



the jobs of the future: 2002 - 2012

chapter eight

The greatest constant in U.S. economic history has been change. Americans are constantly adjusting to meet new demands and utilize new technologies. New jobs require new skills. By analyzing trends in the economy, we can make projections for the future and help prepare the American workforce for tomorrow's economy.

Predicting the Future

The nation's predominant industries and occupations have drastically changed over the course of the last century and even the last decade.

- At the turn of the last century, 40 percent of all U.S. workers were employed in agriculture. Today, fewer than 2 percent work in that industry.
- At its height during World War II, manufacturing employed nearly four of every ten workers in this country. By 2002, the figure had fallen to one of every nine workers.

- In 1994, there were a reported 916,000 computer systems analysts and scientists. By the end of the decade, that number had nearly doubled, rising to 1.8 million workers.
- Over the 2002-12 decade, BLS projects that employment in healthcare occupations will grow by 2.9 million, an increase of more than 28 percent.

The pace of employment change is not always so dramatic, especially in the shorter term. Because of the dynamic nature of the U.S. economy, the speed of technological innovation, and the changing demands by employers for skilled employees, it is essential that the best and latest information is available to individuals who are making decisions about education, training, and careers.

This chapter examines the ten-year projections of the labor force, industry output and employment, and occupational employment. What will be the trends in labor force growth for the population, for men and women, and for minority groups? What industries will be the source of job growth? What will be the high-paying, in-demand occupations that will provide employment opportunities for U.S. workers? And what levels of education and training are generally required to enter these occupations?

A Note of Caution

It is important to remember that long-term employment projections of occupations and industries are speculative, and actual employment trends may differ from the projections. BLS regularly compares its employment projections with actual employment trends to evaluate the accuracy of the models, assumptions, and analytical judgments that underlie the projections.

The objective of these evaluations is to improve future projections. The most recent evaluation examined projections made in the late 1980s of occupational employment trends during the period from 1988 to 2000.

Of the 338 occupational employment projections evaluated for the 1988-2000 period, BLS projected the direction of the employment change correctly for about 70 percent of the occupations. For each occupation, BLS classified the direction and rate of the employment change into the following 6 categories:

- Declining (decrease of 4 percent or more)
- Little or no change (increase or decrease of 3 percent or less)
- Slower than average (increase of 4 to 10 percent)
- Average (increase of 11 to 19 percent)
- Faster than average (increase of 20 to 30 percent)
- Much faster than average (increase of 31 percent or more)

Overall, the actual growth for 87 of the 338 occupations (26 percent of the total) fell into the category that was projected. Another 100 occupations (30 percent of the total) were 1 category higher or lower than projected. The 1988-2000 projections were more accurate for occupations that were predicted to have much faster than average employment growth or declining employment. Of the occupations predicted to have much faster than average employment growth, 66 percent of them actually had much faster than average growth. Of the occupations predicted to experience declining employment, 50 percent of them actually experienced declining employment. By comparison, of the occupations predicted to have average growth, only one-fifth experienced average growth, with roughly the same proportions experiencing much faster than average growth, little or no change, and declining employment.

Even with the information learned from these evaluations, employment projections will remain inherently speculative and sometimes significantly wrong. Occasionally, unforeseen changes in technology, business practices, and government regulations affect occupational and industry employment patterns significantly, frequently resulting in projection error. Likewise, events such as the timing of business cycles, the onset of international conflicts, and the occurrences of natural disasters are difficult to predict and often affect the accuracy of projections.

In February of 2004, BLS published ten-year long-term projections of employment growth for 725 occupations covering the period from 2002 to 2012. These projections are based on a model of the U.S. economy which assumes relatively strong long-term growth in output and productivity and relatively low unemployment rates. In particular, it is assumed there will be annual growth rates of 3 percent for real Gross Domestic Product and 2.1 percent for labor productivity. The BLS projections are also based on an economy with an unemployment rate of 5.2 percent in 2012. (See Chart 8.1.)

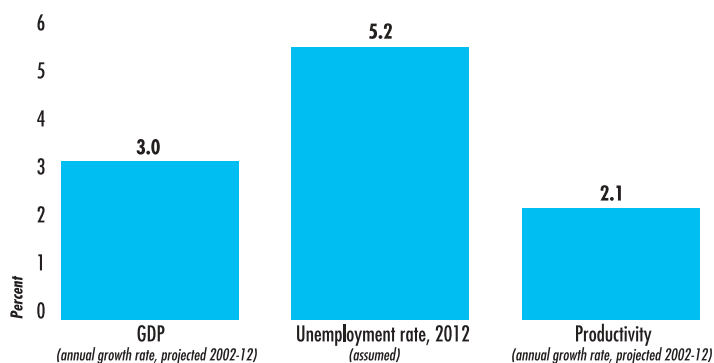
Using these general macroeconomic assumptions, BLS estimates how much output will be produced by industries and the total number of jobs needed to produce this output. Based on both expert analysis of occupations and a rich data base on the occupational staffing patterns of detailed industries (the biannual Occupational Employment Statistics survey of 400,000 establishments), the BLS also projects the employment levels in 725 occupations and the education and training levels of those jobs.

Labor Force Projections

BLS projects that the labor force will grow by 1.1 percent per year between 2002 and 2012, similar to the 1.1 percent annual growth rate during the prior ten years. The growth rate of the population and the labor force has slowed considerably after the arrival of the Baby Boom generation into the labor force in the 1970s. (See Chart 8.2.)

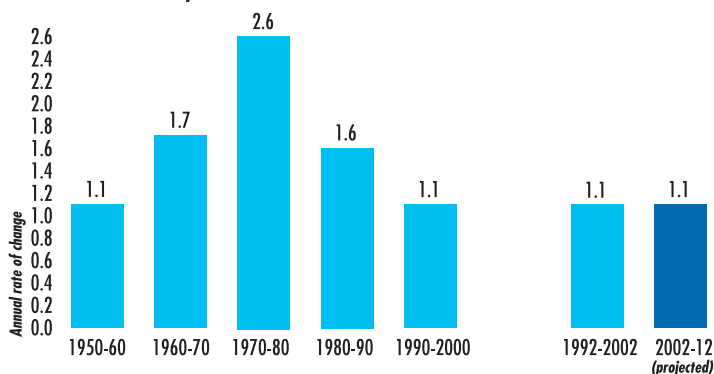
Over the last 50 years the labor force participation rates of women have increased remarkably, rising from 34 percent in 1950 to 60 percent in 2002. As Chart 8.3 indicates, this

Chart 8.1 A Healthy Economy is Projected Through 2012



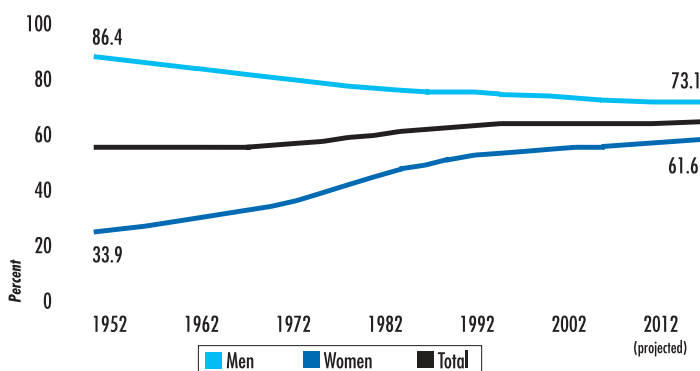
Source: Bureau of Labor Statistics

Chart 8.2 The Civilian Labor Force, Ages 16 and Older, Will Grow by 1.1 Percent Annually between 2002 and 2012



Source: Bureau of Labor Statistics

Chart 8.3 Labor Force Participation Rate by Sex, 1952 to Projected 2012



Source: Bureau of Labor Statistics

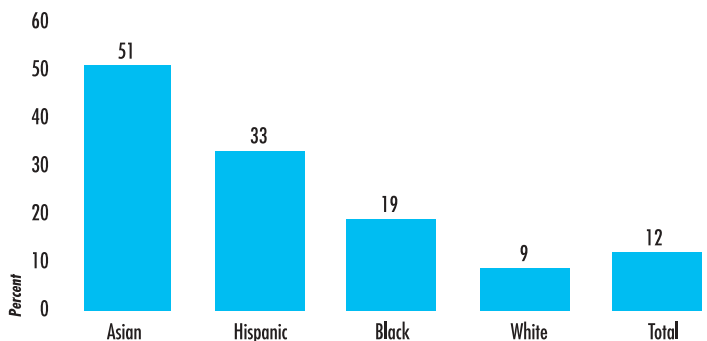
increase has slowed substantially in the last 20 years, but still exceeds those of men. For men, the pattern has been one of declining participation rates, although the pace of decline has also slowed in the last two decades. BLS projects a continuation of this pattern between 2002 and 2012. (See Chart 8.3.) As a result, the share of the labor force made up of women is projected to be 48 percent by 2012.

The labor force growth rates of minority populations are projected to continue their rapid pace and exceed those of whites over the projections period. (See Chart 8.4.) Whites will continue to be the dominant demographic group in the labor force, although their shares are gradually declining due to their relatively slower growth rates.

High Growth Employment: A Focus on Industries

BLS develops projections for 284 detailed industries that fall under the 22 major industry sectors described above. Which of these detailed industries will grow faster than average, and what will be the net employment increase in these industries over the projections period? Which of these fast growing industries will contribute the greatest increase in employment? And, despite the overall declining levels of employment in manufacturing, are there detailed manufacturing industries that will experience strong employment growth?

Chart 8.4 Labor Force Growth Rates of Minorities Outpaces Whites, 2002 to Projected 2012



Source: Bureau of Labor Statistics

Table 8.1 Employment by Industry and Percent Distribution, 2002 and Projected 2012

Detailed industry	2002 number	2012 number	Percent change	Numeric change
Software publishers	256,000	429,700	67.9	173,700
Internet service providers and web search portals	142,100	233,300	64.2	91,200
Other residential care facilities	165,200	262,300	58.8	97,100
Home health care services	675,100	1,051,700	55.8	376,600
Management, scientific, and technical consulting services	731,800	1,137,400	55.4	405,600
Computer systems design and related services	1,162,700	1,797,700	54.6	635,000
Employment services	3,248,800	5,012,300	54.3	1,763,500
Community care facilities for the elderly	530,100	815,300	53.8	285,200
Wireless telecommunications carriers (except satellite)	195,900	294,800	50.5	98,900
Vocational rehabilitation services	376,300	562,500	49.5	186,200

Table 8.1 provides a list of the top ten detailed industries expected to experience faster than average employment growth. Three of the top ten are in the information sector, four of the top ten are in the health care and social assistance industry, and two of the top ten are in the professional, scientific, and technical services sector.

Table 8.2 provides a list of all of the fast-employment-growing detailed industries. These industries are presented under their

major industry group, and are in order of their projected change in employment levels. Four detailed construction industries are projected to grow faster than average, including the building equipment contractors industry with a projected employment increase of over 430,000 jobs. There are a number of fast growing manufacturing industries, including the plastics product manufacturing industry that is projected to grow by more than 128,000 jobs.



Table 8.2 Employment by Industry and Percent Distribution, 2002 and Projected 2012

Industry	Percent change	Numeric change	Industry	Percent change	Numeric change
Total employment, all workers¹	14.8	21,305,070	Finance and insurance		
Wage and salary workers²	16.3	21,603,400	Activities related to credit intermediation	26.3	66,900
Agriculture, forestry, fishing and hunting			Other financial investment activities	22.6	59,200
Support activities for agriculture and forestry	18.4	17,800	Other investment pools and funds	16.6	6,400
Construction			Nondepository credit intermediation	16.3	112,300
Building equipment contractors	23.5	432,500	Real estate and rental and leasing		
Foundation, structure, and building exterior contractors	17.8	162,900	Commercial & industrial machinery & equipment rental & leasing	39.7	40,600
Other specialty trade contractors	17.7	102,800	Consumer goods rental	37.4	108,500
Building finishing contractors	14.9	131,300	General rental centers	36.3	22,800
Manufacturing			Lessors of nonfinancial intangible assets (except copyrighted works)	33.1	9,200
Pharmaceutical and medicine manufacturing	23.2	68,000	Activities related to real estate	18.9	83,600
Cement and concrete product manufacturing	20.9	48,000	Offices of real estate agents and brokers	15.7	47,000
Other wood product manufacturing	20.9	66,700	Professional, scientific, and technical services		
Architectural and structural metals manufacturing	19.3	77,300	Management, scientific, & technical consulting services	55.4	405,600
Plastics product manufacturing	19.2	128,100	Computer systems design & related services	54.6	635,000
Veneer, plywood, and engineered wood product manufacturing	18.4	21,400	Other professional, scientific, & technical services	36.7	179,200
Other general purpose machinery manufacturing	17.7	51,000	Specialized design services	30.8	37,900
Forging and stamping	16.2	18,400	Accounting, tax preparation, bookkeeping, & payroll services	24.8	214,700
Metalworking machinery manufacturing	15.5	33,700	Legal services	19.6	218,100
Animal slaughtering and processing	15.4	80,300	Advertising & related services	18.9	83,500
Wholesale trade			Administrative & support & waste management & remediation services		
Electrical and electronic goods merchant wholesalers	22.6	83,000	Employment services	54.3	1,763,500
Lumber and other construction materials merchant wholesalers	19.8	44,600	Investigation & security services	46.7	338,800
Professional and commercial equipment and supplies merchant wholesalers	19.8	130,300	Facilities support services	40.6	42,100
Drugs and druggists' sundries merchant wholesalers	18.3	38,900	Remediation & other waste management services	33.3	32,100
Furniture and home furnishing merchant wholesalers	17.0	18,300	Waste treatment & disposal	28.4	34,000
Metal and mineral (except petroleum) merchant wholesalers	16.4	20,700	Office administrative services	26.2	75,200
Retail trade			Other support services	25.0	72,400
Used merchandise stores	47.5	51,300	Services to buildings & dwellings	24.0	382,900
Electronic shopping and mail-order houses	45.3	101,600	Waste collection	21.0	21,200
Electronics and appliance stores	38.2	202,100	Educational services, private		
Other miscellaneous store retailers	37.3	110,700	Educational services, private	28.6	759,200
Book, periodical, and music stores	34.5	77,700	Health care & social assistance		
Office supplies, stationery, and gift stores	29.3	127,500	Other residential care facilities	58.8	97,100
Home furnishings stores	27.2	70,400	Home health care services	55.8	376,600
Building material and supplies dealers	22.6	232,200	Community care facilities for the elderly	53.8	285,200
Sporting goods, hobby, and musical instrument stores	18.9	82,300	Vocational rehabilitation services	49.5	186,200
Furniture stores	18.4	51,700	Community food & housing, & emergency & other relief services	49.0	61,500
Other motor vehicle dealers	18.3	25,900	Offices of other health practitioners	48.8	234,900
Department stores	18.1	309,400	Other ambulatory health care services	47.5	87,500
Specialty food stores	17.7	44,800	Individual & family services	45.6	349,600
Lawn and garden equipment and supplies stores	15.4	23,500	Residential mental retardation, mental health & substance abuse facilities	43.9	208,000
Transportation and warehousing			Child day care services	43.1	316,100
Urban transit systems	47.9	18,400	Offices of physicians	38.8	770,100
Other transit and ground passenger transportation	47.8	26,600	Medical & diagnostic laboratories	37.6	65,500
Local messengers and local delivery	46.4	25,300	Outpatient care centers	34.2	140,200
Nonscheduled air transportation	43.5	18,900	Offices of dentists	30.9	223,900
Couriers	41.1	207,100	Nursing care facilities	22.3	351,300
Support activities for rail transportation	36.2	7,500	Arts, entertainment, & recreation		
Scenic and sightseeing transportation, other	34.8	800	Other amusement & recreation industries	31.9	324,100
Other support activities for transportation	33.6	10,900	Gambling industries	30.8	42,100
Charter bus industry	31.4	11,000	Amusement parks & arcades	28.3	43,500
School and employee bus transportation	30.2	46,400	Independent artists, writers, & performers	26.9	10,800
Warehousing and storage	28.6	146,700	Spectator sports	22.3	26,300
Support activities for road transportation	28.4	20,000	Museums, historical sites, & similar institutions	21.2	23,900
Freight transportation arrangement	27.5	45,900	Agents & managers for artists, athletes, entertainers, & other public figures	19.2	2,800
General freight trucking	20.8	199,300	Accommodation & food services		
Specialized freight trucking	19.7	75,500	Special food services	25.0	126,700
Scenic and sightseeing transportation, land	19.6	1,800	RV (recreational vehicle) parks & recreational camps	18.8	7,800
Taxi and limousine service	16.8	11,100	Traveler accommodation	17.0	292,600
Utilities			Full-service restaurants	16.1	640,900
Water, sewage and other systems	46.4	22,500	Other services (except government)		
Information			Personal care services	27.6	144,100
Software publishers	67.9	173,700	Religious organizations	24.4	400,800
Internet service providers and web search portals	64.2	91,200	Business, professional, labor, political, & similar organizations	23.4	117,900
Wireless telecommunications carriers (except satellite)	50.5	98,900	Other personal services	23.2	50,700
Internet publishing and broadcasting	41.1	14,300	Social advocacy organizations	19.5	33,600
Data processing, hosting, and related services	40.8	124,500	Commercial & industrial machinery & equipment (except automotive & electronic) repair & maintenance	18.7	29,200
Cable and other subscription programming	36.5	33,900	Automotive repair & maintenance	16.7	149,400
Cable and other program distribution	35.2	45,000	Government		
Motion picture and video industries	31.1	111,900	Local government educational services	17.5	1,341,700
Other information services	30.7	14,300	State government educational services	17.5	388,300
Sound recording industries	15.0	4,100			

Nine of the ten detailed industries in the information sector are projected to have employment increases of more than 30 percent. Five of these are projected to have employment growth exceeding 40 percent: software publishers; internet service providers and web search portals; wireless telecommunications carriers (except satellite); internet publishing and broadcasting; and data processing, hosting, and related services.

Fourteen of the 15 fast growing detailed industries in the health care and social assistance sector are projected to have employment increases of more than 30 percent. These health-care related industries reflect a diverse mix of delivery systems for health care ranging from home-based care, ambulatory and outpatient care facilities, offices of physicians, vocational rehabilitation services, and nursing care facilities.

The professional, scientific, and technical services industry has a number of fast growing detailed industries, especially the management, scientific, and technical consulting industry and the computer systems design and related services industry, both with project-

ed employment changes exceeding 50 percent.

High Growth Employment: A Focus on Occupations

The growth in industry output and employment has a significant effect on both the number of jobs and the types of occupations that will be in demand by employers. Which occupations will grow the fastest and how many jobs will these occupations produce?

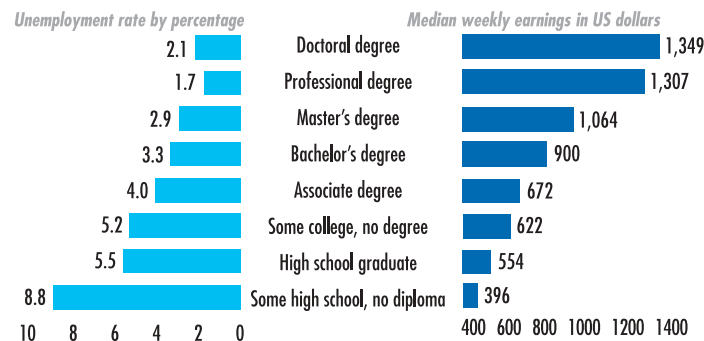
Which occupations will provide the best earnings opportunities? And what are the educational and training requirements of these jobs? What share of jobs will be available for individuals with education and training beyond high school but without a four-year college degree? Are there good jobs for those with only a high school degree?

One of the most consistent findings in studies of labor markets is the increasing return to educational attainment.

As Chart 8.5 demonstrates, earnings rise and unemployment rates fall with higher levels of education. These are average levels of earnings for each education group. What the chart does not reflect is that with-

...earnings rise and unemployment rates fall with higher levels of education.

Chart 8.5 Education and Training Pays, 2003



Note: Unemployment and earnings for workers 25 and older, by educational attainment; earnings for full-time wage and salary workers
 Source: Bureau of Labor Statistics



in each group there can be substantial variation in earnings depending on what kind of occupation an individual is in.

Focusing on high-growth, high-wage occupations and the education and training requirements of those occupations provides a richer and more detailed picture of employment opportunities than just looking at the returns to education alone. Of course, the analysis depends critically on how high-growth and high-wage occupations are defined. The approach taken here is to define a high-growth occupation as one with an employment change between 2002 and 2012 that is projected to be greater than the overall average of 14.8 percent. A high-wage occupation is one that had average earnings in 2002 that are in the top half of the overall distribution of earnings (based on data from the 2002 Occupational Employment Statistics survey).

BLS has derived 11 education and training categories that describes for each occupation the most significant education or training pathway to employment. For some occupations, the education and training preparation may be very straightforward because government laws and regulations establish it, as it is for physicians and lawyers. In other occupations, such as computer programmers or industrial machinery repairers, jobs may vary considerably in their educational and training requirements. When an occupation has more than one path of entry, BLS identifies the one that research suggests is most preferred by employers and likely to lead to the best advancement prospects.

The 11 categories of education and training are:

1. First professional degree
2. Doctoral degree
3. Master's degree
4. Bachelor's or higher degree, plus work experience
5. Bachelor's degree
6. Associate degree
7. Postsecondary vocational award
8. Work experience in a related occupation
9. Long-term on-the-job training
10. Moderate-term on-the-job training
11. Short-term on-the-job training

The grouping of occupations into the six educational clusters along with information on the most significant source of postsecondary education and training provides a natural hierarchical sorting of occupations based on the training and skill requirements found within each cluster. It is not surprising that high school occupations all have short, moderate or long-term on-the-job training as their most significant source of education and training.

Further, it is not surprising that college occupations all have bachelor's degree or higher as their most significant source of education or training. It is the mixture occupations that reflect a substantial diversity in the pathways to entry into occupations. In general, the "high school / some college" occupations have a greater concentration of the short, moderate, and long-term training categories as their single descriptor while the "some college / college" occupations have a greater concentration of higher education awards as their single most significant source of education or training.

The widest range of training and education categories is found in the full mixture occupa-

tion, "high school / some college / college" occupations. An occupation such as flight attendant is classified as requiring long-term on-the-job training as its most significant source of education or training, but the hiring pattern of employers results in a diverse mix of those with high school, some college and bachelor's degree or higher backgrounds. This reflects the interplay between training requirements and employer preferences for characteristics such as so-called "people" skills that can result in substantial diversity in the educational attainment of those hired into this occupation.

The list of high-growth, high-wage occupations in Table 8.3 provides a wide range of career options and opportunities for U.S. workers at all levels of educational attainment. The high-school occupations listed contain several construction-related occupations, including 3 that are projected to add at least 25,000 jobs over the projections period: drywall and ceiling tile installers, cement masons and concrete finishers, and roofers.

The high-school/some-college occupations include a large number of fields requiring the acquisition of technical knowledge related to repair, installation, and the operation of various types of equipment. These include, among others: maintenance and repair workers; first-line supervisors of mechanics, installers, and repairers; heating, air conditioning and refrigerator mechanics and installers; telecommunications line installers and repairers; truck drivers (heavy and tractor-trailer); and bus drivers (transit and intercity).

There are also a number of construction-related occupations, including: electricians;

plumbers, pipefitters, and steamfitters; sheet metal workers; and structural iron and steel workers. There are also a number of production-related occupations including: welders, cutters, solderers, and brazers; and water and liquid waste treatment plant and systems operators.

The high-school/some-college/college occupations reflect a more diverse mix of skill requirements including a large number of service-providing fields, especially sales

health-related fields include registered nurses; physicians assistants; dental hygienists; medical and clinical laboratory technologists and technicians; respiratory therapists; radiologic technologists and technicians; cardiovascular technologists and technicians; and physical therapist assistants.

The computer-related occupations include: computer systems analysts; database administrators; network and computer systems administrators; and computer support specialists.

The grouping of occupations into the six educational clusters . . . provides a natural hierarchical sorting of occupations based on the training and skill requirements found within each cluster.

related including sales representatives for wholesale and manufacturing and technical and related products. This list also includes a number of management-related occupations such as general and operations managers; administrative service managers; and transportation, storage and distribution managers. There are a number of fields requiring highly technical levels of skills such biological technicians; health practitioners and technical workers; and life, physical and social science technicians.

The some-college/college occupations include a significant number of health and computer-related fields requiring more extensive academic preparation. Some of the

There is a broad mix of other occupational fields represented in the list including adult literacy, remedial education and GED teachers and instructors; self-enrichment education teachers; police and sheriff patrol officers; private detectives and investigators; graphic designers; multi-media artists and animators; and interior designers.

The college occupations naturally reflect a broad mix of professional occupations that generally require at least a bachelor's degree or higher. Again, there are a large number of health-related and computer-related fields. Other general fields with a substantial number of occupations include education, science, engineering, and counseling-related occupations.

Table 8.3 Employment in High-Wage, High-Growth Occupations, 2002 and 2012, Projected

Occupation	Most significant source of postsecondary education & training	2002 employment level	2002 median annual earnings	Employment change, 2002-2012	
				Number	Percent
High School Occupations					
Tapers	Moderate term on-the-job training	40,763	39,900	8,482	20.8
Reinforcing iron & rebar workers	Long-term on-the-job training	28,670	36,740	4,775	16.7
Tile & marble setters	Long-term on-the-job training	33,171	35,770	8,790	26.5
Drywall & ceiling tile installers	Moderate term on-the-job training	125,361	33,210	29,012	23.4
Carpet installers	Moderate term on-the-job training	82,218	32,590	13,795	16.8
Hazardous materials removal workers	Moderate term on-the-job training	37,539	32,440	16,201	43.1
Concrete masons & concrete finishers	Moderate term on-the-job training	181,692	30,640	47,355	26.1
Roofers	Moderate term on-the-job training	146,235	30,180	30,859	21.1
Terrazzo workers & finishers	Long-term on-the-job training	6,351	27,910	967	15.2
High School/Some College Occupations					
Elevator installers & repairers	Long-term on-the-job training	21,012	54,870	3,381	15.6
First-line supervisors/managers of mechanics, installers, & repairers	Work experience in a related occupation	443,985	47,580	68,290	15.4
Electricians	Long-term on-the-job training	659,441	41,370	154,467	23.4
Structural iron & steel workers	Long-term on-the-job training	78,060	40,660	12,383	15.9
Plumbers, pipefitters, & steamfitters	Long-term on-the-job training	492,126	40,170	91,942	18.7
Telecommunications line installers & repairers	Long-term on-the-job training	167,389	39,640	31,456	18.8
Aircraft cargo handling supervisors	Work experience in a related occupation	8,916	37,220	1,390	15.6
Environmental engineering technicians	Associate degree	19,085	36,850	5,411	28.4
Fire fighters	Long-term on-the-job training	281,948	36,230	58,454	20.7
All other vehicle & mobile equipment mechanics, installers, & repairers	Moderate term on-the-job training	35,818	35,840	5,509	15.4
All other electrical & electronic equipment mechanics, installers, & repairers	Postsecondary vocational award	21,928	35,160	4,381	19.9
Legal secretaries	Postsecondary vocational award	363,712	35,020	49,681	13.7
Heating, air conditioning, & refrigeration mechanics & installers	Long-term on-the-job training	248,649	34,900	79,062	31.8
Sheet metal workers	Moderate term on-the-job training	305,016	34,560	40,588	13.3
Respiratory therapy technicians	Postsecondary vocational award	36,421	34,130	9,048	24.8
Painters, transportation equipment	Moderate term on-the-job training	49,999	33,550	8,752	17.5
Water & liquid waste treatment plant & system operators	Long-term on-the-job training	99,300	33,390	15,881	16.0
Truck drivers, heavy & tractor-trailer	Moderate term on-the-job training	1,767,093	33,210	336,574	19.0
First-line supervisors/managers of landscaping, lawn service, & groundskeeping workers	Work experience in a related occupation	149,727	33,050	32,415	21.6
Correctional officers & jailers	Moderate term on-the-job training	427,147	32,670	103,375	24.2
Security & fire alarm systems installers	Postsecondary vocational award	46,303	32,370	13,974	30.1
Desktop publishers	Postsecondary vocational award	34,994	31,620	10,217	29.2
Electricians	Long-term on-the-job training	48,519	31,620	8,340	17.2
Licensed practical & licensed vocational nurses	Postsecondary vocational award	701,879	31,440	141,779	20.2
Cargo & freight agents	Moderate term on-the-job training	59,128	31,410	9,157	15.5
Surgical technologists	Postsecondary vocational award	72,248	31,210	20,175	27.9
Lay-out workers, metal & plastic	Moderate term on-the-job training	12,803	30,760	1,991	15.6
Bus drivers, transit & intercity	Moderate term on-the-job training	201,921	29,580	30,602	15.2
Dermatologists	Work experience in a related occupation	17,313	29,470	2,744	15.8
Maintenance & repair workers, general	Moderate term on-the-job training	1,265,585	29,370	206,787	16.3
Surveying & mapping technicians	Moderate term on-the-job training	60,139	29,230	12,920	21.4
Mechanical door repairers	Moderate term on-the-job training	10,766	29,190	2,351	21.8
Welders, cutters, solderers, & brazers	Long-term on-the-job training	390,524	29,160	66,206	17.0
Motorboat mechanics	Long-term on-the-job training	21,660	29,050	3,966	18.3
Insulation workers	Moderate term on-the-job training	53,466	28,930	8,472	15.8
Lodermite & safe repairers	Moderate term on-the-job training	22,929	28,430	4,819	21.5
First-line supervisors/managers of housekeeping & janitorial workers	Work experience in a related occupation	229,910	28,140	37,333	16.7
Chefs & head cooks	Work experience in a related occupation	131,857	27,940	20,896	15.8
Septic tank servicers & sewer pipe cleaners	Moderate term on-the-job training	17,923	27,940	3,801	21.2
Medical appliance technicians	Long-term on-the-job training	13,806	27,680	2,225	16.1
Some College Occupations					
Occupational therapist assistants	Associate degree	18,484	36,660	7,241	39.2
High School/Some College/College Occupations					
General supervisory managers	Bachelor's or higher degree, plus work exp.	2,948,913	68,210	376,003	12.8
Transportation, storage, & distribution managers	Work experience in a related occupation	110,929	59,660	21,880	19.7
Sales representatives, wholesale & manufacturing, technical & scientific products	Moderate term on-the-job training	398,259	55,740	76,993	19.3
Administrative services managers	Bachelor's or higher degree, plus work exp.	320,509	52,500	63,464	19.8
Cost estimators	Work experience in a related occupation	188,044	47,550	34,963	18.6
Dentists & prosthetists	Bachelor's degree	4,631	46,260	874	18.9
First-line supervisors/managers of correctional officers	Work experience in a related occupation	33,417	44,940	6,336	18.0
All other financial specialists	Bachelor's degree	161,978	44,140	28,498	17.6
Transit & railroad police	Long-term on-the-job training	6,153	43,710	980	15.9
Flight attendants	Long-term on-the-job training	104,008	43,140	16,588	15.9
Sales representatives, wholesale & manufacturing, except technical & scientific products	Moderate term on-the-job training	1,458,800	42,730	279,345	19.1
Dietitians & nutritionists	Bachelor's degree	48,871	41,170	8,679	17.8
Forensic science technicians	Associate degree	8,390	41,040	1,387	16.3
Kindergarten teachers, except special education	Bachelor's degree	168,461	39,810	45,861	27.2
Earning supervisors	Work experience in a related occupation	38,962	39,290	6,103	15.7
Sound engineering technicians	Postsecondary vocational award	12,830	36,970	3,266	25.5
Musicians & singers	Long-term on-the-job training	161,154	36,290	27,495	17.1
Environmental science & protection technicians, including health	Associate degree	27,591	35,320	10,147	36.8
All other sales & related workers	Moderate term on-the-job training	576,778	35,170	146,298	25.4

Table 8.3 Employment in High-Wage, High-Growth Occupations, 2002 and 2012, Projected

Occupation	Next significant source of postsecondary education & training	2002 employment level	2002 median annual earnings	Employment change, 2000-2012	
				Numeric	Percent
College Occupations					
Physicians & surgeons	First professional degree	583,014	145,600	113,516	19.5
Airline pilots, copilots, & flight engineers	Bachelor's degree	79,158	109,580	14,673	18.5
Podiatrists	First professional degree	13,263	94,870	1,994	15.0
Lawyers	First professional degree	495,248	93,290	117,872	17.0
Optometrists	First professional degree	32,051	86,090	5,478	17.1
Pharmacists	First professional degree	230,200	77,050	49,107	20.1
Computer software engineers, systems software	Bachelor's degree	281,103	74,040	127,803	45.5
Education administrators, elementary & secondary school	Bachelor's or higher degree, plus work experience	216,713	71,490	44,876	20.7
Computer software engineers, applications	Bachelor's degree	394,076	70,900	179,341	45.5
Actuaries	Bachelor's or higher degree, plus work experience	15,310	69,870	2,277	14.8
Chiropractors	First professional degree	48,926	65,330	11,296	23.2
Education administrators, postsecondary	Bachelor's or higher degree, plus work experience	125,037	64,640	32,313	25.8
Industrial organizational psychologists	Master's degree	1,865	63,710	299	16.0
Sales engineers	Bachelor's degree	81,682	63,660	16,254	19.9
Veterinarians	First professional degree	57,537	63,090	14,447	25.1
Environmental engineers	Bachelor's degree	47,114	61,410	18,014	28.2
Public relations managers	Bachelor's or higher degree, plus work experience	69,185	60,640	16,223	23.4
Biomedical engineers	Bachelor's degree	7,587	60,410	1,984	26.1
Mechanics & biophysicists	Doctoral degree	16,733	60,390	3,827	22.9
Management analysts	Bachelor's or higher degree, plus work experience	517,421	60,340	175,695	30.4
Atmospheric & space scientists	Bachelor's degree	7,700	60,200	1,244	16.2
Education administrators, all other	Bachelor's or higher degree, plus work experience	26,840	57,840	3,117	19.1
Physical therapists	Master's degree	136,854	57,330	48,331	35.3
Financial analysts	Bachelor's degree	173,122	57,100	32,144	18.7
Medical scientists, except epidemiologists	Doctoral degree	57,807	56,980	15,517	26.9
Personal financial advisors	Bachelor's degree	126,208	56,680	43,648	34.6
Architects, except landscape & naval	Bachelor's degree	113,243	56,620	19,528	17.3
Hydrologists	Master's degree	7,957	56,530	1,671	21.0
Agents & business managers of artists, performers, & athletes	Bachelor's or higher degree, plus work experience	13,171	55,730	4,221	27.8
Epidemiologists	Master's degree	3,936	53,840	1,279	32.5
Market research analysts	Master's degree	134,474	53,810	31,453	23.4
Geographers	Master's degree	817	53,420	160	19.5
Biological scientists, all other	Bachelor's degree	27,299	53,300	6,088	22.3
All other health diagnosing & treating practitioners	Bachelor's degree	107,336	52,430	26,293	24.5
Occupational therapists	Bachelor's degree	81,624	51,990	28,742	35.2
Clinical, counseling, & school psychologists	Doctoral degree	137,248	51,170	33,534	24.4
Microbiologists	Doctoral degree	16,454	51,020	3,283	20.0
Speech-language pathologists	Master's degree	94,319	49,450	25,645	27.2
Postsecondary teachers	Doctoral degree	1,581,247	49,090	402,739	25.5
Audiologists	Master's degree	10,929	48,400	3,168	29.0
Commercial pilots	Postsecondary vocational award	21,073	47,970	3,145	14.9
Environmental scientists & specialists, including health	Master's degree	65,069	47,600	15,407	23.7
Landscape architects	Bachelor's degree	23,125	47,400	5,136	22.2
Instructional coordinators	Master's degree	98,454	47,350	25,018	25.4
Accountants & auditors	Bachelor's degree	1,055,217	47,000	205,439	19.5
All other life scientists	Bachelor's degree	25,965	46,140	4,745	18.3
Educational, vocational, & school counselors	Master's degree	228,159	44,100	34,136	15.0
Secondary school teachers, except special & vocational education	Bachelor's degree	987,503	43,950	179,738	18.2
Special education teachers	Bachelor's degree	432,925	43,450	129,772	30.0
Social & community service managers	Bachelor's degree	128,749	43,080	35,654	27.7
Cartographers & photogrammetrists	Bachelor's degree	8,554	42,870	1,292	15.1
Writers & authors	Bachelor's degree	136,980	42,790	27,334	16.1
Elementary school teachers, except special education	Bachelor's degree	1,467,155	41,780	223,203	15.2
Public relations specialists	Bachelor's degree	158,079	41,710	52,054	32.9
Medical & public health social workers	Bachelor's degree	107,194	37,380	30,709	28.6
Marriage & family therapists	Master's degree	22,495	35,580	5,264	22.4
Archivists, curators, & museum technicians	Master's degree	22,258	35,270	3,782	17.0
Athletic trainers	Bachelor's degree	14,282	33,820	4,265	29.9
Education administrators, preschool & child care center/program	Bachelor's or higher degree, plus work experience	57,991	33,340	18,552	32.0
Child, family, & school social workers	Bachelor's degree	274,455	33,150	60,599	22.2
Clergy	First professional degree	400,485	33,110	62,114	15.5
Mental health & substance abuse social workers	Master's degree	94,946	32,850	32,762	34.5
Audio-visual collections specialists	Moderate-term on-the-job training	9,771	32,360	1,590	16.3
All other counselors, social, & religious workers	Bachelor's degree	347,823	31,150	70,028	23.0
Substance abuse & behavioral disorder counselors	Master's degree	67,148	30,180	15,612	23.3
Mental health counselors	Master's degree	84,816	29,940	22,404	26.7

Table 8.3 Employment in High-Wage, High-Growth Occupations, 2002 and 2012, Projected

Occupation	Most significant source of postsecondary education & training	2002	2002	Employment change, 2000-2012	
		employment level	median annual earnings	Number	Percent
First-line supervisors/managers of protective service workers, except police, fire & correction	Work experience in a related occupation	56,314	34,320	12,440	23.9
All other life, physical, & social science technicians	Associate degree	137,443	34,030	24,057	17.5
All other entertainers & performers, sports & related workers	Long-term on-the-job training	56,054	33,740	9,144	16.4
Computer, automated office, & office machine repairers	Postsecondary vocational award	156,386	33,250	23,529	15.1
Biological technicians	Associate degree	47,903	32,710	9,279	19.4
All other health practitioners & technical workers	Postsecondary vocational award	189,594	31,690	51,520	27.2
Audio & video equipment technicians	Long-term on-the-job training	41,759	31,110	11,149	26.7
Human resources assistants, except payroll & timekeeping	Short-term on-the-job training	173,844	30,410	33,467	19.3
Some College/College Occupations					
Chief executives	Bachelor's or higher degree, plus work experience	532,761	126,260	92,579	16.7
Computer & information systems managers	Bachelor's or higher degree, plus work experience	284,415	85,240	102,608	36.1
Marketing managers	Bachelor's or higher degree, plus work experience	202,628	78,250	43,252	21.3
Computer & information scientists, research	Doctoral degree	23,343	77,760	6,961	29.9
Sales managers	Bachelor's or higher degree, plus work experience	343,046	75,040	104,562	30.5
Financial managers	Bachelor's or higher degree, plus work experience	399,055	73,340	108,456	18.3
Human resources managers	Bachelor's or higher degree, plus work experience	202,345	64,710	39,323	19.4
Physician assistants	Bachelor's degree	63,033	64,670	36,794	48.9
Computer systems analysts	Bachelor's degree	468,345	62,890	184,346	39.4
Medical & health services managers	Bachelor's or higher degree, plus work experience	243,524	61,370	71,336	29.3
First-line supervisors/managers of police & detectives	Work experience in a related occupation	113,828	61,010	17,363	15.3
Network systems & data communication analysts	Bachelor's degree	185,971	58,420	106,073	37.8
Advertising & promotion managers	Bachelor's or higher degree, plus work experience	85,345	57,130	21,281	25.0
Database administrators	Bachelor's degree	108,954	55,480	48,613	44.2
First-line supervisors/managers of fire fighting & prevention workers	Work experience in a related occupation	62,602	55,450	11,699	18.7
Dental hygienists	Associate degree	147,961	55,220	63,740	43.1
Network & computer systems administrators	Bachelor's degree	251,375	54,810	93,899	37.4
All other computer specialists	Associate degree	191,629	54,070	70,009	36.5
Detectives & criminal investigators	Work experience in a related occupation	93,667	51,410	21,006	22.4
All other business operations specialists	Bachelor's degree	1,055,663	50,680	290,380	27.5
Radiation therapists	Associate degree	13,585	50,640	4,269	31.6
Technical writers	Bachelor's degree	49,584	50,580	13,446	27.1
Nuclear machine technologists	Associate degree	17,142	48,750	4,051	23.6
Diagnostic medical sonographers	Associate degree	36,508	48,660	8,774	24.0
Registered nurses	Associate degree	2,284,459	48,090	622,156	27.3
Producers & directors	Bachelor's or higher degree, plus work experience	76,125	46,240	13,894	18.3
Athletes & sports competitors	Long-term on-the-job training	15,116	45,220	3,901	19.2
Compensation, benefits, & job analysis specialists	Bachelor's degree	90,669	45,100	25,405	28.0
Loan officers	Bachelor's degree	223,469	43,980	42,071	18.8
Multi-media artists & animators	Bachelor's degree	74,826	43,980	11,831	15.8
Emergency management specialists	Work experience in a related occupation	10,948	42,560	3,092	28.2
Credit analysts	Bachelor's degree	65,934	42,910	12,349	18.7
Medical & clinical laboratory technologists	Bachelor's degree	149,952	42,910	26,936	19.3
Training & development specialists	Bachelor's degree	208,952	42,800	58,296	27.9
Police & sheriff's patrol officers	Long-term on-the-job training	618,786	42,370	152,795	34.7
Appraisers & assessors of real estate	Postsecondary vocational award	88,345	41,760	15,551	17.6
Respiratory therapists	Associate degree	85,770	40,220	29,829	34.8
Employment, recruitment, & placement specialists	Bachelor's degree	174,819	39,410	67,228	27.3
Interior designers	Bachelor's degree	60,050	39,180	13,023	21.7
Computer support specialists	Associate degree	506,877	39,100	152,422	30.2
Radiologic technologists & technicians	Associate degree	174,112	38,970	39,958	22.9
All other media & communication workers	Long-term on-the-job training	57,717	38,680	9,903	17.2
Film & video editors	Bachelor's degree	19,280	38,270	5,177	26.4
Paralegals & legal assistants	Associate degree	199,626	37,950	57,381	28.7
Meeting & convention planners	Bachelor's degree	36,867	37,420	7,846	21.3
Graphic designers	Bachelor's degree	211,871	36,680	46,379	21.9
Cardiovascular technologists & technicians	Associate degree	43,390	36,430	14,554	33.5
Adult literacy, remedial education, & GED teachers/instructors	Bachelor's degree	80,076	36,400	16,299	20.4
Health educators	Master's degree	44,536	36,240	9,743	21.9
Physical therapist assistants	Associate degree	58,388	36,080	22,282	44.6
Airfield operations specialists	Long-term on-the-job training	6,881	36,010	7,046	17.2
Fine artists, including painters, sculptors, & illustrators	Long-term on-the-job training	23,182	35,260	3,836	16.5
All other media & communication equipment workers	Moderate-term on-the-job training	24,342	34,680	4,990	20.1
Set & exhibit designers	Bachelor's degree	12,119	33,870	2,334	20.9
Interpreters & translators	Long-term on-the-job training	24,111	32,590	5,207	22.3
Loan counselors	Bachelor's degree	31,306	32,010	5,529	17.8
Self-enrichment education teachers	Work experience in a related occupation	200,365	29,320	80,418	40.1
Private detectives & investigators	Work experience in a related occupation	48,009	29,200	12,151	25.3
All other teachers, primary, secondary, & adult	Bachelor's degree	679,385	29,250	228,731	33.7
Medical & clinical laboratory technicians	Associate degree	147,462	29,040	28,665	19.4
Massage therapists	Postsecondary vocational award	92,086	28,610	24,912	27.1
Directors, religious activities & education	Bachelor's degree	105,311	28,020	25,346	24.1
Coaches & scouts	Long-term on-the-job training	139,715	27,880	23,777	18.3

The Skilled Trades

Throughout history, we have turned to the men and women of the skilled trades to keep America's foundation strong. Skilled trades workers have built homes for our families and the roads and factories that keep our economy moving forward. While the tools and technology used for these trades have changed – with nail guns now accompanying hammers and laser guides accompanying plumb lines – the important role played by the skilled trades has not.

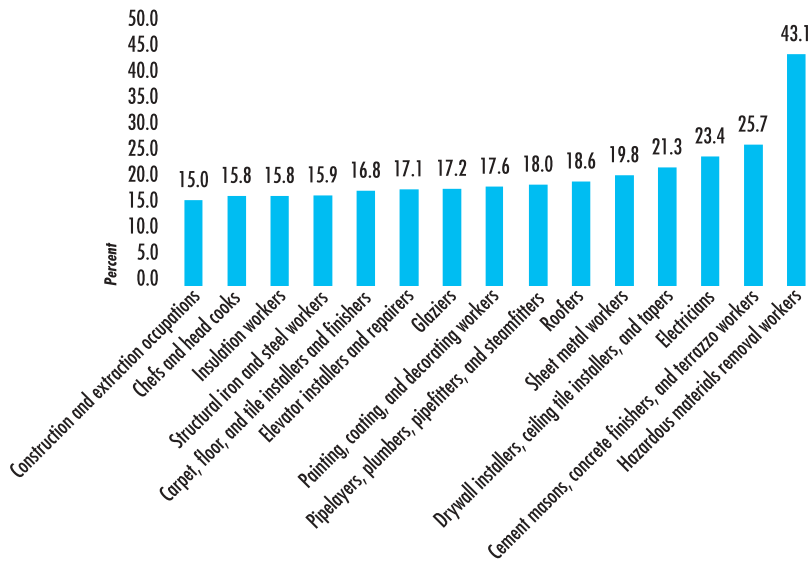
As America grows, we need a new generation of skilled trades workers. By the year 2012, there is projected to be 8.4 million people in construction and extraction occupations. In addition to the projected 1.1 million new jobs to be created, opportunities will exist to

replace experienced construction workers as they leave their jobs. Some firms in the construction industry are today reporting shortages of skilled labor. In order to keep America strong, we must not discourage young people from entering the skilled trades.

The skilled trades offer opportunities across a broad set of occupations. Most of the workers in construction occupations are skilled craftworkers or laborers, helpers, and apprentices who assist the more skilled workers. Construction workers generally are classified as one of the following: structural, finishing, or mechanical workers.

Skilled trades and crafts jobs are heavily concentrated in the construction industry. While these workers may be employed in any indus-

Chart 8.6 Percent Change in Employment for Selected Skilled Trade Occupations, 2002 - Projected 2012



Source: Bureau of Labor Statistics, Office of Occupational Statistics and Employment Projections

try, half of construction industry employment is comprised of these skilled trades and crafts workers. Other industries in which they may be employed include manufacturing, real estate, and wholesale and retail trade. In addition, self-employment is very common.

Labor force growth for the 2002-2012 period will be affected by the aging of the Baby Boom generation.

The aging workforce will stimulate demand for new workers to sustain growth in the skilled trades. The median age of the labor force was 34.6 years in 1982; it is expected to rise to 41.4 years in 2012, exceeding the highest level ever recorded, which was 40.5 years in 1962.

Not only will the aging population generate job openings due to retirements, but the aging population will also increase demand for various construction activities. Construction of nursing homes and convalescent homes will multiply. And as the children of the Baby Boomers become young adults, the demand for manufactured housing, starter homes, and rental apartments is expected to increase.

Job opportunities are expected to be excellent in the construction industry. Construction employment is expected to increase by 15.1 percent (from 6.7 million to 7.7 million) during the 2002-2012 period. Demand for new housing and an increase in road, bridge, and tunnel construction will account for the bulk of job growth in this supersector. Skilled trades workers are likely to be in demand for the foreseeable future.

Skilled trades occupations are a diverse group . . .

Skilled trades occupations are a diverse group, and the projected ten-year increase for each specific occupation ranges from 1.7 to 43.1 percent. For instance, from 2002 to 2012

boilermakers are projected to grow by 1.7 percent, carpenters by 10.1 percent, insulation workers by 15.8 percent, electricians by 23.4 percent, and hazardous materials removal workers by 43.1 percent. Chart 8.6 shows projected employment

changes for selected skilled trades occupations. Overall, construction and extraction occupations are projected to increase by 1.1 million jobs during the 2002-2012 period.

Conclusion

The Department of Labor has committed itself to preparing the workforce of today for tomorrow's economy. Health, education, and computer-related fields will continue to serve as the source of many good jobs for those with at least some college education. Jobs in maintenance, production, repair, and construction and installation will provide a good source of jobs for high school graduates, especially those who have received additional vocational training. In the dynamic U.S. economy, the technological advances in production and the changing demand for goods and services will determine what industries will provide good jobs for U.S. workers. The American workforce has met the challenges of every new economic era and the next one will be no exception.

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