers	36	36	14	-	1	1	9	4	17	7	4
Typists	214	25	7	2	(*)	1	3	1	7	13	2

See footnotes at end of table.

Table 45. Skill improvement training: Sources of training by occupation—Continued

Occupation ¹	Workers who took training		Source of training (percent of total employment in occupation)								
	Number (thousands)	Percent of total employment in occupation ²	School						Formal company training	Informal on-the- job training	Other types of training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program			
Information clerks	337	29	8	1	1	1	4	1	9	14	2
Interviewers	64	43	13	1	1	-	10	3	20	17	1
Hotel clerks	20	40	7	4	-	-	4	-	2	28	6
Transportation ticket and reservation agents	64	57	10	-	-	-	6	2	39	20	2
Receptionists	155	25	8	1	2	2	3	1	5	13	2
Information clerks, n.e.c.	34	14	6	1	(⁴)	1	2	1	2	9	1
Records processing occupations, except financial	320	35	8	(⁴)	1	1	3	2	11	20	1
Order clerks	100	49	9	-	2	(⁴)	4	2	25	27	(⁴)
Personnel clerks, except payroll and timekeeping	34	44	12	-	3	-	-	4	11	23	2
Library clerks	49	36	12	-	-	3	2	5	5	22	2
File clerks	52	20	6	2	(⁴)	1	-	2	2	13	-
Records clerks	80	39	7	-	-	(⁴)	7	-	13	19	3
Financial records processing occupations	692	27	11	1	1	1	5	3	6	12	2
Bookkeepers, accounting and auditing clerks	539	27	11	1	1	1	6	3	5	11	2
Payroll and timekeeping clerks	63	31	14	-	1	4	4	4	7	13	2
Billing clerks	42	24	6	-	-	2	2	2	10	9	(⁴)
Cost and rate clerks	33	28	5	-	-	2	3	1	11	19	-
Duplicating, mail and other office machine operators	20	26	3	-	-	-	3	-	6	17	2
Communications equipment operators	82	34	6	1	1	-	2	3	11	21	1
Telephone operators	80	35	6	1	1	-	2	3	11	22	1
Mail and message distributing occupations	218	28	(⁴)	-	-	(⁴)	(⁴)	(⁴)	8	19	1
Postal clerks, except mail carriers	90	39	1	-	-	1	-	-	12	26	2
Mail carriers, postal service	82	31	-	-	-	-	-	-	9	22	1
Mail clerks, except postal service	34	20	1	-	-	-	1	(⁴)	1	18	-
Messengers	12	10	-	-	-	-	-	-	6	4	-
Material recording, scheduling, and distributing clerks n.e.c.	463	29	4	(⁴)	(⁴)	(⁴)	2	1	9	18	2
Dispatchers	57	39	9	1	2	1	5	-	16	17	4
Production coordinators	100	52	13	-	(⁴)	-	4	6	19	34	3
Traffic, shipping, and receiving clerks	80	18	2	-	-	(⁴)	1	1	5	13	(⁴)
Stock and inventory clerks	154	29	3	(⁴)	(⁴)	1	1	1	7	18	3
Weighers, measurers, and checkers	21	26	-	-	-	-	-	-	10	15	-
Expeditors	35	29	3	-	-	-	(⁴)	3	9	18	3
Adjusters and investigators	304	47	11	(⁴)	(⁴)	1	4	5	21	20	5
Insurance adjusters, examiners, and investigators	112	56	10	-	-	-	2	6	25	23	6
Investigators and adjusters, except insurance	129	46	13	-	(⁴)	2	6	5	22	19	4
Eligibility clerks, social welfare	29	42	11	3	(⁴)	-	3	4	13	23	5
Bill and account collectors	34	33	8	-	2	-	2	4	13	18	2
Miscellaneous administrative support occupations	839	37	11	1	1	1	4	3	12	18	3
General office clerks	156	29	8	1	1	(⁴)	3	2	9	16	3
Bank tellers	206	46	12	-	1	1	5	3	21	23	3
Data-entry keyers	79	27	5	-	(⁴)	1	2	1	8	14	1
Statistical clerks	36	45	8	2	-	-	2	3	15	26	4
Teachers aides	164	45	21	2	(⁴)	2	8	8	8	18	3
Administrative support occupations, n.e.c.	195	38	9	1	(⁴)	-	4	3	11	18	3
Private household occupations	33	3	1	(⁴)	-	(⁴)	(⁴)	(⁴)	1	1	1
Launderers, cooks, housekeepers, and butlers	1	2	-	-	-	-	-	-	1	-	-
Child care workers, private household	23	5	1	1	-	-	-	(⁴)	1	2	2
Private household cleaners and servants	9	2	1	(⁴)	-	(⁴)	1	-	(⁴)	1	(⁴)
Service workers, except private household	3,151	25	7	(⁴)	1	1	3	1	8	12	3
Protective service occupations	896	55	20	(⁴)	2	2	10	4	28	21	4
Supervisors, protective service occupations	111	78	39	-	7	3	22	10	35	33	10
Supervisors, police and detectives	59	80	43	-	9	-	18	19	33	24	17
Firefighting and fire prevention occupations	169	87	35	-	2	6	20	3	51	35	8
Firefighting occupations	149	87	34	-	2	6	18	4	51	37	7
Police and detectives	437	69	28	(⁴)	3	2	14	6	39	23	4
Police and detectives, public service	292	77	33	(⁴)	4	3	14	8	45	22	5
Sheriffs, bailiffs, and other law enforcement officers	54	56	24	-	2	2	16	4	25	25	2
Correctional institution officers	91	58	21	-	2	1	12	4	31	23	2
Guards	180	27	4	-	1	(⁴)	2	(⁴)	10	13	2
Guards and police, except public service	171	28	4	-	1	(⁴)	3	(⁴)	11	14	2
Food preparation and service occupations	698	15	2	(⁴)	(⁴)	(⁴)	1	(⁴)	2	11	1
Supervisors, food preparation and service occupations	65	31	9	1	-	1	2	2	5	19	2
Bartenders	30	10	1	1	-	-	1	-	1	9	-
Waiters and waitresses	140	11	1	-	1	(⁴)	(⁴)	(⁴)	2	8	(⁴)
Cooks, except short order	271	20	4	(⁴)	(⁴)	1	1	(⁴)	3	13	1
Short-order cooks	14	18	5	3	-	-	5	-	-	15	-
Food counter, fountain and related occupations	38	15	2	-	-	1	1	-	(⁴)	13	-
Kitchen workers, food preparation	23	15	2	1	1	-	-	-	-	13	1

See footnotes at end of table.

Table 45. Skill improvement training: Sources of training by occupation—Continued

Occupation ¹	Workers who took training		Source of training (percent of total employment in occupation)								
	Number (thousands)	Percent of total employment in occupation ²	School						Formal company training	Informal on-the- job training	Other types of training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program			
Waiters and waitresses assistants	38	11	(⁴)	-	-	-	(⁴)	-	(⁴)	10	1
Miscellaneous food preparation occupations	79	13	2	(⁴)	-	-	1	1	1	10	1
Health service occupations	716	42	9	(⁴)	1	1	5	2	11	22	4
Dental assistants	63	48	12	-	(⁴)	-	4	5	9	25	6
Health aides, except nursing	139	43	11	-	1	2	6	2	9	25	4
Nursing aides, orderlies, and attendants	514	41	9	(⁴)	1	1	4	1	12	20	4
Cleaning and building service occupations, except private household	296	11	2	1	(⁴)	(⁴)	1	(⁴)	2	7	1
Supervisors, cleaning and building service workers	31	25	4	-	1	-	(⁴)	2	12	10	1
Maids and housemen	48	10	1	(⁴)	-	(⁴)	(⁴)	-	1	8	1
Janitors and cleaners	206	11	2	1	(⁴)	(⁴)	1	(⁴)	2	7	1
Personal service occupations	545	29	9	(⁴)	2	1	3	1	8	6	9
Barbers	27	25	8	3	3	-	2	-	5	8	7
Hairdressers and cosmetologists	300	51	14	1	6	1	5	(⁴)	11	8	22
Attendants, amusement and recreation facilities	12	10	3	-	3	-	-	-	4	2	(⁴)
Welfare service aides	25	30	3	-	1	-	3	-	20	7	2
Child care workers, except private household	101	16	7	(⁴)	-	(⁴)	4	2	4	3	4
Personal service occupations, n.e.c.	29	19	4	-	-	(⁴)	2	2	9	6	2
Farming, forestry, and fishing occupations	500	16	5	1	(⁴)	1	2	1	2	7	5
Farm operators and managers	267	19	8	1	(⁴)	2	3	2	2	5	7
Farmers, except horticultural	242	18	7	1	(⁴)	2	2	2	1	5	7
Managers, farms, except horticultural	17	25	11	2	-	1	5	4	12	3	4
Farm occupations, except managerial	125	13	3	1	(⁴)	1	1	(⁴)	1	7	3
Farm workers	101	12	3	1	(⁴)	1	1	(⁴)	1	5	3
Related agricultural occupations	89	16	4	-	-	(⁴)	3	1	2	11	1
Supervisors, related agricultural occupations	26	34	3	-	-	-	3	-	8	28	4
Groundskeepers and gardeners, except farm	48	14	5	-	-	(⁴)	3	1	2	9	1
Animal caretakers, except farm	15	14	4	-	-	-	4	-	-	8	2
Forestry and logging occupations	12	11	3	-	-	-	2	3	4	4	2
Timber cutting and logging occupations	2	3	-	-	-	-	-	-	(⁴)	1	1
Fishers, hunters, and trappers	8	13	3	-	-	-	3	-	3	7	(⁴)
Precision production, craft, and repair occupations	4,133	35	7	(⁴)	1	1	3	1	14	16	3
Mechanics and repairers	1,818	44	7	(⁴)	1	1	3	1	22	17	4
Supervisors, mechanics and repairers	171	58	5	-	1	-	3	(⁴)	38	22	2
Mechanics and repairers, except supervisors	1,646	43	7	(⁴)	1	1	3	1	21	17	4
Vehicle and mobile equipment mechanics and repairers	584	37	7	(⁴)	2	1	3	1	16	14	3
Automobile mechanics	292	37	8	(⁴)	2	1	3	(⁴)	19	12	3
Bus, truck, and stationary engine mechanics	105	38	8	1	3	1	3	(⁴)	15	14	4
Aircraft engine mechanics	51	53	5	-	1	-	4	(⁴)	24	24	6
Automobile body and related repairers	37	21	3	-	(⁴)	-	3	-	6	11	2
Heavy equipment mechanics	62	38	4	-	1	-	3	-	13	23	1
Industrial machinery repairers	178	37	6	(⁴)	1	2	4	-	15	18	2
Electrical and electronic equipment repairers	444	63	7	(⁴)	1	1	3	1	41	23	7
Electronic repairers, communications and industrial equipment	93	54	7	-	2	1	4	(⁴)	17	23	15
Data processing equipment repairers	65	67	10	-	1	-	5	2	58	10	10
Telephone line installers and repairers	46	67	10	-	2	1	3	3	57	16	1
Telephone installers and repairers	188	73	5	-	1	(⁴)	2	1	55	28	1
Miscellaneous electrical and electronic equipment repairers	34	52	3	3	-	-	-	-	19	28	9
Heating, air conditioning, and refrigeration mechanics	75	40	7	-	(⁴)	3	2	1	20	12	7
Miscellaneous mechanics and repairers	358	43	8	1	1	1	3	(⁴)	18	18	4
Office machine repairers	41	57	7	-	-	-	7	-	49	3	-
Millwrights	40	47	11	-	3	6	2	-	18	24	2
Specified mechanics and repairers, n.e.c.	126	38	9	1	1	1	3	1	13	18	2
Not specified mechanics and repairers	85	40	8	1	1	(⁴)	1	-	13	26	1
Construction trades	991	26	7	(⁴)	1	2	3	1	7	13	2
Supervisors, construction occupations	116	25	8	(⁴)	2	1	3	2	6	11	5
Supervisors, n.e.c.	87	24	8	-	1	-	3	3	5	11	5
Construction trades, except supervisors	875	26	7	(⁴)	1	2	3	(⁴)	7	13	2
Brickmasons and stonemasons	22	16	4	-	-	4	-	-	1	10	(⁴)
Carpet installers	25	23	2	-	-	2	-	-	9	10	5
Carpenters	143	14	4	(⁴)	1	2	1	(⁴)	1	8	2
Drywall installers	12	15	5	-	-	-	5	-	-	8	2
Electricians	261	48	19	1	3	4	9	1	15	17	3
Electrical power installers and repairers	65	60	4	-	1	3	-	-	29	28	5
Painters, construction and maintenance	38	11	2	-	1	1	1	-	1	8	1
Plumbers, pipefitters, and steamfitters	132	34	10	-	1	3	5	-	10	17	1
Roofers	25	24	2	-	-	-	2	-	9	14	-
Structural metal workers	13	21	13	-	-	6	4	-	4	8	-

See footnotes at end of table.

Table 45. Skill improvement training: Sources of training by occupation—Continued

Occupation ¹	Workers who took training		Source of training (percent of total employment in occupation)								
	Number (thousands)	Percent of total employment in occupation ²	School						Formal company training	Informal on-the- job training	Other types of training
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program			
Construction trades, n.e.c.	44	24	1	-	-	-	1	-	7	16	1
Extractive occupations	71	34	6	1	1	1	3	2	16	13	3
Supervisors, extractive occupations	37	47	12	2	3	2	5	4	20	21	4
Drillers, oil well	10	18	6	-	-	3	3	-	9	4	-
Precision production occupations	1,254	36	8	(⁴)	1	1	4	2	13	18	3
Supervisors, production occupations	527	44	12	(⁴)	1	(⁴)	5	4	18	19	4
Precision metalworking occupations	332	36	10	1	2	1	5	(⁴)	12	18	3
Tool and die makers	65	40	17	2	6	2	6	1	10	17	2
Machinists	154	33	7	(⁴)	1	1	4	(⁴)	10	18	4
Sheet metal workers	50	39	12	-	-	1	11	-	16	18	3
Precision woodworking occupations	7	8	2	-	-	-	2	-	-	6	-
Precision textile, apparel, and furnishings machine workers	32	12	4	(⁴)	-	1	1	2	1	8	1
Dressmakers	16	15	9	1	-	2	2	5	2	6	2
Upholsterers	8	12	(⁴)	-	-	-	(⁴)	-	-	12	-
Precision workers, assorted materials	92	35	6	1	1	1	4	-	10	20	5
Optical goods workers	24	45	5	-	2	-	3	-	14	31	5
Dental laboratory and medical appliance technicians	30	56	6	-	-	-	6	-	22	31	17
Electrical and electronic equipment assemblers	17	21	3	-	-	-	3	-	6	13	-
Precision food production occupations	112	26	2	-	(⁴)	-	1	-	3	23	1
Butchers and meat cutters	69	24	2	-	-	-	2	-	3	22	-
Bakers	39	32	1	-	1	-	-	-	4	25	2
Precision inspectors, testors, and related workers	57	39	8	2	-	-	6	-	15	15	7
Inspectors, testers, and graders	54	40	9	2	-	-	6	-	16	14	6
Plant and system operators	96	48	8	-	2	2	4	-	23	20	3
Stationary engineers	39	35	11	-	3	4	4	-	17	9	1
Machine operators, assemblers, and inspectors	1,639	22	3	(⁴)	(⁴)	1	1	1	4	16	1
Machine operators and tenders, except precision	1,047	21	2	(⁴)	(⁴)	1	1	1	3	16	1
Metalworking and plastic working machine operators	101	22	3	1	-	1	1	1	4	15	(⁴)
Lathe and turning machine operators	15	20	6	3	-	-	3	-	3	9	3
Punching and stamping press machine operators	28	27	5	2	-	-	2	1	2	20	-
Grinding, abrading, buffing and polishing machine operators	37	24	4	-	-	1	1	1	4	15	-
Metal and plastic processing machine operators	42	26	5	-	-	1	4	-	9	15	1
Molding and casting machine operators	18	21	3	-	-	-	3	-	9	10	-
Woodworking machine operators	11	9	-	-	-	-	-	-	2	9	-
Sawing machine operators	6	8	-	-	-	-	-	-	-	8	-
Printing equipment operators	136	31	7	(⁴)	(⁴)	3	(⁴)	2	5	19	3
Printing machine operators	105	35	9	-	(⁴)	3	(⁴)	3	7	20	3
Typesetters and compositors	8	11	-	-	-	-	-	-	3	8	(⁴)
Textile, apparel, and furnishings machine operators	196	14	(⁴)	-	-	-	-	(⁴)	1	13	(⁴)
Winding and twisting machine operators	26	25	2	-	-	-	-	-	3	22	-
Textile sewing machine operators	89	12	(⁴)	-	-	-	-	(⁴)	-	11	(⁴)
Shoe machine operators	13	16	-	-	-	-	-	-	-	15	1
Pressing machine operators	19	15	-	-	-	-	-	-	1	15	-
Laundering and dry cleaning machine operators	28	15	(⁴)	-	-	-	-	(⁴)	4	10	2
Miscellaneous textile machine operators	9	12	-	-	-	-	-	-	1	11	-
Machine operators, assorted materials	556	23	3	(⁴)	(⁴)	(⁴)	1	1	4	17	1
Packaging and filling machine operators	52	14	1	-	-	-	1	-	1	13	-
Separating, filtering, and clarifying machine operators	23	37	5	-	-	-	3	2	21	14	-
Painting and paint spraying machine operators	37	20	3	-	-	-	1	-	7	9	2
Furnace, kiln, and oven operators, except food	42	33	6	-	1	1	5	-	6	19	7
Slicing and cutting machine operators	33	16	3	1	-	-	1	1	1	11	1
Photographic process machine operators	33	31	4	-	-	-	3	1	3	21	4
Miscellaneous machine operators, n.e.c.	185	24	2	-	(⁴)	1	1	1	4	18	(⁴)
Machine operators, not specified	66	25	3	-	-	1	1	(⁴)	5	18	-
Fabricators, assemblers, and handworking occupations	368	22	4	1	(⁴)	1	1	(⁴)	4	14	1
Welders and cutters	132	25	7	1	1	2	4	-	5	13	2
Assemblers	193	20	1	(⁴)	(⁴)	1	(⁴)	(⁴)	4	15	1
Miscellaneous handworking occupations	15	29	-	-	-	-	-	-	-	20	9
Production inspectors, testers, samplers, and weighers	225	30	6	-	(⁴)	1	3	2	8	18	1
Production inspectors, checkers, and examiners	175	30	5	-	(⁴)	1	3	1	9	18	2
Production testers	36	48	13	-	-	5	-	7	12	30	2
Graders and sorters, except agricultural	9	10	-	-	-	-	-	-	-	10	-
Transportation and material moving occupations	706	18	2	(⁴)	(⁴)	(⁴)	1	(⁴)	6	9	1
Motor vehicle operators	439	15	2	(⁴)	(⁴)	(⁴)	(⁴)	(⁴)	5	7	1
Truck drivers, heavy	147	9	1	-	(⁴)	(⁴)	1	(⁴)	3	5	1
Truck drivers, light	52	12	2	(⁴)	-	-	(⁴)	(⁴)	2	8	(⁴)

See footnotes at end of table.

Table 45. Skill improvement training: Sources of training by occupation—Continued

Occupation ¹	Workers who took training		Source of training (percent of total employment in occupation)									
	Number (thousands)	Percent of total employment in occupation ²	School						Formal company training	Informal on-the- job training	Other types of training	
			Total with school training ³	High school vocational education	Private post-high school vocational education	Public post-high school vocational education	Junior college or technical institute	4-year or longer college program				
Driver-sales workers	37	17	1	-	-	-	-	-	1	6	8	3
Bus drivers	166	42	5	2	1	1	(⁴)	(⁴)	22	16	16	2
Taxi cab drivers and chauffeurs	18	10	2	(⁴)	-	1	1	-	1	1	4	4
Transportation occupations, except motor vehicle	58	34	6	-	-	-	4	1	11	15	15	5
Rail transportation occupations	40	34	3	-	-	-	-	2	13	17	(⁴)	-
Locomotive operating occupations	21	39	3	-	-	-	3	-	18	18	-	-
Water transportation occupations	19	33	13	-	-	-	10	-	7	11	14	-
Material moving equipment operators	208	22	2	-	(⁴)	(⁴)	1	(⁴)	6	14	14	1
Operating engineers	38	31	2	-	2	-	-	-	12	19	-	-
Crane and tower operators	23	25	-	-	-	-	-	-	7	19	2	-
Excavating and loading machine operators	14	15	3	-	-	(⁴)	2	-	6	5	(⁴)	-
Grader, dozer, and scraper operators	9	11	-	-	-	-	-	-	3	11	-	-
Industrial truck and tractor equipment operators	75	22	1	-	-	-	1	1	5	15	1	-
Miscellaneous material moving equipment operators	41	23	3	-	-	-	3	-	5	14	1	-
Handlers, equipment cleaners, helpers and laborers	520	14	2	(⁴)	(⁴)	(⁴)	1	-	2	10	(⁴)	(⁴)
Helpers, construction and extractive occupations	44	27	6	1	1	1	1	-	1	22	(⁴)	(⁴)
Helpers, construction trades	39	27	6	2	1	1	(⁴)	-	1	22	(⁴)	(⁴)
Construction laborers	61	14	2	1	-	1	(⁴)	-	2	10	1	-
Production helpers	18	28	3	-	-	-	3	-	4	21	-	-
Freight, stock, and material movers, hand	163	12	1	(⁴)	-	(⁴)	1	-	2	9	(⁴)	-
Garbage collectors	10	14	3	-	-	-	-	-	6	8	-	-
Stock handlers and baggers	95	13	1	(⁴)	-	-	1	-	2	9	(⁴)	-
Machine feeders and offbearers	12	13	-	-	-	-	-	-	-	13	-	-
Freight, stock, and material movers, hand, n.e.c.	43	9	1	-	-	(⁴)	(⁴)	-	2	7	(⁴)	-
Garage and service station related occupations	29	10	-	-	-	-	-	-	3	7	1	-
Vehicle washers and equipment cleaners	9	6	-	-	-	-	-	-	1	5	-	-
Hand packers and packagers	32	12	1	-	-	-	1	-	-	10	-	-
Laborers, except construction	148	16	2	1	1	(⁴)	(⁴)	-	3	11	1	-

¹ Includes only detailed occupations with January 1983 employment of 50,000 or more.

² Percent is less than the sum of sources of training because many workers reported more than one source of training.

³ Percent does not equal the sum of all sources of schooling because some workers

reported more than one source and some did not provide information on the source of schooling.

⁴ Value less than 0.5.

- No data reported.

NOTE: N.e.c. stands for "not elsewhere classified."

Appendix. Sources and Limitations of the Data

This publication reports the responses of individuals to questions about training or skills that were needed to obtain their current jobs and about training that was taken to improve skills since obtaining their current jobs. As such, the responses represent the perceptions of individual employees. Users of these data must be aware that the perceptions of individuals as to whether training was needed to obtain or to improve skills needed for their jobs may not be the same as those of their employers.

Source of data

The January 1983 Current Population Survey (CPS) provided the data used in this report. Data were obtained from a sample survey of the population 16 years of age and over. The CPS is a household survey conducted each month by the Bureau of the Census for the Bureau of Labor Statistics which provides comprehensive data on the labor force, the employed, and the unemployed, including such characteristics as age, sex, race, occupation, and industry attachment. The information is collected by trained interviewers from a sample of about 60,000 households. A detailed description of the survey appears in *Concepts and Methods Used in Labor Force Statistics Derived from the Current Population Survey*, BLS Report 463 (1976).

In January 1983, the questionnaire used to obtain the basic labor force information was supplemented with questions about training. (See questionnaire.) Although only data about employed persons are presented in this report, the supplemental questions were asked of all employed and unemployed persons. Interviewers were instructed to obtain the information from each individual; proxy responses were discouraged.

After completing the January 1983 CPS, the Census Bureau determined that 5 percent of the respondents did not answer the supplemental questions and that training information was not obtained directly from the individual for about 30 percent of the respondents. Because of the nonresponse problem, the Census Bureau developed new weights for respondents based on ra-

tio-estimate factors needed to adjust the sample estimates of population for various age-race-sex-employment status groups to the current estimates of the population in these groups. The Census Bureau then provided a computer tape containing the responses and appropriate weights. Data in this report were tabulated by BLS using the computer tape provided by the Census Bureau.

Limitations of the data

Like those from any sample, the data presented in this report are subject to nonsampling and sampling errors. The former result because individuals may not have understood the question, may have remembered the past incorrectly, or may have simply made a mistake in choosing the answer.¹ The magnitude of these types of errors is impossible to quantify but, because of the size and complexity of the questionnaire, is probably greater than for many other surveys.

In addition to nonsampling errors, the data are subject to sampling variability, the variations that occur because a sample rather than the entire population was surveyed. The standard errors developed by the Bureau of the Census and presented in tables A-1, A-2, and A-3 measure sampling variability.² For example, in January 1983, 53,890,000 employed persons age 16 and older reported they needed training in order to obtain their current job. Using table A-1 and interpolating between 50,000,000 and 60,000,000, the standard error is approximately 300,000. The chances are about 68 out of 100 that the difference between estimates based on the sample and an actual count of the population would be less than the standard error.

¹ Detailed information on nonsampling errors in the CPS appears in "An Error Profile: Employment as Measured by the Current Population Survey," by Camilla Brooks and Barbara Bailar, Statistical Policy Working Paper 3 (U.S. Department of Commerce, Office of Federal Statistical Policy and Standards, 1978).

² "Source and Reliability Statement for the Report: Occupational Mobility and Job Training of Workers, January 1983" (unpublished memorandum, Bureau of the Census, November 1984).

Supplement to January 1983 Current Population Survey

<p>29. INTERVIEWER CHECK ITEM</p> <p>A. Entry (or NA) in 20A or 21B (Fill items 30-50)</p> <p>B. Entry (or NA) in 22F and 23E is not "never" (Skip to 35)</p> <p>C. All other (Go to next person)</p>	<p>ASK ITEMS 35 through 49 OF SAMPLE PERSON. IF NOT PRESENT MAKE TELEPHONE CALLBACK(S)</p> <p>35. Did you need specific skills or training to obtain your current (last) job?</p> <p>Yes (Ask 36) No (Skip to 37)</p>	<p>Items 40 through 49 to be completed only for entries in items 36A, 36B, 39A, and 39B.</p> <p>40. INTERVIEWER CHECK ITEM (Fill all that apply)</p> <p>Entry in 36A (Ask 41)</p> <p>Entry in 36B (Ask 43)</p> <p>Entry in 39A (Ask 41)</p> <p>Entry in 39B (Ask 43)</p> <p>None of the above (Fill 50)</p>																																																																																																																													
<p>LEAD-IN This month we are asking some additional questions about occupational mobility, job training, and length of employment at current job.</p>	<p>36. Did you obtain those skills or training through one or more of the following: (Mark all that apply)</p> <p>A. A training program in a high school or a post-secondary school.</p> <p>B. A formal company training program such as apprenticeship training or other type of training having an instructor and a planned program.</p> <p>C. Informal on-the-job training or experience in previously held job or jobs.</p> <p>D. Training received in the armed forces.</p> <p>E. A correspondence course.</p> <p>F. Informal training from a friend or relative or other experience not related to work.</p>	<p>41. LEAD IN - These questions refer to the job related training you received in school to (obtain) (improve) your current (last) job. Was the training received through:</p> <p>(Read categories) (Mark all that apply)</p> <p>A high school vocational program?</p> <p>A private post-high school vocational school program?</p> <p>A public post-high school vocational school program?</p> <p>Junior or community college or Technical Institute?</p> <p>4 year or longer college program?</p>																																																																																																																													
<p>30. Was ... working a year ago, in January 1982? Yes No</p> <p>30A. Was ... on layoff or looking for work at that time? Yes No</p> <p>(Ask 31) (Ask 30A) (Skip to 33)</p>	<p>37. INTERVIEWER CHECK ITEM</p> <p>Category "A" marked in item 29 (Ask 38)</p> <p>Category "B" marked in item 29 (Skip to 40)</p>	<table border="1"> <tr> <td></td> <td>36 A</td> <td>36 B</td> <td>39 A</td> <td>39 B</td> </tr> <tr> <td></td> <td>(Read lead-in)</td> <td></td> <td>(Read lead-in)</td> <td></td> </tr> <tr> <td>Was the training sponsored by a government program such as CETA?</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> <td>Yes</td> </tr> <tr> <td></td> <td>No</td> <td>No</td> <td>No</td> <td>No</td> </tr> <tr> <td>44. How long was the training program?</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Under 12 weeks</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>13-25 weeks</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>26-52 weeks</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>53+ weeks</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>45. Did you complete the training?</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Yes</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>No</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>46. How many courses were included in the program?</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>One</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2-4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>5+</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>47. Was the training given primarily</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Away from your job?</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>On the job?</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>48. Was this an apprenticeship program leading to journeyman status?</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Yes</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>No</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>49. Was this training provided by</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Your present employer?</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>or a former employer?</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>		36 A	36 B	39 A	39 B		(Read lead-in)		(Read lead-in)		Was the training sponsored by a government program such as CETA?	Yes	Yes	Yes	Yes		No	No	No	No	44. How long was the training program?					Under 12 weeks					13-25 weeks					26-52 weeks					53+ weeks					45. Did you complete the training?					Yes					No					46. How many courses were included in the program?					One					2-4					5+					47. Was the training given primarily					Away from your job?					On the job?					48. Was this an apprenticeship program leading to journeyman status?					Yes					No					49. Was this training provided by					Your present employer?					or a former employer?				
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<p>31. You told me that ... is now working as ... (Occupation) (Read entry from 23C)</p> <p>Was ... doing the same kind of work a year ago, in January 1982? Yes No</p> <p>(Skip to 33) (Ask 32)</p>	<p>38. Since you obtained your present job did you take any training to improve your skills? Yes No</p> <p>(Ask 39) (Skip to 40)</p>	<p>43. For entries in 36B and 39B (Read parenthetical lead-in) (These questions refer to the formal training you took to (obtain) (improve) your job) Was the training sponsored by a government program such as CETA?</p> <p>Yes</p> <p>No</p>																																																																																																																													
<p>32. DESCRIPTION OF JOB OR BUSINESS: (A year ago, in January 1982)</p> <p>A. A year ago, in January 1982 for whom was ... working?</p> <p>B. In what kind of business or industry was ... employed?</p> <p>C. What kind of work was ... doing?</p> <p>D. What were ...'s most important activities or duties?</p> <p>E. Was this person</p> <p>An employee of PRIVATE Co., bus., or individual for wages, salary or comm. ... P</p> <p>A FEDERAL government employee ... F</p> <p>A STATE government employee ... S</p> <p>A LOCAL government employee ... L</p> <p>Self-empl. in OWN bus., prof. practice, or farm (Ask 33)</p> <p>Is the business incorporated? Yes No</p> <p>SE</p> <p>Working WITHOUT PAY in fam. bus. or farm ... WP</p>	<p>39. Did you take the training in</p> <p>A. A school?</p> <p>B. A formal company training program?</p> <p>C. Informal on-the-job training?</p> <p>D. Other?</p>	<p>44. How long was the training program?</p> <p>Under 12 weeks</p> <p>13-25 weeks</p> <p>26-52 weeks</p> <p>53+ weeks</p>																																																																																																																													
<p>33. Altogether, how long has ... done the kind of work he/she is doing now? (Years)</p> <p>1 2 3 4 5 6 7 8 9</p>	<p>OFFICE USE ONLY</p> <table border="1"> <tr> <th>INDUSTRY</th> <th>OCCUPATION</th> </tr> <tr> <td>1 1 1 A</td> <td>1 1 N</td> </tr> <tr> <td>1 1 1 B</td> <td>1 1 P</td> </tr> <tr> <td>2 2 2 C</td> <td>2 2 Q</td> </tr> <tr> <td>3 3 3 D</td> <td>3 3 R</td> </tr> <tr> <td>4 4 4 E</td> <td>4 4 S</td> </tr> <tr> <td>5 5 5 F</td> <td>5 5 T</td> </tr> <tr> <td>6 6 6 G</td> <td>6 6 U</td> </tr> <tr> <td>7 7 7 H</td> <td>7 7 V</td> </tr> <tr> <td>8 8 8 J</td> <td>8 8 W</td> </tr> <tr> <td>9 9 9 K</td> <td>9 9 X</td> </tr> <tr> <td>L</td> <td>Y</td> </tr> <tr> <td>Ref. M</td> <td>Ref. Z</td> </tr> </table>	INDUSTRY	OCCUPATION	1 1 1 A	1 1 N	1 1 1 B	1 1 P	2 2 2 C	2 2 Q	3 3 3 D	3 3 R	4 4 4 E	4 4 S	5 5 5 F	5 5 T	6 6 6 G	6 6 U	7 7 7 H	7 7 V	8 8 8 J	8 8 W	9 9 9 K	9 9 X	L	Y	Ref. M	Ref. Z	<p>45. Did you complete the training? Yes No</p> <p>46. How many courses were included in the program? One 2-4 5+</p>																																																																																																			
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<p>34. How long has ... been working continuously for the present employer (or as self-employed)? (Years)</p> <p>1 2 3 4 5 6 7 8 9</p> <p>(Months, if less than one year) 1 2 3 4 5 6 7 8 9</p>	<p>34. How long has ... been working continuously for the present employer (or as self-employed)? (Years)</p> <p>1 2 3 4 5 6 7 8 9</p> <p>(Months, if less than one year) 1 2 3 4 5 6 7 8 9</p>	<p>47. Was the training given primarily</p> <p>Away from your job?</p> <p>On the job?</p> <p>48. Was this an apprenticeship program leading to journeyman status? Yes No</p> <p>49. Was this training provided by</p> <p>Your present employer?</p> <p>or a former employer?</p> <p>50. Who responded to supplement items? Self Other</p> <p>(Make certain all columns are completed as applicable)</p>																																																																																																																													

Table A-1. Standard errors of estimates from the January 1983 Current Population Survey supplement

(In thousands)

Estimated level	Workers needing training to qualify for their current job or who obtained skill improvement training	Source of qualifying or skill improvement training	Source of school training
10	5	7	4
50	11	15	10
100	15	21	14
500	35	48	32
1,000	49	68	45
2,500	77	108	70
5,000	108	154	97
10,000	149	223	133
15,000	180	278	157
20,000	204	328	174
30,000	240	416	195
40,000	265	498	-
50,000	282	574	-
60,000	293	648	-

SOURCE: Bureau of the Census.

Table A-2. Standard errors of estimated percentages from January 1983 Current Population Survey supplement

Estimated base of percentages (thousands)	Estimated percentage									
	1 or 99	2 or 98	5 or 95	10 or 90	15 or 85	20 or 80	25 or 75	30 or 70	35 or 65	50
10	4.87	6.85	10.67	14.68	17.47	19.58	21.19	22.43	23.34	24.47
50	2.18	3.06	4.77	6.57	7.81	8.75	9.48	10.03	10.44	10.94
100	1.54	2.17	3.37	4.64	5.53	6.19	6.70	7.09	7.38	7.74
250	.97	1.37	2.13	2.94	3.49	3.92	4.24	4.49	4.67	4.89
500	.69	.97	1.51	2.08	2.47	2.77	3.00	3.17	3.30	3.46
750	.56	.79	1.23	1.70	2.02	2.26	2.45	2.59	2.70	2.83
1,000	.49	.69	1.07	1.47	1.75	1.96	2.12	2.24	2.33	2.45
2,000	.34	.48	.75	1.04	1.24	1.38	1.50	1.59	1.65	1.73
4,000	.24	.34	.53	.73	.87	.98	1.06	1.12	1.17	1.22
6,000	.20	.28	.44	.60	.71	.80	.87	.92	.95	1.00
8,000	.17	.24	.38	.52	.62	.69	.75	.79	.83	.87
10,000	.15	.22	.34	.46	.55	.62	.67	.71	.74	.77
15,000	.13	.18	.28	.38	.45	.51	.55	.58	.60	.63
20,000	.11	.15	.24	.33	.39	.44	.47	.50	.52	.55
30,000	.09	.13	.19	.27	.32	.36	.39	.41	.43	.45
40,000	.08	.11	.17	.23	.28	.31	.34	.35	.37	.39
50,000	.07	.10	.15	.21	.25	.28	.30	.32	.33	.35
60,000	.06	.09	.14	.19	.23	.25	.27	.29	.30	.32

NOTE: The standard errors in this table must be multiplied by the "F" factor in table A-3 to obtain the approximate standard error for a specific characteristic.

SOURCE: Bureau of the Census.

Table A-3. "F" factors for calculating the approximate standard errors of estimated percentages ¹

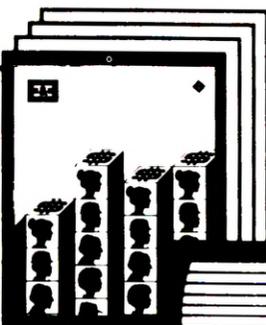
Characteristic	"F" factor
Workers needing training to qualify for their current job or who obtained skill improvement training	1.0
Source of qualifying or skill improvement training	1.4
Source of school training	.9

¹ Apply "F" factors only to the standard errors in table A-2 to obtain standard error for characteristic of interest.

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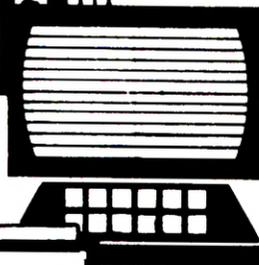
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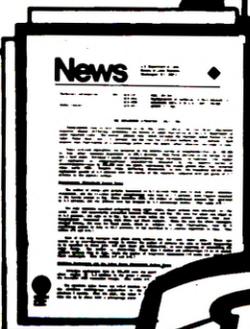
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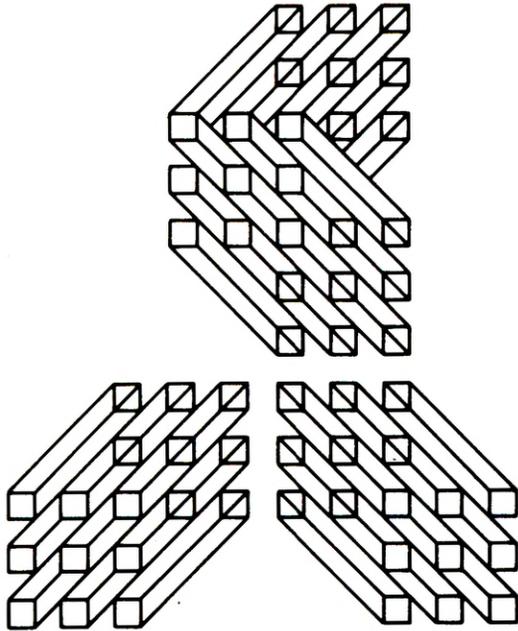
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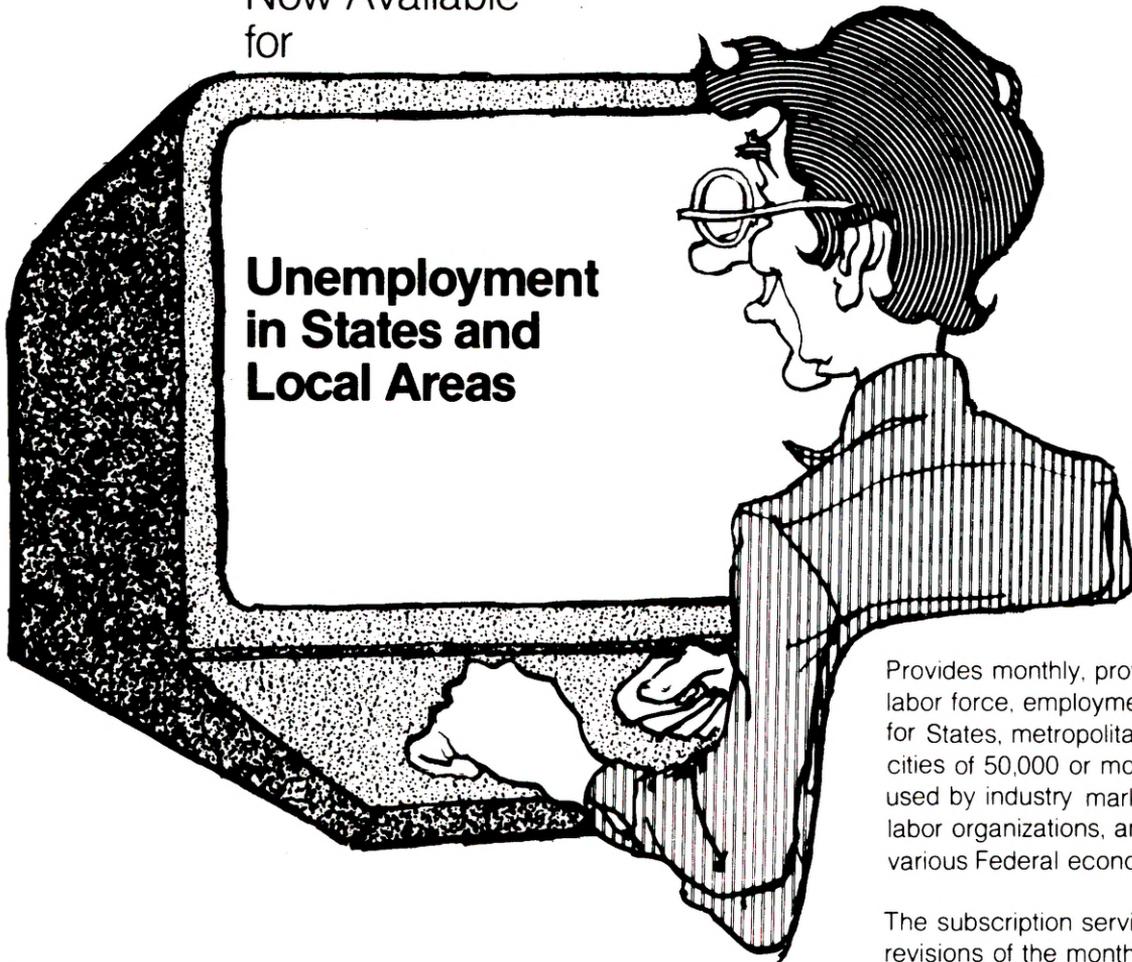
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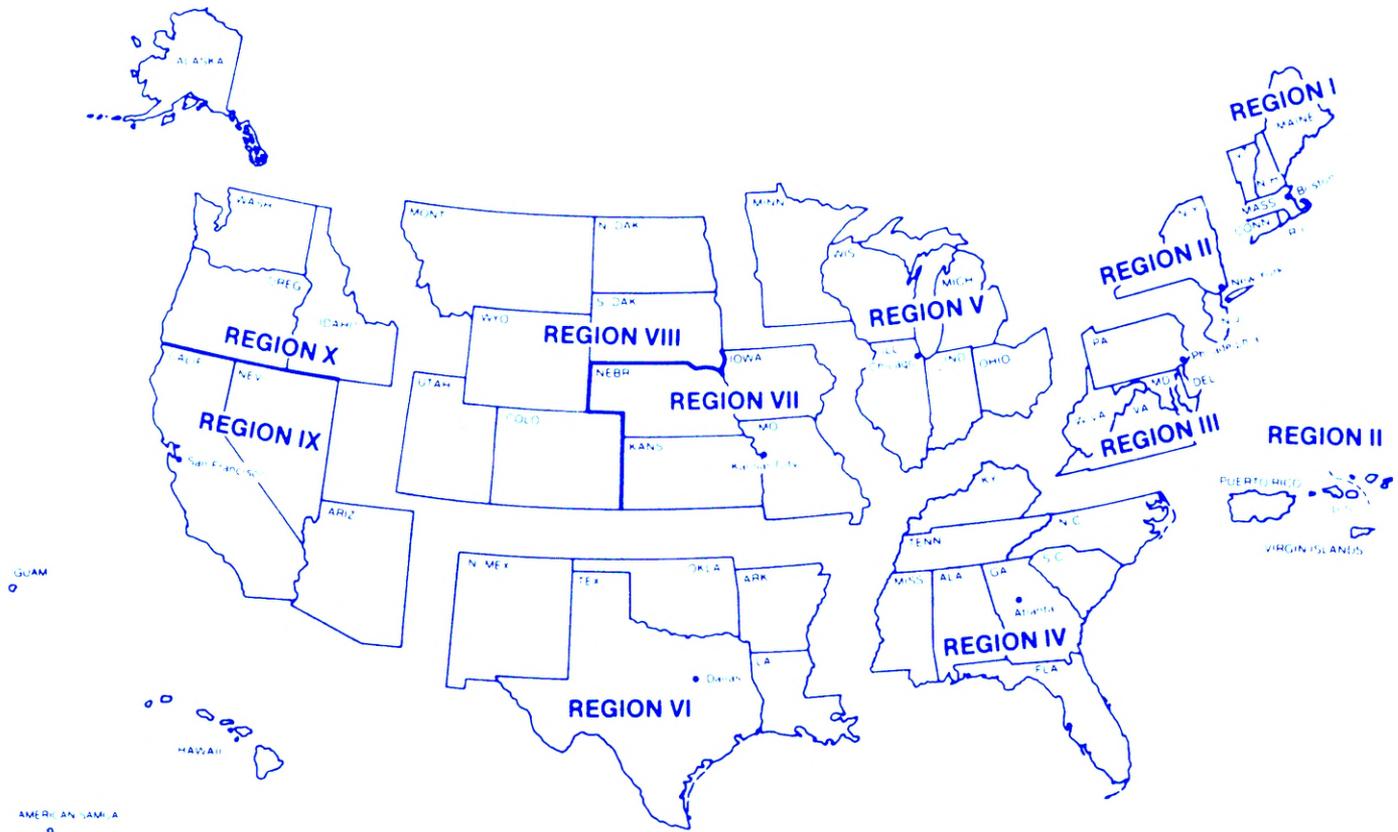
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