Construction Trades and Related Occupations

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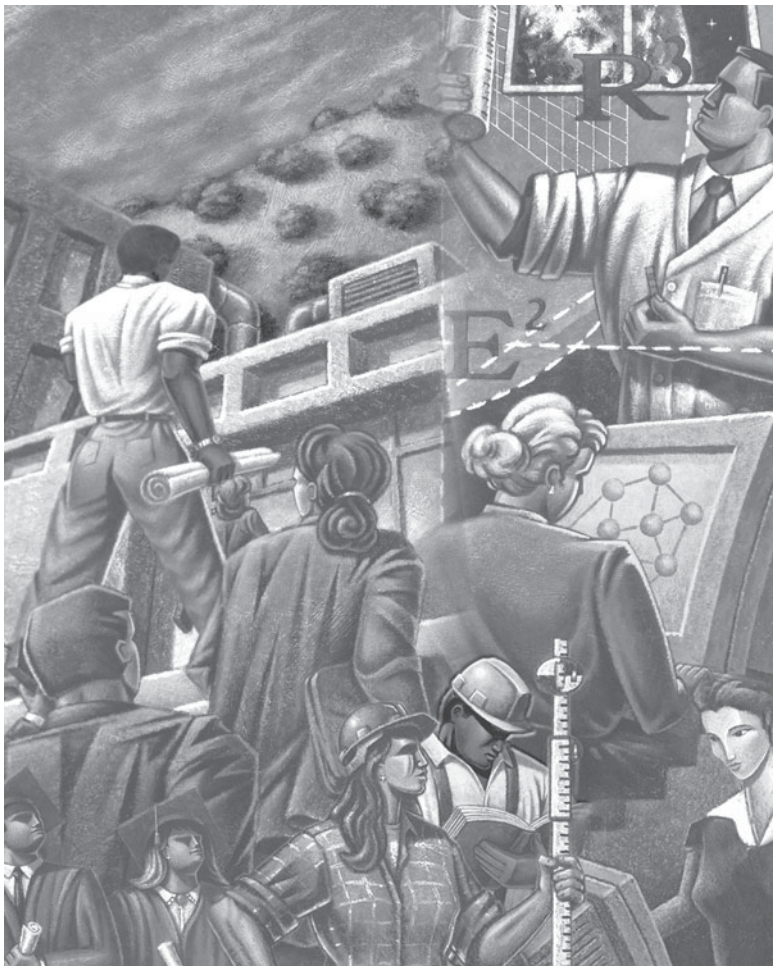
Bureau of Labor Statistics



Occupations Included in this Reprint

Boilermakers
Brickmasons, blockmasons, and stonemastons
Carpenters
Carpet, floor, and tile installers and finishers
Cement masons, concrete finishers, segmental pavers, and terrazzo workers
Construction and building inspectors
Construction equipment operators
Construction laborers
Construction managers
Drywall installers, ceiling tile installers, and tapers
Electricians
Elevator installers and repairers
Glaziers
Hazardous materials removal workers
Insulation workers
Painters and paperhangers
Pipelayers, plumbers, pipefitters, and steamfitters
Plasterers and stucco masons
Roofers
Sheet metal workers
Structural and reinforcing iron and metal workers
Welding, soldering, and brazing workers
Woodworkers

Boilermakers

(0*NET 47-2011.00)

Significant Points

- A formal apprenticeship is the best way to learn this trade.
- Little or no employment growth is expected, but many openings will be created by the need to replace experienced workers who leave this occupation.

Nature of the Work

Boilermakers and *boilermaker mechanics* make, install, and repair boilers, vats, and other large vessels that hold liquids and gases. Boilers supply steam to drive huge turbines in electric powerplants and to provide heat and power in buildings, factories, and ships. Tanks and vats are used to process and store chemicals, oil, beer, and hundreds of other products.

Boilers and other high-pressure vessels usually are made in sections, by casting each piece out of molten iron or steel. Manufacturers are increasingly automating this process to increase the quality of these vessels. Boiler sections are then welded together, often using automated orbital welding machines, which make more consistent welds than are possible by hand. Small boilers may be assembled in the manufacturing plant; larger boilers usually are assembled on site.

Following blueprints, boilermakers locate and mark reference points on the boiler foundation, using straightedges, squares, transits, and tape measures. Boilermakers attach rigging and signal crane operators to lift heavy frame and plate sections and other parts into place. They align sections, using plumb bobs, levels, wedges, and turnbuckles. Boilermakers use hammers, files, grinders, and cutting torches to remove irregular edges, so that edges fit properly. They then bolt or weld edges together. Boilermakers align and attach water tubes, stacks, valves, gauges, and other parts and test complete vessels for leaks or other defects. They also install refractory brick and other heat-resistant materials in fireboxes or pressure vessels. Usually, they assemble large vessels temporarily in a fabrication shop to ensure a proper fit before final assembly on the permanent site.

Because boilers last a long time—35 years or more—boilermakers regularly maintain them and update components, such as burners and boiler tubes, to increase efficiency. Boilermaker mechanics maintain and repair boilers and similar vessels. They inspect tubes, fittings, valves, controls, and auxiliary machinery and clean or supervise the cleaning of boilers using scrapers, wire brushes, and cleaning solvents. They repair or replace defective parts, using hand and power tools, gas torches, and welding equipment, and may operate metalworking machinery to repair or make parts. They also dismantle leaky boilers, patch weak spots with metal stock, replace defective sections, and strengthen joints.

Working Conditions

Boilermakers often use potentially dangerous equipment, such as acetylene torches and power grinders, handle heavy parts, and work on ladders or on top of large vessels. Work is physically demanding and may be done in cramped quarters inside boilers, vats, or tanks that are often damp and poorly ventilated. In some instances, work may be done at high elevations for an extended period. To reduce the chance of injuries, boilermakers may wear hardhats, harnesses, protective clothing, safety glasses and shoes, and respirators. Boilermakers may experience extended periods of overtime when equipment is shut down for maintenance. Overtime work also may be necessary to meet construction or production deadlines.

Employment

Boilermakers held about 25,000 jobs in 2002. Nearly 7 out of 10 worked in the construction industry, assembling and erecting boilers and other vessels. More than 1 in 10 worked in manufacturing, primarily in boiler manufacturing shops, iron and steel plants, petroleum refineries, chemical plants, and shipyards. Some also worked for boiler repair firms or railroads.

Training, Other Qualifications, and Advancement

Many boilermakers learn this trade through a formal apprenticeship. Others become boilermakers through a combination of trade or technical school training and employer-provided training. Apprenticeship programs usually consist of 4 years of on-the-job training, supplemented by a minimum of 144 hours of classroom instruction each year in subjects such as set-up and assembly rigging, welding of all types, blueprint reading, and layout. Experienced boilermakers often attend apprenticeship classes or seminars to learn about new equipment, procedures, and technology. When an apprenticeship becomes available, the local union publicizes the opportunity by notifying local vocational schools and high school vocational programs.

Some boilermakers advance to supervisory positions. Because of their broader training, apprentices usually have an advantage in promotion.

Job Outlook

Little or no growth in employment of boilermakers is expected through the year 2012, but many openings will be created by the need to replace experienced workers who leave this occupation; boilermakers tend to retire early, partly due to the physically demanding nature of the work. Because the number of persons seeking entry to the occupation is relatively low, some areas currently are experiencing a shortage of applicants for apprenticeship programs.

Growth may be limited by the trend toward repairing and retrofitting, rather than replacing, existing boilers; the use of small boilers, which require less onsite assembly; and automation of produc-

Many boilermakers learn their trade through a formal apprenticeship

tion technologies. However, demand for more boilermakers may stem from environmental upgrades required by Federal regulations such as the Clean Air Act.

Most industries that purchase boilers are sensitive to economic conditions. Therefore, during economic downturns, boilermakers in the construction industry may be laid off. However, because maintenance and repairs of boilers must continue even during economic downturns, boilermaker mechanics in manufacturing and other industries generally have stable employment.

Earnings

In 2002, the median hourly earnings of boilermakers were about $20.17. The middle 50 percent earned between $16.24 and $25.09. The lowest 10 percent earned less than $12.24, and the highest 10 percent earned more than $28.96. Apprentices generally start at about half of journey wages, with wages gradually increasing to the journey wage as progress is made in the apprenticeship.

About two-thirds of boilermakers belong to labor unions. The principal union is the International Brotherhood of Boilermakers. Other boilermakers are members of the International Association of Machinists, the United Automobile Workers, or the United Steelworkers of America.

Related Occupations

Workers in a number of other occupations assemble, install, or repair metal equipment or machines. These occupations include assemblers and fabricators; machinists; industrial machinery installation, repair, and maintenance workers, except millwrights; millwrights; pipelayers, plumbers, pipefitters, and steamfitters; sheet metal workers; tool-and-die makers; and welding, soldering, and brazing workers.

Sources of Additional Information

For further information regarding boilermaking apprenticeships or other training opportunities, contact local offices of the unions previously mentioned, local construction companies and boiler manufacturers, or the local office of your State employment service.

For information on apprenticeships and the boilermaking occupation, contact:

➤ International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers, and Helpers, 753 State Ave., Suite 570, Kansas City, KS 66101.

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their website: **http://www.doleta.gov**

Brickmasons, Blockmasons, and Stonemasons

(0*NET 47-2021.00, 47-2022.00)

Significant Points

- Job prospects are expected to be excellent.
- Most entrants learn informally on the job, but apprenticeship programs provide the most thorough training.
- The work is usually outdoors and involves lifting heavy materials and working on scaffolds.
- More than 1out of 4 are self-employed.

Nature of the Work

Brickmasons, blockmasons, and stonemasons work in closely related trades creating attractive, durable surfaces and structures. The work varies in complexity, from laying a simple masonry walkway to installing an ornate exterior on a highrise building. *Brickmasons* and *blockmasons*—who often are called simply *bricklayers*—build and repair walls, floors, partitions, fireplaces, chimneys, and other structures with brick, precast masonry panels, concrete block, and other masonry materials. Some brickmasons specialize in installing firebrick linings in industrial furnaces. *Stonemasons* build stone walls, as well as set stone exteriors and floors. They work with two types of stone—natural cut stone, such as marble, granite, and limestone; and artificial stone made from concrete, marble chips, or other masonry materials. Stonemasons usually work on nonresidential structures, such as houses of worship, hotels, and office buildings.

When building a structure, brickmasons use 1 of 2 methods, the corner lead or the corner pole. Using the corner lead method, they begin by constructing a pyramid of bricks at each corner—called a lead. After the corner leads are complete, less experienced brickmasons fill in the wall between the corners, using a line from corner to corner to guide each course, or layer, of brick. Due to the precision needed, corner leads are time-consuming to erect and require the skills of experienced bricklayers.

Because of the expense associated with building corner leads, most brickmasons use corner poles, also called masonry guides, that enable them to build an entire wall at the same time. They fasten the corner poles (posts) in a plumb position to define the wall line and stretch a line between them. This line serves as a guide for each course of brick. Brickmasons then spread a bed of mortar (a cement, sand, and water mixture) with a trowel (a flat, bladed metal tool with a handle), place the brick on the mortar bed, and press and tap the brick into place. Depending on blueprint specifications, brickmasons either cut bricks with a hammer and chisel or saw them to fit around windows, doors, and other openings. Mortar joints are then finished with jointing tools for a sealed, neat, uniform appearance. Although brickmasons typically use steel supports, or lintels, at window and door openings, they sometimes build brick arches, which support and enhance the beauty of the brickwork.

Stonemasons often work from a set of drawings, in which each stone has been numbered for identification. Helpers may locate and carry these prenumbered stones to the masons. A derrick operator using a hoist may be needed to lift large stone pieces into place.

When building a stone wall, masons set the first course of stones into a shallow bed of mortar. They then align the stones with wedges, plumblines, and levels, and work them into position with a hard rubber mallet. Masons continue to build the wall by alternating layers of mortar and courses of stone. As the work progresses, masons remove the wedges, fill the joints between stones, and use a pointed metal tool, called a tuck pointer, to smooth the mortar to an attractive finish. To hold large stones in place, stonemasons attach brackets to the stone and weld or bolt these brackets to anchors in the wall. Finally, masons wash the stone with a cleansing solution to remove stains and dry mortar.

When setting stone floors, which often consist of large and heavy pieces of stone, masons first use a trowel to spread a layer of damp mortar over the surface to be covered. Using crowbars and hard rubber mallets for aligning and leveling, they then set the stone in the mortar bed. To finish, workers fill the joints and wash the stone slabs.

Masons use a special hammer and chisel to cut stone. They cut stone along the grain to make various shapes and sizes, and valuable pieces often are cut with a saw that has a diamond blade. Some masons specialize in setting marble, which, in many respects, is similar to setting large pieces of stone. Brickmasons and stonemasons also repair imperfections and cracks, and replace broken or missing masonry units in walls and floors.

Most nonresidential buildings now are built with walls made of concrete block, brick veneer, stone, granite, marble, tile, or glass. In the past, masons doing nonresidential interior work mainly built block partition walls and elevator shafts, but because many types of masonry and stone are used in the interiors of today's nonresiden-

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tial structures, these workers now must be more versatile. For example, some brickmasons and blockmasons now install structural insulated wall panels and masonry accessories used in many highrise buildings.

Refractory masons are brickmasons who specialize in installing firebrick and refractory tile in high-temperature boilers, furnaces, cupolas, ladles, and soaking pits in industrial establishments. Most of these workers are employed in steel mills, where molten materials flow on refractory beds from furnaces to rolling machines.

Working Conditions

Brickmasons, blockmasons, and stonemasons usually work outdoors and are exposed to the elements. They stand, kneel, and bend for long periods and often have to lift heavy materials. Common hazards include injuries from tools and falls from scaffolds, but these can often be avoided when proper safety equipment is used and safety practices are followed.

Employment

Brickmasons, blockmasons, and stonemasons held 165,000 jobs in 2002. The vast majority were brickmasons. Workers in these crafts are employed primarily by building, specialty trade, or general contractors. Brickmasons, blockmasons, and stonemasons work throughout the country but, like the general population, are concentrated in metropolitan areas.

More than 1 out of 4 brickmasons, blockmasons, and stonemasons are self-employed. Many of the self-employed specialize in contracting to work on small jobs, such as patios, walkways, and fireplaces.

Training, Other Qualifications, and Advancement

Most brickmasons, blockmasons, and stonemasons pick up their skills informally, observing and learning from experienced workers. Many others receive training in vocational education schools or from industry-based programs that are common throughout the country. Another way to learn these skills is through an apprenticeship program, which generally provides the most thorough training.

Individuals who learn the trade on the job usually start as helpers, laborers, or mason tenders. These workers carry materials, move scaffolds, and mix mortar. When the opportunity arises, they learn from experienced craftworkers how to spread mortar, lay brick and block, or set stone. As they gain experience, they make the transition to full-fledged craftworkers. The learning period on the job may last longer than an apprenticeship program. Industry-based training programs offered through companies usually last between 2 and 4 years.

Apprenticeships for brickmasons, blockmasons, and stonemasons usually are sponsored by local contractors, trade associations, or by local union-management committees. The apprenticeship program requires 3 years of on-the-job training, in addition to a minimum 144 hours of classroom instruction each year in subjects such as blueprint reading, mathematics, layout work, and sketching.

Apprentices often start by working with laborers, carrying materials, mixing mortar, and building scaffolds. This period generally lasts about a month and familiarizes the apprentice with job routines and materials. Next, apprentices learn to lay, align, and join brick and block. They also learn to work with stone and concrete, which enables them to be certified to work with more than one masonry material.

Applicants for apprenticeships must be at least 17 years old and in good physical condition. A high school education is preferable; and courses in mathematics, mechanical drawing, and shop are helpful. The Associated Builders and Contractors and International Masonry Institute (IMI), a joint trust of the International Union of Bricklayers and Allied Craftsworkers and the contractors who employ its members, operates training centers in several large cities that help jobseekers develop the skills needed to successfully complete the formal apprenticeship program. In order to attract more entrants, IMI has expanded these centers in recent years to recruit and train workers before they enter apprenticeship programs. In addition, the IMI has a national training and education center at Fort Ritchie, MD. The national center's programs teach basic job skills for brick, stone, tile, terrazzo, refractory, and restoration work, as well as safety and scaffolding training.

Bricklayers who work in nonresidential construction usually work for large contractors and receive well-rounded training—normally through apprenticeship in all phases of brick or stone work. Those who work in residential construction usually work primarily for small contractors and specialize in only one or two aspects of the job.

With additional training, brickmasons, blockmasons, and stonemasons may become supervisors for masonry contractors. Some eventually become owners of businesses employing many workers and may spend most of their time as managers rather than as brickmasons, blockmasons, or stonemasons. Others move into closely related areas such as construction management or building inspection.

Job Outlook

Job opportunities for brickmasons, blockmasons, and stonemasons are expected to be excellent through 2012. Many openings will result from the need to replace workers who retire, transfer to other occupations, or leave these trades for other reasons. There may be fewer applicants than needed because many potential workers prefer to work under less strenuous, more comfortable conditions.

Employment of brickmasons, blockmasons, and stonemasons is expected to increase about as fast as the average for all occupations over the 2002-12 period, as population and business growth create a need for new houses, industrial facilities, schools, hospitals, offices, and other structures. Also stimulating demand will be the need to restore a growing stock of old masonry buildings, as well as the increasing use of brick and stone for decorative work on building fronts and in lobbies and foyers. Brick exteriors should remain very popular, reflecting a growing preference for durable exterior materials requiring little maintenance.

Employment of brickmasons, blockmasons, and stonemasons, like that of many other construction workers, is sensitive to changes in the economy. When the level of construction activity falls, workers in these trades can experience periods of unemployment.

Earnings

Median hourly earnings of brickmasons and blockmasons in 2002 were $20.11. The middle 50 percent earned between $15.36 and $25.32. The lowest 10 percent earned less than $11.55, and the highest 10 percent earned more than $30.66. Median hourly earnings in the industries employing the largest number of brickmasons in 2002 are shown below:

Nonresidential building construction	$22.12
Foundation, structure, and building exterior contractors	20.26

Median hourly earnings of stonemasons in 2002 were $16.36. The middle 50 percent earned between $12.06 and $20.76. The lowest 10 percent earned less than $9.43, and the highest 10 percent earned more than $26.59.

Earnings for workers in these trades can be reduced on occasion because poor weather and downturns in construction activity limit the time they can work. Apprentices or helpers usually start at about 50 percent of the wage rate paid to experienced workers. Pay increases as apprentices gain experience and learn new skills.

Some brickmasons, blockmasons, and stonemasons are members of the International Union of Bricklayers and Allied Craftsworkers.

Related Occupations

Brickmasons, blockmasons, and stonemasons combine a thorough knowledge of brick, concrete block, stone, and marble with manual skill to erect attractive, yet highly durable, structures. Workers in other occupations with similar skills include carpet, floor, and tile installers and finishers; cement masons, concrete finishers, segmental pavers, and terrazzo workers; and plasterers and stucco masons.

Sources of Additional Information

For details about apprenticeships or other work opportunities in these trades, contact local bricklaying, stonemasonry, or marble-setting contractors; the Associated Builders and Contractors; a local of the International Union of Bricklayers and Allied Craftsworkers; a local joint union-management apprenticeship committee; or the nearest office of the State employment service or apprenticeship agency.

For general information about the work of brickmasons, blockmasons, or stonemasons, contact:

➤ International Union of Bricklayers and Allied Craftworkers, 1776 I St. NW., Washington, DC. 20006.

For information on training for brickmasons, blockmasons, and stonemasons, contact:

➤ Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.

➤ International Masonry Institute, Apprenticeship and Training, The James Brice House, 42 East St., Annapolis, MD 21401. Internet: **http://www.imiweb.org**

Information about the work of bricklayers also can be obtained from:

➤ Associated General Contractors of America, Inc., 333 John Carlyle St., Alexandria, VA 22314. Internet: **http://www.agc.org**

➤ Brick Industry Association, 11490 Commerce Park Dr., Reston, VA 22091-1525. Internet: **http://www.brickinfo.org**

➤ National Association of Home Builders, 1201 15th St. NW., Washington, DC 20005. Internet: **http://www.nahb.org**

➤ Home Builders Institute, 1201 15th St. NW., Washington, DC 20005. Internet **http://www.hbi.org**

➤ National Concrete Masonry Association, 13750 Sunrise Valley Dr., Herndon, VA 20171-3499. Internet: **http://www.ncma.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their website: **http://www.doleta.gov**

Carpenters

(0*NET 47-2031.01, 47-2031.02, 47-2031.03, 47-2031.04, 47-2031.05, 47-2031.06)

Significant Points

- About 30 percent of all carpenters—the largest construction trade in 2002—were self-employed.
- Job opportunities should be excellent.
- Carpenters with all-round skills will have the best opportunities for steady work.

Nature of the Work

Carpenters are involved in many different kinds of construction activity. They cut, fit, and assemble wood and other materials for the construction of buildings, highways, bridges, docks, industrial plants, boats, and many other structures. Carpenters' duties vary by type of employer. Builders increasingly are using specialty trade contractors who, in turn, hire carpenters who specialize in just one or two activities. Such activities include setting forms for concrete construction; erecting scaffolding; or doing finishing work, such as installing interior and exterior trim. However, a carpenter directly employed by a general building contractor often must perform a variety of the tasks associated with new construction, such as framing walls and partitions, putting in doors and windows, building stairs, laying hardwood floors, and hanging kitchen cabinets. Carpenters also build brattices (ventilation walls or partitions) in underground passageways to control the proper circulation of air through these passageways and to worksites.

Because local building codes often dictate where certain materials can be used, carpenters must know these regulations. Each carpentry task is somewhat different, but most involve the same basic steps. Working from blueprints or instructions from supervisors, carpenters first do the layout—measuring, marking, and arranging materials. They cut and shape wood, plastic, fiberglass, or drywall, using hand and power tools, such as chisels, planes, saws, drills, and sanders. They then join the materials with nails, screws, staples, or adhesives. In the final step, carpenters check the accuracy of their work with levels, rules, plumb bobs, and framing squares, and make any necessary adjustments. When working with prefabricated components, such as stairs or wall panels, the carpenter's task is somewhat simpler than above, because it does not require as much layout work or the cutting and assembly of as many pieces. Prefabricated components are designed for easy and fast installation and generally can be installed in a single operation.

Carpenters who remodel homes and other structures must be able to do all aspects of a job—not just one task. Thus, individuals with good basic overall training are at a distinct advantage, because they can switch from residential building to commercial construction or remodeling work, depending on which offers the best work opportunities.

Carpenters employed outside the construction industry perform a variety of installation and maintenance work. They may replace panes of glass, ceiling tiles, and doors, as well as repair desks, cabinets, and other furniture. Depending on the employer, carpenters install partitions, doors, and windows; change locks; and repair broken furniture. In manufacturing firms, carpenters may assist in moving or installing machinery. (For more information on workers who install machinery, see the discussion of millwrights as well as industrial machinery installation, repair, and maintenance workers, except millwrights, elsewhere in the *Handbook*.)

Working Conditions

As is true of other building trades, carpentry work is sometimes strenuous. Prolonged standing, climbing, bending, and kneeling often are necessary. Carpenters risk injury working with sharp or rough materials, using sharp tools and power equipment, and working in situations where they might slip or fall. Additionally, many carpenters work outdoors.

Some carpenters change employers each time they finish a construction job. Others alternate between working for a contractor and working as contractors themselves on small jobs.

Employment

Carpenters, who make up the largest building trades occupation, held about 1.2 million jobs in 2002. One-third worked for general building contractors and one-fifth worked for special trade contractors. Most of the rest of the wage and salary workers worked for manufacturing firms, government agencies, retail establishments and a wide variety of other industries. About 30 percent of all carpenters were self-employed.

Carpenters are employed throughout the country in almost every community.

Training, Other Qualifications, and Advancement

Carpenters learn their trade through on-the-job training, as well as formal training programs. Most pick up skills informally by working under the supervision of experienced workers. Many acquire skills through vocational education. Others participate in employer training programs or apprenticeships.

Most employers recommend an apprenticeship as the best way to learn carpentry. Apprenticeship programs are administered by local joint union-management committees of the United Brotherhood of Carpenters and Joiners of America, the Associated General Contractors, Inc., and the National Association of Home Builders. In addition, training programs are administered by local chapters of the Associated Builders and Contractors and by local chapters of the Associated General Contractors, Inc. These programs combine on-the-job training with related classroom instruction.

On the job, apprentices learn elementary structural design and become familiar with common carpentry jobs, such as layout, form building, rough framing, and outside and inside finishing. They also learn to use the tools, machines, equipment, and materials of the trade. Apprentices receive classroom instruction in safety, first aid, blueprint reading, freehand sketching, basic mathematics, and

Carpenters employed outside the construction industry perform a variety of installation and maintenance work.

different carpentry techniques. Both in the classroom and on the job, they learn the relationship between carpentry and the other building trades.

Usually, apprenticeship applicants must be at least 18 years old and meet local requirements. For example, some union locals test an applicant's aptitude for carpentry. The length of the program, usually 3 to 4 years, varies with the apprentice's skill. Because the number of apprenticeship programs is limited, however, only a small proportion of carpenters learn their trade through these programs.

Informal on-the-job training is normally less thorough than an apprenticeship. The degree of training and supervision often depends on the size of the employing firm. A small contractor specializing in homebuilding may provide training only in rough framing. In contrast, a large general contractor may provide training in several carpentry skills. Although specialization is becoming increasingly common, it is important to try to acquire skills in all aspects of carpentry and to have the flexibility to perform any kind of work.

A high school education is desirable, including courses in carpentry, shop, mechanical drawing, and general mathematics. Manual dexterity, eye-hand coordination, physical fitness, and a good sense of balance are important. The ability to solve arithmetic problems quickly and accurately also is helpful. Employers and apprenticeship committees generally view favorably any construction-related training and work experience obtained in the Armed Services or Job Corps.

Carpenters may advance to carpentry supervisor or general construction supervisor positions. Carpenters usually have greater opportunities than most other construction workers to become general construction supervisors, because carpenters are exposed to the entire construction process. Some carpenters become independent contractors. To advance, these workers should be able to identify and estimate the quantity of materials needed to properly complete a job. In addition, they must be able to accurately estimate how long a job should take to complete and what it will cost.

Job Outlook

Job opportunities for carpenters are expected to be excellent over the 2002-12 period, largely due to the numerous openings arising each year as experienced carpenters leave this large occupation. Contributing to this favorable job market is the fact that many potential workers prefer work that is less strenuous and that has more comfortable working conditions. Because there are no strict training requirements for entry, many people with limited skills take jobs as carpenters but eventually leave the occupation because they dislike the work or cannot find steady employment.

Employment of carpenters is expected to increase about as fast as average for all occupations through 2012. Construction activity should increase in response to demand for new housing and commercial and industrial plants and the need to renovate and modernize existing structures. The demand for larger homes with more amenities and for second homes will continue to rise, especially as the baby boomers reach their peak earning years and can afford to spend more on housing. At the same time, the demand for manufactured housing, starter homes, and rental apartments also is expected to increase as the number of immigrants grows and as the relatively small baby bust generation, which followed the baby boom generation, is replaced by echo boomers (the children of the baby boomers) in the young adult age groups.

However, some of the demand for carpenters will be offset by expected productivity gains resulting from the increasing use of prefabricated components, such as prehung doors and windows and prefabricated wall panels and stairs, which can be installed very quickly. Prefabricated walls, partitions, and stairs are lifted into place in one operation; beams—and, in some cases, entire roof assemblies—are lifted into place using a crane. As prefabricated components become more standardized, builders will use them more often. In addition, improved adhesives will reduce the time needed to join materials, and lightweight, cordless, and pneumatic tools—such as nailers and drills—all make carpenters more efficient.

Carpenters can experience periods of unemployment because of the short-term nature of many construction projects and the cyclical nature of the construction industry. Building activity depends on many factors—interest rates, availability of mortgage funds, the season, government spending, and business investment—that vary with the state of the economy. During economic downturns, the number of job openings for carpenters declines. New and improved tools, equipment, techniques, and materials have vastly increased carpenter versatility. Therefore, carpenters with all-round skills will have better opportunities for steady work than carpenters who can do only a few relatively simple, routine tasks.

Job opportunities for carpenters also vary by geographic area. Construction activity parallels the movement of people and businesses and reflects differences in local economic conditions. Therefore, the number of job opportunities and apprenticeship opportunities in a given year may vary widely from area to area.

Earnings

In 2002, median hourly earnings of carpenters were $16.44. The middle 50 percent earned between $12.59 and $21.91. The lowest 10 percent earned less than $9.95, and the highest 10 percent earned more than $27.97. Median hourly earnings in the industries employing the largest numbers of carpenters in 2002 are shown below:

Nonresidential building construction	$18.31
Building finishing contractors	17.30
Residential building construction	16.02
Foundation, structure, and building exterior contractors	16.01
Employment services	12.58

Earnings can be reduced on occasion, because carpenters lose worktime in bad weather and during recessions when jobs are unavailable.

Some carpenters are members of the United Brotherhood of Carpenters and Joiners of America.

Related Occupations

Carpenters are skilled construction workers. Other skilled construction occupations include brickmasons, blockmasons, and stonemasons; cement masons, concrete finishers, segmental pavers, and terrazzo workers; electricians; pipelayers, plumbers, pipefitters, and steamfitters; and plasterers and stucco masons.

Sources of Additional Information

For information about carpentry apprenticeships or other work opportunities in this trade, contact local carpentry contractors, locals of the union mentioned above, local joint union-contractor apprenticeship committees, or the nearest office of the State employment service or apprenticeship agency.

For information on training opportunities and carpentry in general, contact:

➤ Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.

➤ Associated General Contractors of America, Inc., 333 John Carlyle St., Suite 200, Alexandria VA, 22314. Internet: **http://www.agc.org**

➤ Home Builders Institute, 1201 15th St. NW., Washington, DC 20005. Internet: **http://www.hbi.org**

➤ National Association of Home Builders, 1201 15th St. NW., Washington, DC 20005. Internet: **http://www.nahb.org**

➤ United Brotherhood of Carpenters and Joiners of America, 50 F St. NW., Washington, DC 20001. Internet: **http://www.carpenters.org**

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Carpet, Floor, and Tile Installers and Finishers

(0*NET 47-2041.00, 47-2042.00, 47-2043.00, 47-2044.00)

Significant Points

- Forty-three percent of all carpet, floor, and tile installers and finishers are self-employed, compared with 19 percent of all construction trades workers.
- Most workers learn on the job.
- Carpet installers, the largest specialty, should have the best job opportunities.
- The employment of carpet, floor, and tile installers and finishers is less sensitive to fluctuations in construction activity than that of other construction trades workers.

Nature of the Work

Carpet, tile, and other types of floor coverings not only serve an important basic function in buildings, but their decorative qualities also contribute to the appeal of the buildings. Carpet, floor, and tile installers and finishers lay these floor coverings in homes, offices, hospitals, stores, restaurants, and many other types of buildings. Tile also is installed on walls and ceilings.

Before installing carpet, *carpet installers* first inspect the surface to be covered to determine its condition and, if necessary, correct any imperfections that could show through the carpet or cause the carpet to wear unevenly. They must measure the area to be carpeted and plan the layout, keeping in mind expected traffic patterns and placement of seams for best appearance and maximum wear.

When installing wall-to-wall carpet without tacks, installers first fasten a tackless strip to the floor, next to the wall. They then install the padded cushion or underlay. Next, they roll out, measure, mark, and cut the carpet, allowing for 2 to 3 inches of extra carpet for the final fitting. Using a device called a "knee kicker," they position the carpet, stretching it to fit evenly on the floor and snugly against each wall and door threshold. They then cut off the excess carpet. Finally, using a power stretcher, they stretch the carpet, hooking it to the tackless strip to hold it in place. The installers then finish the edges using a wall trimmer.

Because most carpet comes in 12-foot widths, wall-to-wall installations require installers to join carpet sections together for large rooms. The installers join the sections using heat-taped seams—seams held together by a special plastic tape that is activated by heat.

On special upholstery work, such as stairs, carpet may be held in place with staples. Also, in commercial installations, carpet often is glued directly to the floor or to padding that has been glued to the floor.

Carpet installers use handtools such as hammers, drills, staple guns, carpet knives, and rubber mallets. They also may use carpetlaying tools, such as carpet shears, knee kickers, wall trimmers, loop pile cutters, heat irons, and power stretchers.

Floor installers, or *floor layers*, apply blocks, strips, or sheets of shock-absorbing, sound-deadening, or decorative coverings to floors and cabinets using rollers, knives, trowels, sanding machines, and other tools. Some floor covering materials are designed to be purely decorative. Others have more specialized purposes, such as to deaden sound, to absorb shocks, or to create air-tight environments. Before installing the floor, floor layers inspect the surface to be covered and, if necessary, correct any imperfections in order to start with a smooth, clean foundation. They measure and cut floor covering materials, such as rubber, vinyl, linoleum, or cork, and any foundation material, such as felt, according to designated blueprints. Next, they may nail or staple a wood underlayment to the surface or may use an adhesive to cement the foundation material to the floor; the foundation helps to deaden sound and prevents the top floor covering from wearing at board joints. Finally, floor layers install the top covering. They join sections of sheet covering by overlapping adjoining edges and cutting through both layers with a knife to form a tight joint.

Floor sanders and finishers scrape and sand wooden floors to smooth surfaces using floor-sanding machines. They then inspect the floor for smoothness and remove excess glue from joints using a knife or wood chisel and may sand wood surfaces by hand, using sandpaper. Finally, they apply coats of finish.

Tile installers, *tilesetters*, and *marble setters* apply hard tile and marble to floors, walls, ceilings, and roof decks. Tile is durable, impervious to water, and easy to clean, making it a popular building material in hospitals, tunnels, lobbies of buildings, bathrooms, and kitchens.

Prior to installation, tilesetters use measuring devices and levels to ensure that the tile is placed in a consistent manner. To set tile, which generally ranges in size from 1 inch to 12 or more inches square, tilesetters use cement or "mastic," a very sticky paste. When using cement, tilesetters nail a support of metal mesh to the wall or ceiling to be tiled. They use a trowel to apply a cement mortar—called a "scratch coat"—onto the metal screen, and scratch the surface of the soft mortar with a small tool similar to a rake. After the scratch coat has dried, tilesetters apply another coat of mortar to level the surface, and then apply mortar to the back of the tile and place it onto the surface.

To set tile in mastic or a cement adhesive, called "thin set," tilesetters need a flat, solid surface such as drywall, concrete, plaster, or wood. They use a tooth-edged trowel to spread mastic on the surface or apply cement adhesive, and then properly position the tile.

Because tile varies in color, shape, and size, workers sometimes prearrange tiles on a dry floor according to a specified design. This allows workers to examine the pattern and make changes. In order to cover all exposed areas, including corners and around pipes, tubs, and wash basins, tilesetters cut tiles to fit with a machine saw or a special cutting tool. Once the tile is placed, they gently tap the

Prior to installing tile, tilesetters use measuring devices and levels to ensure that the tile is placed in a consistent manner.

surface with their trowel handle or a small block of wood to seat the tile evenly.

When the cement or mastic has set, tilesetters fill the joints with "grout," which is very fine cement. They then scrape the surface with a rubber-edged device called a grout float or a grouting trowel to dress the joints and remove excess grout. Before the grout sets, they finish the joints with a damp sponge for a uniform appearance. Marble setters cut and set marble slabs in floors and walls of buildings. They trim and cut marble to specified size using a power wet saw, other cutting equipment, or handtools. After setting the marble in place, they polish the marble to high luster using power tools or by hand.

Working Conditions

Carpet, floor, and tile installers and finishers generally work indoors and have regular daytime hours. However, when floor covering installers work in occupied stores or offices, they may work evenings and weekends to avoid disturbing customers or employees. Installers and finishers usually work under better conditions than do most other construction workers. By the time workers install carpets, flooring, or tile in a new structure, most construction has been completed and the work area is relatively clean and uncluttered. Installing these materials is labor intensive; workers spend much of their time bending, kneeling, and reaching—activities that require endurance. Carpet installers frequently lift heavy rolls of carpet and may move heavy furniture. Safety regulations may require that they wear kneepads or safety goggles when using certain tools. Carpet and floor layers may be exposed to fumes from various kinds of glue and to fibers of certain types of carpet.

Although workers are subject to cuts from tools or materials, falls from ladders, and strained muscles, the occupation is not as hazardous as some other construction occupations.

Employment

Carpet, floor, and tile installers and finishers held about 164,000 jobs in 2002. Forty-three percent of all carpet, floor, and tile installers and finishers were self-employed, compared with 19 percent of all construction trades workers. The following tabulation shows 2002 wage and salary employment by specialty:

Carpet installers	82,000
Tile and marble setters	33,000
Floor layers, except carpet, wood, and hard tiles	31,000
Floor sanders and finishers	17,000

Many carpet installers worked for flooring contractors or floor covering retailers. Most salaried tilesetters were employed by tilesetting contractors who work mainly on nonresidential construction projects, such as schools, hospitals, and office buildings. Most self-employed tilesetters work on residential projects.

Although carpet, floor, and tile installers and finishers are employed throughout the Nation, they tend to be concentrated in populated areas where there are high levels of construction activity.

Training, Other Qualifications, and Advancement

The vast majority of carpet, floor, and tile installers and finishers learn their trade informally, on the job, as helpers to experienced workers. Others learn through formal apprenticeship programs, which include on-the-job training as well as related classroom instruction.

Informal training for carpet installers often is sponsored by individual contractors. Workers start as helpers, and begin with simple assignments, such as installing stripping and padding, or helping to stretch newly installed carpet. With experience, helpers take on more difficult assignments, such as measuring, cutting, and fitting.

Persons who wish to begin a career in carpet installation as a helper or apprentice should be at least 18 years old and have good manual dexterity. Many employers prefer applicants with a high school diploma; courses in general mathematics and shop are helpful. Some employers may require a driver's license and a criminal background check. Because carpet installers frequently deal directly with customers, they should be courteous and tactful.

Many tile and floor layers learn their job through on-the-job training and begin by learning about the tools of the trade. They next learn to prepare surfaces to receive flooring. As they progress, tilesetters, marble setters, and floor layers learn to cut and install tile, marble, and floor coverings. Tile and marble setters also learn to apply grout and to do finishing work.

Apprenticeship programs and some contractor-sponsored programs provide comprehensive training in all phases of the tilesetting and floor layer trades. Most apprenticeship programs are union-sponsored and consist of weekly classes and on-the-job training usually lasting 3 to 4 years.

When hiring apprentices or helpers for floor layer and tilesetter jobs, employers usually prefer high school graduates who have had courses in general mathematics, mechanical drawing, and shop. Good physical condition, manual dexterity, and a good sense of color harmony also are important assets.

Carpet, floor, and tile installers and finishers may advance to positions as supervisors or become salespersons or estimators. Some carpet installers may become managers for large installation firms. Many carpet, floor, and tile installers and finishers who begin working for a large contractor eventually go into business for themselves as independent subcontractors.

Job Outlook

Employment of carpet, floor, and tile installers and finishers is expected to grow about as fast as the average for all occupations through the year 2012, reflecting the continued need to renovate and refurbish existing structures. However, employment of one specialty—floor sanders and finishers—is projected to grow more slowly than average due to the increasing use of prefinished hardwood and similar flooring. Carpet installers, the largest specialty, should have the best job opportunities.

Carpet as a floor covering continues to be popular and its use is expected to grow in structures such as schools, offices, hospitals, and industrial plants. Employment of carpet installers also is expected to grow because wall-to-wall carpeting is a necessity in the many houses built with plywood, rather than hardwood, floors. Similarly, offices, hotels, and stores often cover concrete floors with wall-to-wall carpet, which must be periodically replaced.

Demand for tile and marble setters will stem from population and business growth, which should result in more construction of shopping malls, hospitals, schools, restaurants, and other structures in which tile is used extensively. Tile is expected to continue to increase in popularity as a building material and to be used more extensively, particularly in the growing number of more expensive homes, leading to faster than average growth for tile and marble setters. Demand for floor layers and sanders and finishers will expand as a result of growth in construction activity, particularly that related to residential homes and commercial buildings, and as some people decide to replace their plywood floors with hardwood floors. Job opportunities for tile and marble setters and for floor layers and sanders, relatively small specialties, will not be as plentiful as those for carpet installers.

The employment of carpet, floor, and tile installers and finishers is less sensitive to changes in construction activity than is that of most other construction occupations because much of the work involves replacing carpet and other flooring in existing buildings. As a result, these workers tend to be sheltered from the business fluctuations that often occur in new construction activity.

Earnings

In 2002, the median hourly earnings of carpet installers were $15.67. The middle 50 percent earned between $11.39 and $21.03. The lowest 10 percent earned less than $8.90, and the top 10 percent earned more than $27.15. In 2002, median hourly earnings of carpet installers working for building finishing contractors were $16.09, and in home furnishings stores, $14.64.

Carpet installers are paid either on an hourly basis, or by the number of yards of carpet installed. The rates vary widely depending on the geographic location and whether the installer is affiliated with a union.

Median hourly earnings of floor layers were $16.15 in 2002. The middle 50 percent earned between $11.42 and $20.81. The lowest 10 percent earned less than $8.58, and the top 10 percent earned more than $26.87.

Median hourly earnings of floor sanders and finishers were $13.22 in 2002. The middle 50 percent earned between $10.38 and $16.97. The lowest 10 percent earned less than $8.96, and the top 10 percent earned more than $22.51.

Median hourly earnings of tile and marble setters were $17.20 in 2002. The middle 50 percent earned between $12.96 and $22.39. The lowest 10 percent earned less than $10.21, and the top 10 percent earned more than $28.22. Earnings of tile and marble setters also vary greatly by geographic location and by union membership status.

Apprentices and other trainees usually start out earning about half of what an experienced worker earns, although their wage rate increases as they advance through the training program.

Some carpet, floor, and tile installers and finishers belong to the United Brotherhood of Carpenters and Joiners of America. Some tilesetters belong to the International Union of Bricklayers and Allied Craftsmen, while some carpet installers belong to the International Brotherhood of Painters and Allied Trades.

Related Occupations

Carpet, floor, and tile installers and finishers measure, cut, and fit materials to cover a space. Workers in other occupations involving similar skills, but using different materials, include brickmasons, blockmasons, and stonemasons; carpenters; cement masons, concrete finishers, segmental pavers, and terrazzo workers; drywall installers, ceiling tile installers, and tapers; painters and paperhangers; roofers; and sheet metal workers.

Sources of Additional Information

For details about apprenticeships or work opportunities, contact local flooring or tilesetting contractors or retailers, locals of the unions previously mentioned, or the nearest office of the State apprenticeship agency or employment service.

For general information about the work of carpet installers and floor layers, contact:

➤ Floor Covering Installation Contractors Association, 7439 Milwood Dr., West Bloomfield, MI 48322.

Additional information on training for carpet installers and floor layers is available from:

➤ International Union of Painters and Allied Trades, 1750 New York Ave. NW., Washington, DC 20006. Internet: **http://www.iupat.org**

For general information about the work of tile installers and finishers, contact:

➤ International Union of Bricklayers and Allied Craftworkers, 1776 I St. NW., Washington, DC. 20006.

➤ International Masonry Institute, James Brice House, 42 East St. Annapolis, MD 21401. Internet: **http://www.imiweb.org**

➤ Home Builders Institute, 1201 15th St. NW., Washington, DC 20005. Internet: **http://www.hbi.org**

➤ National Association of Home Builders, 1201 15th St. NW., Washington, DC 20005. Internet: **http://www.nahb.org**

For more information about tile setting and tile training, contact:

➤ National Tile Contractors Association, P.O. Box 13629, Jackson MS 39236.

For information concerning training of carpet, floor, and tile installers and finishers, contact:

➤ United Brotherhood of Carpenters and Joiners of America, 50 F St. NW., Washington, DC 20001. Internet: **http://www.carpenters.org**

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Cement Masons, Concrete Finishers, Segmental Pavers, and Terrazzo Workers

(0*NET 47-2051.00, 47-2053.00, 47-4091.00)

Significant Points

- Job opportunities are expected to be favorable.
- Most learn on the job, either through formal 3-year or 4-year apprenticeship programs or by working as helpers.
- Like many other construction trades, these workers may experience reduced earnings and layoffs during downturns in construction activity.
- Cement masons often work overtime, with premium pay, because once concrete has been placed, the job must be completed.

Nature of the Work

Cement masons, concrete finishers, and terrazzo workers all work with concrete, one of the most common and durable materials used in construction. Once set, concrete—a mixture of Portland cement, sand, gravel, and water—becomes the foundation for everything from decorative patios and floors to huge dams or miles of roadways.

Cement masons and *concrete finishers* place and finish the concrete. They also may color concrete surfaces; expose aggregate (small stones) in walls and sidewalks; or fabricate concrete beams, columns, and panels. In preparing a site for placing concrete, cement masons first set the forms for holding the concrete and properly align them. They then direct the casting of the concrete and supervise laborers who use shovels or special tools to spread it. Masons then guide a straightedge back and forth across the top of the forms to "screed," or level, the freshly placed concrete. Immediately after leveling the concrete, masons carefully smooth the concrete surface with a "bull float," a long-handled tool about 8 by 48 inches that covers the coarser materials in the concrete and brings a rich mixture of fine cement paste to the surface.

After the concrete has been leveled and floated, concrete finishers press an edger between the forms and the concrete and guide it along the edge and the surface. This produces slightly rounded edges and helps prevent chipping or cracking. Concrete finishers use a special tool called a "groover" to make joints or grooves at specific intervals that help control cracking. Next, they trowel the surface using either a powered or hand trowel, a small, smooth, rectangular metal tool.

Sometimes, cement masons perform all the steps of laying concrete, including the finishing. As the final step, they retrowel the concrete surface back and forth with powered and hand trowels to create a smooth finish. For a coarse, nonskid finish, masons brush the surface with a broom or stiff-bristled brush. For a pebble finish, they embed small gravel chips into the surface. They then wash any excess cement from the exposed chips with a mild acid solution. For color, they use colored premixed concrete. On concrete surfaces that will remain exposed after the forms are stripped, such as columns, ceilings, and wall panels, cement masons cut away high spots and loose concrete with hammer and chisel, fill any large indentations with a Portland cement paste, and smooth the surface with a carborundum stone. Finally, they coat the exposed area with a rich Portland cement mixture, using either a special tool or a coarse cloth to rub the concrete to a uniform finish.

Throughout the entire process, cement masons must monitor how the wind, heat, or cold affects the curing of the concrete. They must have a thorough knowledge of concrete characteristics so that, by using sight and touch, they can determine what is happening to the concrete and take measures to prevent defects.

Segmental pavers lay out, cut, and install pavers, which are flat pieces of masonry usually made from compacted concrete or brick. Pavers are used to pave paths, patios, playgrounds, driveways, and steps. They are manufactured in various textures and often interlock together to form an attractive pattern. Segmental pavers first prepare the site by removing the existing pavement or soil. They grade the remaining soil to the proper depth and determine the amount of base material that is needed, which depends on the local soil conditions. They then install and compact the base material, a granular material that compacts easily, and lay the pavers from the center out, so that any trimmed pieces will be on the outside rather than in the center. Then, they install edging materials to prevent the pavers from shifting and fill the spaces between the pavers with dry sand.

Terrazzo workers create attractive walkways, floors, patios, and panels by exposing marble chips and other fine aggregates on the surface of finished concrete. Much of the preliminary work of terrazzo workers is similar to that of cement masons. Attractive, marble-chip terrazzo requires three layers of materials. First, cement masons or terrazzo workers build a solid, level concrete foundation that is 3 to 4 inches deep. After the forms are removed from the foundation, workers add a 1-inch layer of sandy concrete. Before this layer sets, terrazzo workers partially embed metal divider strips in the concrete wherever there is to be a joint or change of color in the terrazzo. For the final layer, terrazzo workers blend and place into each of the panels a fine marble chip mixture that may be color-pigmented. While the mixture is still wet, workers toss additional marble chips of various colors into each panel and roll a lightweight roller over the entire surface.

When the terrazzo is thoroughly dry, helpers grind it with a terrazzo grinder, which is somewhat like a floor polisher, only much heavier. Slight depressions left by the grinding are filled with a matching grout material and hand-troweled for a smooth, uniform surface. Terrazzo workers then clean, polish, and seal the dry surface for a lustrous finish.

Working Conditions

Concrete, segmental paving, or terrazzo work is fast-paced and strenuous, and requires continuous physical effort. Because most finishing is done at floor level, workers must bend and kneel often.

Sometimes, cement masons perform all the steps of laying concrete, including the finishing.

Many jobs are outdoors, and work is generally halted during inclement weather. The work, either indoors or outdoors, may be in areas that are muddy, dusty, or dirty. To avoid chemical burns from uncured concrete and sore knees from frequent kneeling, many workers wear kneepads. Workers usually also wear water-repellent boots while working in wet concrete.

Employment

Cement masons, concrete finishers, segmental pavers, and terrazzo workers held about 190,000 jobs in 2002; segmental pavers and terrazzo workers accounted for only a small portion of the total. Most cement masons and concrete finishers worked for concrete contractors or for general contractors on projects such as highways; bridges; shopping malls; or large buildings such as factories, schools, and hospitals. A small number were employed by firms that manufacture concrete products. Most segmental pavers and terrazzo workers worked for special trade contractors who install decorative floors and wall panels.

Only about 1 out of 20 cement masons, concrete finishers, segmental pavers, and terrazzo workers were self-employed, a smaller proportion than in other building trades. Most self-employed masons specialized in small jobs, such as driveways, sidewalks, and patios.

Training, Other Qualifications, and Advancement

Most cement masons, concrete finishers, segmental pavers, and terrazzo workers learn their trades either through on-the-job training as helpers, or through 3-year or 4-year apprenticeship programs. Many masons and finishers first gain experience as construction laborers. (See the statement on construction laborers elsewhere in the *Handbook*.)

When hiring helpers and apprentices, employers prefer high school graduates who are at least 18 years old and in good physical condition, and who have a driver's license. The ability to get along with others also is important because cement masons frequently work in teams. High school courses in general science, vocational-technical subjects, mathematics, blueprint reading, or mechanical drawing provide a helpful background.

On-the-job training programs consist of informal instruction, in which experienced workers teach helpers to use the tools, equipment, machines, and materials of the trade. Trainees begin with tasks such as edging, jointing, and using a straightedge on freshly placed concrete. As training progresses, assignments become more complex, and trainees can usually do finishing work within a short time.

Three-year or four-year apprenticeship programs, usually jointly sponsored by local unions and contractors, provide on-the-job training in addition to a recommended minimum of 144 hours of classroom instruction each year. A written test and a physical exam may be required. In the classroom, apprentices learn applied mathematics, blueprint reading, and safety. Apprentices generally receive special instruction in layout work and cost estimation. Some workers learn their jobs by attending trade or vocational-technical schools.

Cement masons, concrete finishers, segmental pavers, and terrazzo workers should enjoy doing demanding work. They should take pride in craftsmanship and be able to work without close supervision.

With additional training, cement masons, concrete finishers, segmental pavers, or terrazzo workers may become supervisors for masonry contractors. Some eventually become owners of businesses employing many workers and may spend most of their time as managers rather than practicing their original trade. Others move into closely related areas such as construction management, building inspection, or contract estimation.

Job Outlook

Opportunities for cement masons, concrete finishers, segmental pavers, and terrazzo workers are expected to be favorable as the demand meets the supply of workers trained in this craft. In addition, many potential workers may prefer work that is less strenuous and has more comfortable working conditions.

Employment of cement masons, concrete finishers, segmental pavers, and terrazzo workers is expected to grow faster than the average for all occupations through 2012. These workers will be needed to build highways, bridges, subways, factories, office buildings, hotels, shopping centers, schools, hospitals, and other structures. In addition, the increasing use of concrete as a building material will add to the demand. More cement masons also will be needed to repair and renovate existing highways, bridges, and other structures. In addition to job growth, other openings will become available as experienced workers transfer to other occupations or leave the labor force.

Employment of cement masons, concrete finishers, segmental pavers, and terrazzo workers, like that of many other construction workers, is sensitive to the fluctuations of the economy. Workers in these trades may experience periods of unemployment when the overall level of construction falls. On the other hand, shortages of these workers may occur in some areas during peak periods of building activity.

Earnings

In 2002, the median hourly earnings of cement masons and concrete finishers were $14.74. The middle 50 percent earned between $11.52 and $20.02. The top 10 percent earned over $26.02, and the bottom 10 percent earned less than $9.31. Median hourly earnings in the industries employing the largest numbers of cement masons and concrete finishers in 2002 are shown below:

Nonresidential building construction	$16.24
Highway, street, and bridge construction	15.37
Other specialty trade contractors	15.19
Foundation, structure, and building exterior contractors	14.52
Residential building construction	14.44

In 2002, the median hourly earnings of terrazzo workers and finishers were $13.42. The middle 50 percent earned between $10.46 and $17.72. The top 10 percent earned over $23.70, and the bottom 10 percent earned less than $8.94.

Like those of other construction trades workers, earnings of cement masons, concrete finishers, segmental pavers, and terrazzo workers may be reduced on occasion because poor weather and downturns in construction activity limit the amount of time they can work. Cement masons often work overtime, with premium pay, because once concrete has been placed, the job must be completed.

Many cement masons, concrete finishers, segmental pavers, and terrazzo workers belong to the Operative Plasterers' and Cement Masons' International Association of the United States and Canada, or to the International Union of Bricklayers and Allied Craftworkers. Some terrazzo workers belong to the United Brotherhood of Carpenters and Joiners of the United States. Nonunion workers generally have lower wage rates than do union workers. Apprentices usually start at 50 to 60 percent of the rate paid to experienced workers.

Related Occupations

Cement masons, concrete finishers, segmental pavers, and terrazzo workers combine skill with knowledge of building materials to con-

struct buildings, highways, and other structures. Other occupations involving similar skills and knowledge include brickmasons, blockmasons, and stonemasons; carpet, floor, and tile installers and finishers; drywall installers, ceiling tile installers, and tapers; and plasterers and stucco masons.

Sources of Additional Information

For information about apprenticeships and work opportunities, contact local concrete or terrazzo contractors, locals of unions previously mentioned, a local joint union-management apprenticeship committee, or the nearest office of the State employment service or apprenticeship agency.

For general information about cement masons, concrete finishers, segmental pavers, and terrazzo workers, contact:

➤ Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.

➤ Associated General Contractors of America, Inc., 333 John Carlyle St., Alexandria, VA 22314. Internet: **http://www.agc.org**

➤ International Union of Bricklayers and Allied Craftworkers, International Masonry Institute, The James Brice House, 42 East St., Annapolis, MD 21401. Internet: **http://www.imiweb.org**

➤ Operative Plasterers' and Cement Masons' International Association of the United States and Canada, 14405 Laurel Place, Suite 300, Laurel, MD 20707. Internet: **http://www.opcmia.org**

➤ National Terrazzo and Mosaic Association, 110 E. Market St., Suite 200 A, Leesburg, VA 20176.

➤ Portland Cement Association, 5420 Old Orchard Rd., Skokie, IL 60077. Internet: **http://www.portcement.org**

➤ United Brotherhood of Carpenters and Joiners of America, 50 F St. NW., Washington, DC 20001. Internet: **http://www.carpenters.org**

For general information about cement masons and concrete finishers, contact:

➤ National Concrete Masonry Association, 13750 Sunrise Valley Dr., Herndon, VA 20171-3499. Internet: **http://www.ncma.org**

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Actors, Producers, and Directors

(0*NET 27-2011.00, 27-2012.01, 27-2012.02,

27-2012.03, 27-2012.04, 27-2012.05)

Significant Points

- Actors endure long periods of unemployment, intense competition for roles, and frequent rejections in auditions.
- Formal training through a university or acting conservatory is typical; however, many actors, producers, and directors find work on the basis of their experience and talent alone.
- Because earnings for actors are erratic, many supplement their incomes by holding jobs in other fields.

Nature of the Work

Actors, producers, and directors express ideas and create images in theater, film, radio, television, and other performing arts media. They interpret a writer's script to entertain, inform, or instruct an audience. Although the most famous actors, producers, and directors work in film, network television, or theater in New York or Los Angeles, far more work in local or regional television studios, theaters, or film production companies, preparing advertising, public-relations, or independent, small-scale movie productions.

Actors perform in stage, radio, television, video, or motion picture productions. They also work in cabarets, nightclubs, theme parks, commercials, and "industrial" films produced for training and educational purposes. Most actors struggle to find steady work; only a few ever achieve recognition as stars. Some well-known, experienced performers may be cast in supporting roles. Others work as "extras," with no lines to deliver, or make brief, cameo appearances, speaking only one or two lines. Some actors do voiceover and narration work for advertisements, animated features, books on tape, and other electronic media. They also teach in high school or university drama departments, acting conservatories, or public programs.

Producers are entrepreneurs, overseeing the business and financial decisions of a motion picture, made-for-television feature, or stage production. They select scripts, approve the development of ideas for the production, arrange financing, and determine the size and cost of the endeavor. Producers hire or approve the selection of directors, principal cast members, and key production staff members. They also negotiate contracts with artistic and design personnel in accordance with collective bargaining agreements and guarantee payment of salaries, rent, and other expenses. Television and radio producers determine which programs, episodes, or news segments get aired. They may research material, write scripts, and oversee the production of individual pieces. Producers in any medium coordinate the activities of writers, directors, managers, and agents to ensure that each project stays on schedule and within budget.

Directors are responsible for the creative decisions of a production. They interpret scripts, express concepts to set and costume designers, audition and select cast members, conduct rehearsals, and direct the work of cast and crew. Directors cue the performers and technicians to make entrances or to make light, sound, or set changes. They approve the design elements of a production, including the sets, costumes, choreography, and music.

Working Conditions

Actors, producers, and directors work under constant pressure. Many face stress from the continual need to find their next job. To succeed, actors, producers, and directors need patience and commitment to their craft. Actors strive to deliver flawless performances, often while working under undesirable and unpleasant conditions. Producers and directors organize rehearsals; meet with writers, designers, financial backers, and production technicians. They experience stress not only from these activities, but also from the need to adhere to budgets, union work rules, and production schedules.

Acting assignments typically are short term—ranging from 1 day to a few months—which means that actors frequently experience long periods of unemployment between jobs. The uncertain nature of the work results in unpredictable earnings and intense competition for even the lowest-paid jobs. Often, actors, producers, and directors must hold other jobs in order to sustain a living.

When performing, actors typically work long, irregular hours. For example, stage actors may perform one show at night while rehearsing another during the day. They also might travel with a show when it tours the country. Movie actors may work on location, sometimes under adverse weather conditions, and may spend considerable time in their trailers or dressing rooms waiting to perform their scenes. Actors who perform in a television series often appear on camera with little preparation time, because scripts tend to be revised frequently or even written moments before taping. Those who appear live or before a studio audience must be able to handle impromptu situations and calmly ad lib, or substitute, lines when necessary.

Evening and weekend work is a regular part of a stage actor's life. On weekends, more than one performance may be held per day. Actors and directors working on movies or television programs—especially those who shoot on location—may work in the early morning or late evening hours to film night scenes or tape scenes inside public facilities outside of normal business hours.

Actors should be in good physical condition and have the necessary stamina and coordination to move about theater stages

Directors, who are responsible for creative decisions, instruct actors and technicians on how to play a scene.

and large movie and television studio lots. They also need to maneuver about complex technical sets while staying in character and projecting their voices audibly. Actors must be fit to endure heat from stage or studio lights and the weight of heavy costumes. Producers and directors ensure the safety of actors by conducting extra rehearsals on the set so that the actors can learn the layout of set pieces and props, by allowing time for warmups and stretching exercises to guard against physical and vocal injuries, and by providing an adequate number of breaks to prevent heat exhaustion and dehydration.

Employment

In 2002, actors, producers, and directors held about 139,000 jobs, primarily in motion picture and video, performing arts, and broadcast industries. Because many others were between jobs, the total number of actors, producers, and directors available for work was higher. Employment in the theater, and other performing arts companies, is cyclical—higher in the fall and spring seasons—and concentrated in New York and other major cities with large commercial houses for musicals and touring productions. Also, many cities support established professional regional theaters that operate on a seasonal or year-round basis. About one fourth of actors, producers, and directors are self-employed.

Actors, producers, and directors may find work in summer festivals, on cruise lines, and in theme parks. Many smaller, nonprofit professional companies, such as repertory companies, dinner theaters, and theaters affiliated with drama schools, acting conservatories, and universities, provide employment opportunities for local amateur talent and professional entertainers. Auditions typically are held in New York for many productions across the country and for shows that go on the road.

Employment in motion pictures and in films for television is centered in New York and Hollywood. However, small studios are located throughout the country. Many films are shot on location and may employ local professional and nonprofessional actors. In television, opportunities are concentrated in the network centers of New York and Los Angeles, but cable television services and local television stations around the country also employ many actors, producers, and directors.

Training, Other Qualifications, and Advancement

Persons who become actors, producers, and directors follow many paths. Employers generally look for people with the creative instincts, innate talent, and intellectual capacity to perform. Actors should possess a passion for performing and enjoy entertaining others. Most aspiring actors participate in high school and college plays, work in college radio stations, or perform with local community theater groups. Local and regional theater experience and work in summer stock, on cruise lines, or in theme parks helps many young actors hone their skills and earn qualifying credits toward membership in one of the actors' unions. Union membership and work experience in smaller communities may lead to work in larger cities, notably New York or Los Angeles. In television and film, actors and directors typically start in smaller television markets or with independent movie production companies and then work their way up to larger media markets and major studio productions. Intense competition, however, ensures that only a few actors reach star billing.

Formal dramatic training, either through an acting conservatory or a university program, generally is necessary; however, some people successfully enter the field without it. Most people studying for a bachelor's degree take courses in radio and television broadcasting, communications, film, theater, drama, or dramatic literature. Many continue their academic training and receive a Master of Fine Arts (MFA) degree. Advanced curricula may include courses in stage speech and movement, directing, playwriting, and design, as well as intensive acting workshops. The National Association of Schools of Theatre accredits 128 programs in theater arts.

Actors, regardless of experience level, may pursue workshop training through acting conservatories or by being mentored by a drama coach. Actors also research roles so that they can grasp concepts quickly during rehearsals and understand the story's setting and background. Sometimes actors learn a foreign language or train with a dialect coach to develop an accent to make their characters more realistic.

Actors need talent, creative ability, and training that will enable them to portray different characters. Because competition for parts is fierce, versatility and a wide range of related performance skills, such as singing, dancing, skating, juggling, or miming are especially useful. Experience in horseback riding, fencing, or stage combat also can lift some actors above the average and get them noticed by producers and directors. Actors must have poise, stage presence, the capability to affect an audience, and the ability to follow direction. Modeling experience also may be helpful. Physical appearance, such as possessing the right size, weight, or features, often is a deciding factor in being selected for particular roles.

Many professional actors rely on agents or managers to find work, negotiate contracts, and plan their careers. Agents generally earn a percentage of the pay specified in an actor's contract. Other actors rely solely on attending open auditions for parts. Trade publications list the times, dates, and locations of these auditions.

To become a movie extra, one usually must be listed by a casting agency, such as Central Casting, a no-fee agency that supplies extras to the major movie studios in Hollywood. Applicants are accepted only when the number of persons of a particular type on the list—for example, athletic young women, old men, or small children—falls below the foreseeable need. In recent years, only a very small proportion of applicants have succeeded in being listed.

There are no specific training requirements for producers. They come from many different backgrounds. Talent, experience, and business acumen are important determinants of success for producers. Actors, writers, film editors, and business managers commonly enter the field. Also, many people who start out as actors move into directing, while some directors might try their hand at acting. Producers often start in a theatrical management office, working for a press agent, managing director, or business manager. Some start in a performing arts union or service organization. Others work behind the scenes with successful directors, serve on boards of directors, or promote their own projects. No formal training exists for producers; however, a growing number of colleges and universities now offer degree programs in arts management and in managing nonprofits.

As the reputations and box-office draw of actors, producers, and directors grow, they might work on bigger budget productions, on network or syndicated broadcasts, or in more prestigious theaters. Actors may advance to lead roles and receive star billing. A few actors move into acting-related jobs, such as drama coaches or directors of stage, television, radio, or motion

picture productions. Some teach drama privately or in colleges and universities.

Job Outlook

Employment of actors, producers, and directors is expected to grow about as fast as the average for all occupations through 2012. Although a growing number of people will aspire to enter these professions, many will leave the field early because the work—when it is available—is hard, the hours are long, and the pay is low. Competition for jobs will be stiff, in part because the large number of highly trained and talented actors auditioning for roles generally exceeds the number of parts that become available. Only performers with the most stamina and talent will find regular employment.

Expanding cable and satellite television operations, increasing production and distribution of major studio and independent films, and continued growth and development of interactive media, such as direct-for-Web movies and videos, should increase demand for actors, producers, and directors. However, greater emphasis on national, rather than local, entertainment productions may restrict employment opportunities in the broadcasting industry.

Venues for live entertainment, such as Broadway and Off-Broadway theaters, touring productions and repertory theaters in many major metropolitan areas, theme parks, and resorts, are expected to offer many job opportunities; however, prospects in these venues are more variable, because they fluctuate with economic conditions.

Earnings

Median annual earnings of salaried actors were $23,470 in 2002. The middle 50 percent earned between $15,320 and $53,320. The lowest 10 percent earned less than $13,330, and the highest 10 percent earned more than $106,360. Median annual earnings in the industries employing the largest numbers of actors were as follows:

Accounting, tax preparation, bookkeeping, and payroll services	$29,590
Performing arts companies	28,850
Motion picture and video industries	17,610

Minimum salaries, hours of work, and other conditions of employment are covered in collective bargaining agreements between the producers and the unions representing workers. The Actors' Equity Association (Equity) represents stage actors; the Screen Actors Guild (SAG) covers actors in motion pictures, including television, commercials, and films; and the American Federation of Television and Radio Artists (AFTRA) represents television and radio studio performers. While these unions generally determine minimum salaries, any actor or director may negotiate for a salary higher than the minimum.

Under terms of a joint SAG and AFTRA contract covering all unionized workers, motion picture and television actors with speaking parts earned a minimum daily rate of $678 or $2,352 for a 5-day week as of July 1, 2003. Actors also receive contributions to their health and pension plans and additional compensation for reruns and foreign telecasts of the productions in which they appear.

According to Equity, the minimum weekly salary for actors in Broadway productions as of June 30, 2003 was $1,354. Actors in Off-Broadway theaters received minimums ranging from $479 to $557 a week as of October 27, 2003, depending on the seating capacity of the theater. Regional theaters that operate under an Equity agreement pay actors $531 to $800 per week. For touring productions, actors receive an additional $111 per day for living expenses ($117 per day in larger, higher cost cities).

Some well-known actors—stars—earn well above the minimum; their salaries are many times the figures cited, creating the false impression that all actors are highly paid. For example, of the nearly 100,000 SAG members, only about 50 might be considered stars. The average income that SAG members earn from acting—less than $5,000 a year—is low because employment is erratic. Therefore, most actors must supplement their incomes by holding jobs in other occupations.

Many actors who work more than a set number of weeks per year are covered by a union health, welfare, and pension fund, which includes hospitalization insurance and to which employers contribute. Under some employment conditions, Equity and AFTRA members receive paid vacations and sick leave.

Median annual earnings of salaried producers and directors were $46,240 in 2002. The middle 50 percent earned between $31,990 and $70,910. The lowest 10 percent earned less than $23,300, and the highest 10 percent earned more than $119,760. Median annual earnings were $56,090 in motion picture and video industries and $38,480 in radio and television broadcasting.

Many stage directors belong to the Society of Stage Directors and Choreographers (SSDC), and film and television directors belong to the Directors Guild of America. Earnings of stage directors vary greatly. According to the SSDC, summer theaters offer compensation, including "royalties" (based on the number of performances), usually ranging from $2,500 to $8,000 for a 3- to 4-week run. Directing a production at a dinner theater generally will pay less than directing one at a summer theater, but has more potential for generating income from royalties. Regional theaters may hire directors for longer periods, increasing compensation accordingly. The highest-paid directors work on Broadway and commonly earn $50,000 per show. However, they also receive payment in the form of royalties—a negotiated percentage of gross box office receipts—that can exceed their contract fee for long-running box office successes.

Stage producers seldom get a set fee; instead, they get a percentage of a show's earnings or ticket sales.

Related Occupations

People who work in performing arts occupations that may require acting skills include announcers; dancers and choreographers; and musicians, singers, and related workers. Others working in film- and theater-related occupations are makeup artists, theatrical and performance; fashion designers; set and exhibit designers; and writers and authors. Producers share many responsibilities with those who work as top executives.

Sources of Additional Information

For general information about theater arts and a list of accredited college-level programs, contact:

➤ National Association of Schools of Theater, 11250 Roger Bacon Dr., Suite 21, Reston, VA 20190. Internet: **http://nast.arts-accredit.org**

For general information on actors, producers, and directors, contact any of the following organizations:

➤ Actors Equity Association, 165 West 46th St., New York, NY 10036. Internet: **http://www.actorsequity.org**

➤ Screen Actors Guild, 5757 Wilshire Blvd., Los Angeles, CA 90036-3600. Internet: **http://www.sag.org**

➤ American Federation of Television and Radio Artists—Screen Actors Guild, 4340 East-West Hwy., Suite 204, Bethesda, MD 20814-4411. Internet: **http://www.aftra.org** or **http://www.sag.org**

Announcers

(0*NET 27-3011.00, 27-3012.00)

Significant Points

- Competition for announcer jobs will continue to be keen.
- Jobs at small stations usually have low pay, but offer the best opportunities for beginners.
- Related work experience at a campus radio station or as an intern at a commercial station can be helpful in breaking into the occupation.

Nature of the Work

Announcers in radio and television perform a variety of tasks on and off the air. They announce station program information, such as program schedules and station breaks for commercials, or public service information, and they introduce and close programs. Announcers read prepared scripts or ad-lib commentary on the air, as they present news, sports, weather, time, and commercials. If a written script is required, they may do the research and writing. Announcers also interview guests and moderate panels or discussions. Some provide commentary for the audience during sporting events, at parades, and on other occasions. Announcers often are well known to radio and television audiences and may make promotional appearances and remote broadcasts for their stations.

Radio announcers often are called *disc jockeys* (*DJs*). Some disc jockeys specialize in one kind of music, announcing selections as they air them. Most DJs do not select much of the music they play (although they often did so in the past); instead, they follow schedules of commercials, talk, and music provided to them by management. While on the air, DJs comment on the music, weather, and traffic. They may take requests from listeners, interview guests, and manage listener contests.

Newscasters, or *anchors*, work at large stations and specialize in news, sports, or weather. (See the related statement on news analysts, reporters, and correspondents elsewhere in the *Handbook*.) *Show hosts* may specialize in a certain area of interest, such as politics, personal finance, sports, or health. They contribute to the preparation of the program's content, interview guests, and discuss issues with viewers, listeners, or the studio audience.

Announcers at smaller stations may cover all of these areas and tend to have more off-air duties as well. They may operate the control board, monitor the transmitter, sell commercial time to advertisers, keep a log of the station's daily programming, and produce advertisements and other recorded material. Advances in technology make it possible for announcers to do some work previously performed by broadcast technicians. At many music stations, the announcer is simultaneously responsible for both announcing and operating the control board, which is used to broadcast programming, commercials, and public-service announcements according to the station's schedule. (See the statement on broadcast and sound engineering technicians and radio operators elsewhere in the *Handbook*.) Public radio and television announcers are involved in station fundraising efforts.

Changes in technology have led to more remote operation of stations. Several stations in different locations of the same region may be operated from one office. Some stations operate without any staff overnight, playing programming from a satellite feed or using programming that was recorder earlier, including segments from announcers.

Announcers frequently participate in community activities. Sports announcers, for example, may serve as masters of ceremonies at sports club banquets or may greet customers at openings of sporting goods stores.

Although most announcers are employed in broadcasting, some are employed in the motion picture production industry. *Public address system announcers* provide information to the audience at sporting, performing arts, and other events. Some disc jockeys announce and play music at clubs, dances, restaurants, and weddings.

Working Conditions

Announcers usually work in well-lighted, air-conditioned, soundproof studios. The broadcast day is long for radio and TV stations—many are on the air 24 hours a day—so announcers can expect to work unusual hours. Many present early-morning shows, when most people are getting ready for work or commuting, while others do late-night programs.

Announcers often work within tight schedule constraints, which can be physically and mentally stressful. For many announcers, the intangible rewards—creative work, many personal contacts, and the satisfaction of becoming widely known—far outweigh the disadvantages of irregular and often unpredictable hours, work pressures, and disrupted personal lives.

Employment

Announcers held about 76,000 jobs in 2002. More than half were employed in broadcasting, but some were self-employed freelance announcers who sold their services for individual assignments to networks and stations or to advertising agencies and other independent producers. About a third of all announcers work part time.

Training, Other Qualifications, and Advancement

Entry into this occupation is highly competitive. Formal training in broadcasting from a college or technical school (private broadcasting school) is valuable. Most announcers have a bachelor's degree in a major such as communications, broadcasting, or journalism. Station officials pay particular attention to taped auditions that show an applicant's delivery and—in television—appearance and style on commercials, news, and interviews. Those hired by television stations usually start out

Some public-address system announcers work at sporting events.

as production assistants, researchers, or reporters and are given a chance to move into announcing if they show an aptitude for "on-air" work. A beginner's chance of landing an on-air job is remote, except possibly at a small radio station, as a substitute for a familiar announcer, or on the late-night shift at a larger station. In radio, newcomers usually start out taping interviews and operating equipment.

Announcers usually begin at a station in a small community and, if they are qualified, may move to a better paying job in a large city. They also may advance by hosting a regular program as a disc jockey, sportscaster, or other specialist. Competition is particularly intense for employment by networks, and employers look for college graduates with at least several years of successful announcing experience.

Announcers must have a pleasant and well-controlled voice, good timing, excellent pronunciation, and correct grammar. College broadcasting programs offer courses, such as voice and diction, to help students improve their vocal qualities. Television announcers need a neat, pleasing appearance as well. Knowledge of theater, sports, music, business, politics, and other subjects likely to be covered in broadcasts improves one's chances for success. Announcers also must be computer literate, because programming is created and edited by computer. Announcers need strong writing skills, because they normally write their own material. In addition, they should be able to ad-lib all or part of a show and to work under tight deadlines. The most successful announcers attract a large audience by combining a pleasing personality and voice with an appealing style.

High school and college courses in English, public speaking, drama, foreign languages, and computer science are valuable, and hobbies such as sports and music are additional assets. Students may gain valuable experience at campus radio or TV facilities and at commercial stations while serving as interns. Paid or unpaid internships provide students with hands-on training and the chance to establish contacts in the industry. Unpaid interns often receive college credit and are allowed to observe and assist station employees. Although the Fair Labor Standards Act limits the work unpaid interns may perform in a station, unpaid internships are the rule. Unpaid internships sometimes lead to paid internships, which are valuable because interns do work ordinarily performed by regular employees and may even go on the air.

Persons considering enrolling in a broadcasting school should contact personnel managers of radio and television stations, as well as broadcasting trade organizations, to determine the school's reputation for producing suitably trained candidates.

Job Outlook

Competition for jobs as announcers will be keen because the broadcasting field attracts many more jobseekers than there are jobs. Small radio stations are more inclined to hire beginners, but the pay is low. Applicants who have completed internships or have related work experience usually receive preference for available positions. Because competition for ratings is so intense in major metropolitan areas, large stations will continue to seek announcers who have proven that they can attract and retain a sizable audience.

Announcers who are knowledgeable in business, consumer, and health news may have an advantage over others. While specialization is more common at large stations and the networks, many small stations also encourage it.

Employment of announcers is expected to decline through 2012, due to the lack of growth of new radio and television stations and consolidation of existing stations, but some job openings will arise from the need to replace those who transfer to other kinds of work or leave the labor force. Some announcers leave the field because they cannot advance to better paying jobs. Changes in station ownership, format, and ratings frequently cause periods of unemployment for many announcers.

Increasing consolidation of radio and television stations, new technology, and the growth of alternative media sources, such as cable television and satellite radio, will contribute to the expected decline in employment of announcers. Consolidation in broadcasting may lead to an increased use of syndicated programming and programs originating outside a station's viewing or listening area. Digital technology is increasing the productivity of announcers, reducing the time required to edit material or perform other off-air technical and production work.

Earnings

Salaries in broadcasting vary widely, but generally are relatively low, except for announcers who work for large stations in major markets or for networks. Earnings are higher in television than in radio and higher in commercial than in public broadcasting.

Median hourly earnings of announcers in 2002 were $9.91. The middle 50 percent earned between $7.13 and $15.10. The lowest 10 percent earned less than $6.14, and the highest 10 percent earned more than $24.92. Median hourly earnings of announcers in 2002 were $9.86 in the radio and television broadcasting industry.

Related Occupations

The success of announcers depends upon how well they communicate. Others who must be skilled at oral communication include news analysts, reporters, and correspondents; interpreters and translators; salespersons and those in related occupations; and public-relations specialists. Many announcers also must entertain their audience, so their work is similar to other entertainment-related occupations, such as actors, producers, and directors; and musicians, singers, and related workers. Announcers perform a variety of duties, including some technical operations, like broadcast sound engineering technicians and radio operators.

Sources of Additional Information

General information on the broadcasting industry is available from

➤ National Association of Broadcasters, 1771 N St. NW., Washington, DC 20036. Internet: **http://www.nab.org**

Artists and Related Workers

(0*NET 27-1011.00, 27-1013.01, 27-1013.02, 27-1013.03, 27-1013.04, 27-1014.00)

Significant Points

- More than half of all artists and related workers were self-employed—almost eight times the proportion for all professional and related occupations.
- Artists usually develop their skills through a bachelor's degree program or other postsecondary training in art or design.
- Keen competition is expected for both salaried jobs and freelance work, because many talented people are attracted to the visual arts.

Nature of the Work

Artists create art to communicate ideas, thoughts, or feelings. They use a variety of methods—painting, sculpting, or illustration—and an assortment of materials, including oils, watercolors, acrylics, pastels, pencils, pen and ink, plaster, clay, and computers. Artists' works may be realistic, stylized, or abstract and may depict objects, people, nature, or events.

Artists generally fall into one of three categories. *Art directors* formulate design concepts and presentation approaches for visual communications media. *Fine artists, including painters, sculptors, and illustrators* create original artwork, using a variety of media and techniques. *Multi-media artists and animators* create special effects, animation, or other visual images on film, on video, or with computers or other electronic media. (Designers, including graphic designers, are discussed elsewhere in the *Handbook*.)

Art directors develop design concepts and review material that is to appear in periodicals, newspapers, and other printed or digital media. They decide how best to present the information visually, so that it is eye catching, appealing, and organized. Art directors decide which photographs or artwork to use and oversee the layout design and production of the printed material. They may direct workers engaged in artwork, layout design, and copywriting.

Fine artists typically display their work in museums, commercial art galleries, corporate collections, and private homes. Some of their artwork may be commissioned (done on request from clients), but most is sold by the artist or through private art galleries or dealers. The gallery and the artist predetermine how much each will earn from the sale. Only the most successful fine artists are able to support themselves solely through the sale of their works. Most fine artists must work in an unrelated field to support their art careers. Some work in museums or art galleries as fine-arts directors or as curators, planning and setting up art exhibits. Others work as art critics for newspapers or magazines or as consultants to foundations or institutional collectors.

Usually, fine artists specialize in one or two art forms, such as painting, illustrating, sketching, sculpting, printmaking, and restoring. *Painters, illustrators, cartoonists, and sketch artists* work with two-dimensional art forms, using shading, perspective, and color to produce realistic scenes or abstractions.

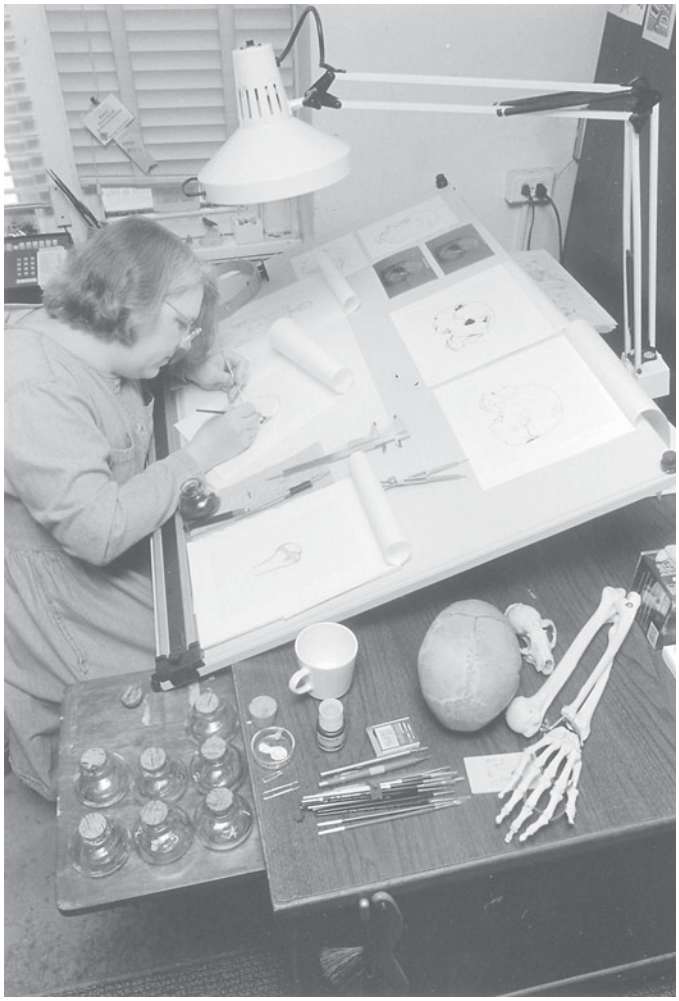
Illustrators typically create pictures for books, magazines, and other publications, and for commercial products such as textiles, wrapping paper, stationery, greeting cards, and calendars. Increasingly, illustrators work in digital format, preparing work directly on a computer.

Medical and *scientific illustrators* combine drawing skills with knowledge of biology or other sciences. Medical illustrators draw illustrations of human anatomy and surgical procedures. Scientific illustrators draw illustrations of animal and plant life, atomic and molecular structures, and geologic and planetary formations. The illustrations are used in medical and scientific publications and in audiovisual presentations for teaching purposes. Medical illustrators also work for lawyers, producing exhibits for court cases.

Cartoonists draw political, advertising, social, and sports cartoons. Some cartoonists work with others who create the idea or story and write the captions. Most cartoonists have comic, critical, or dramatic talents in addition to drawing skills.

Sketch artists create likenesses of subjects using pencil, charcoal, or pastels. Sketches are used by law enforcement agencies to assist in identifying suspects, by the news media to depict courtroom scenes, and by individual patrons for their own enjoyment.

Sculptors design three-dimensional artworks, either by molding and joining materials such as clay, glass, wire, plastic, fabric, or metal or by cutting and carving forms from a block of plaster, wood, or stone. Some sculptors combine various materials to create mixed-media installations. Some incorporate light, sound, and motion into their works.



Medical illustrators combine drawing skills with knowledge of the biological sciences.

Printmakers create printed images from designs cut or etched into wood, stone, or metal. After creating the design, the artist inks the surface of the woodblock, stone, or plate and uses a printing press to roll the image onto paper or fabric. Some make prints by pressing the inked surface onto paper by hand or by graphically encoding and processing data, using a computer. The digitized images are then printed on paper with the use of a computer printer.

Painting restorers preserve and restore damaged and faded paintings. They apply solvents and cleaning agents to clean the surfaces of the paintings, they reconstruct or retouch damaged areas, and they apply preservatives to protect the paintings. All this is highly detailed work and usually is reserved for experts in the field.

Multi-media artists and animators work primarily in motion picture and video industries, advertising, and computer systems design services. They draw by hand and use computers to create the large series of pictures that form the animated images or special effects seen in movies, television programs, and computer games. Some draw storyboards for television commercials, movies, and animated features. Storyboards present television commercials in a series of scenes similar to a comic strip and allow an advertising agency to evaluate proposed commercials with the company doing the advertising. Storyboards also serve as guides to placing actors and cameras on the television or motion picture set and to other details that need to be taken care of during the production of commercials.

Working Conditions

Many artists work in fine- or commercial-art studios located in office buildings, warehouses, or lofts. Others work in private studios in their homes. Some fine artists share studio space, where they also may exhibit their work. Studio surroundings usually are well lighted and ventilated; however, fine artists may be exposed to fumes from glue, paint, ink, and other materials and to dust or other residue from filings, splattered paint, or spilled fluids. Artists who sit at drafting tables or who use computers for extended periods may experience back pain, eyestrain, or fatigue.

Artists employed by publishing companies, advertising agencies, and design firms generally work a standard workweek. During busy periods, they may work overtime to meet deadlines. Self-employed artists can set their own hours, but may spend much time and effort selling their artwork to potential customers or clients and building a reputation.

Employment

Artists held about 149,000 jobs in 2002. More than half were self-employed. Of the artists who were not self-employed, many worked in advertising and related services; newspaper, periodical, book, and software publishers; motion picture and video industries; specialized design services; and computer systems design and related services. Some self-employed artists offered their services to advertising agencies, design firms, publishing houses, and other businesses on a contract or freelance basis.

Training, Other Qualifications, and Advancement

Training requirements for artists vary by specialty. Although formal training is not strictly necessary for fine artists, it is very difficult to become skilled enough to make a living without some training. Many colleges and universities offer programs leading to the Bachelor in Fine Arts (BFA) and Master in Fine Arts (MFA) degrees. Course work usually includes core subjects, such as English, social science, and natural science, in addition to art history and studio art.

Independent schools of art and design also offer postsecondary studio training in the fine arts leading to an Associate in Art or Bachelor in Fine Arts degree. Typically, these programs focus more intensively on studio work than do the academic programs in a university setting. The National Association of Schools of Art and Design accredits more than 200 postsecondary institutions with programs in art and design; most award a degree in art.

Formal educational programs in art also provide training in computer techniques. Computers are used widely in the visual arts, and knowledge and training in computer graphics and other visual display software are critical elements of many jobs in these fields.

Those who want to teach fine arts at public elementary or secondary schools must have a teaching certificate in addition to a bachelor's degree. An advanced degree in fine arts or arts administration is necessary for management or administrative positions in government or in foundations or for teaching in colleges and universities. (See the statements for teachers-postsecondary; and teachers-preschool, kindergarten, elementary, middle, and secondary school teachers elsewhere in the *Handbook*.)

Illustrators learn drawing and sketching skills through training in art programs and through extensive practice. Most employers prefer candidates with a bachelor's degree; however, some illustrators are contracted on the basis of portfolios of their past work.

Medical illustrators must have both a demonstrated artistic ability and a detailed knowledge of living organisms, surgical and medical procedures, and human and animal anatomy. A 4-year bachelor's degree combining art and premedical courses usually is preferred; a master's degree in medical illustration is recommended. This degree is offered in only five accredited schools in the United States.

Evidence of appropriate talent and skill, displayed in an artist's portfolio, is an important factor used by art directors, clients, and others in deciding whether to hire an individual or to contract out work. The portfolio is a collection of handmade, computer-generated, photographic, or printed samples of the artist's best work. Assembling a successful portfolio requires skills usually developed in a bachelor's degree program or through other postsecondary training in art or visual communications. Internships also provide excellent opportunities for artists to develop and enhance their portfolios.

Artists hired by advertising agencies often start with relatively routine work. While doing this work, however, they may observe and practice their skills on the side. Many artists freelance on a part-time basis while continuing to hold a full-time job until they are established. Others freelance part time while still in school, to develop experience and to build a portfolio of published work.

Freelance artists try to develop a set of clients who regularly contract for work. Some freelance artists are widely recognized for their skill in specialties such as magazine or children's book illustration. These artists may earn high incomes and can choose the type of work they do.

Fine artists advance professionally as their work circulates and as they establish a reputation for a particular style. Many of the most successful artists continually develop new ideas, and their work often evolves over time.

Job Outlook

Employment of artists and related workers is expected to grow about as fast as the average through the year 2012. Because the arts attract many talented people with creative ability, the number of aspiring artists continues to grow. Consequently, competition for both salaried jobs and freelance work in some areas is expected to be keen.

Art directors work in a variety of industries, such as advertising, public relations, publishing, and design firms. Despite an expanding number of opportunities, they should experience keen competition for the available openings.

Fine artists mostly work on a freelance, or commission, basis and may find it difficult to earn a living solely by selling their artwork. Only the most successful fine artists receive major commissions for their work. Competition among artists for the privilege of being shown in galleries is expected to remain acute, and grants from sponsors such as private foundations, State and local arts councils, and the National Endowment for the Arts should remain competitive. Nonetheless, studios, galleries, and individual clients are always on the lookout for artists who display outstanding talent, creativity, and style. Talented fine artists who have developed a mastery of artistic techniques and skills, including computer skills, will have the best job prospects.

The need for artists to illustrate and animate materials for magazines, journals, and other printed or electronic media will spur demand for illustrators and animators of all types. Growth in motion picture and video industries will provide new job opportunities for illustrators, cartoonists, and animators. Competition for most jobs, however, will be strong, because job opportunities are relatively few and the number of people interested in these positions usually exceeds the number of available openings. Employers should be able to choose from among the most qualified candidates.

Earnings

Median annual earnings of salaried art directors were $61,850 in 2002. The middle 50 percent earned between $44,740 and $85,010. The lowest 10 percent earned less than $32,410, and the highest 10 percent earned more than $115,570. Median annual earnings were $67,340 in advertising and related services.

Median annual earnings of salaried fine artists, including painters, sculptors, and illustrators, were $35,260 in 2002. The middle 50 percent earned between $23,970 and $48,040. The lowest 10 percent earned less than $16,900, and the highest 10 percent earned more than $73,560.

Median annual earnings of salaried multi-media artists and animators were $43,980 in 2002. The middle 50 percent earned between $33,970 and $61,120. The lowest 10 percent earned less than $25,830, and the highest 10 percent earned more than $85,160. Median annual earnings were $58,840 in motion picture and video industries.

Earnings for self-employed artists vary widely. Some charge only a nominal fee while they gain experience and build a reputation for their work. Others, such as well-established freelance fine artists and illustrators, can earn more than salaried artists. Many, however, find it difficult to rely solely on income earned from selling paintings or other works of art. Like other self-employed workers, freelance artists must provide their own benefits.

Related Occupations

Other workers who apply art skills include architects, except landscape and naval; archivists, curators, and museum technicians; designers; landscape architects; and photographers. Some computer-related occupations, including computer software engineers and desktop publishers, may require art skills.

Sources of Additional Information

For general information about art and design and a list of accredited college-level programs, contact:

➤ National Association of Schools of Art and Design, 11250 Roger Bacon Dr., Suite 21, Reston, VA 20190. Internet: **http://nasad.arts-accredit.org**

For information on careers in medical illustration, contact:

➤ Association of Medical Illustrators, 5475 Mark Dabling Blvd., Suite 108, Colorado Springs, CO 80918. Internet: **http://www.ami.org**

Athletes, Coaches, Umpires, and Related Workers

(0*NET 27-2021.00, 27-2022.00, 27-2023.00)

Significant Points

- Work hours are often irregular; travel may be extensive.
- Career-ending injuries are always a risk for athletes.
- Job opportunities for coaches, sports instructors, umpires, referees, and sports officials will be best in high school and other amateur sports.
- Competition for professional athlete jobs will continue to be extremely intense; athletes who seek to compete professionally must have extraordinary talent, desire, and dedication to training.

Nature of the Work

We are a nation of sports fans and sports players. Interest in watching sports continues at a high level and recreational participation in sports continues to grow. Some of those who participate in amateur sports dream of becoming paid professional athletes, coaches, or sports officials but very few beat the long and daunting odds of making a full-time living from professional athletics. Those athletes who do make it to professional levels find that careers are short and jobs are insecure. Even though the chances of employment as a professional athlete are slim, there are many opportunities for at least a part-time job related to athletics as a coach, instructor, referee, or umpire in amateur athletics and in high schools, colleges, and universities.

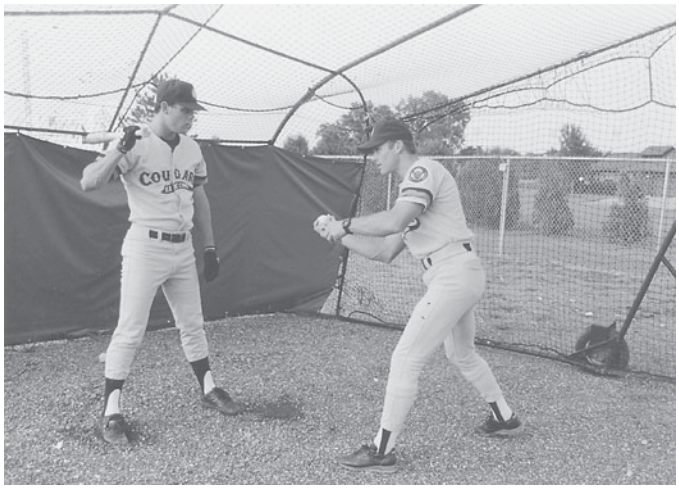
Athletes and *sports competitors* compete in organized, officiated sports events to entertain spectators. When playing a game, athletes are required to understand the strategies of their game while obeying the rules and regulations of the sport. The events in which they compete include both team sports—such as baseball, basketball, football, hockey, and soccer—and individual sports—such as golf, tennis, and bowling. As the type of sport varies, so does the level of play, ranging from unpaid high school athletics to professional sports, in which the best from around the world compete before international television audiences.

In addition to competing in athletic events, athletes spend many hours practicing skills and teamwork under the guidance of a coach or sports instructor. Most athletes spend hours in hard practices every day. They also spend additional hours viewing video tapes, in order to critique their own performances and techniques and to scout their opponents' tendencies and weaknesses to gain a competitive advantage. Some athletes may also be advised by *strength trainers* in an effort to gain muscle and stamina, while also preventing injury. Competition at all levels is extremely intense and job security is always precarious. As a result, many athletes train year round to maintain excellent form, technique, and peak physical condition. Very little downtime from the sport exists at the professional level. Athletes also must conform to regimented diets during the height of their sports season to supplement any physical training program. Many athletes push their bodies to the limit during both practice and play, so career-ending injury always is a risk. Even minor injuries to an athlete may put the player at risk of replacement.

Coaches organize, instruct, and teach amateur and professional athletes in fundamentals of individual and team sports. In individual sports, *instructors* may sometimes fill this role. Coaches train athletes for competition by holding practice sessions to perform drills and improve the athlete's skills and stamina. Using their expertise in the sport, coaches instruct the athlete on proper form and technique in beginning and, later, in advanced exercises attempting to maximize the players' physical potential. Along with overseeing athletes as they refine their individual skills, coaches also are responsible for managing the team during both practice sessions and competitions, and for instilling good sportsmanship, a competitive spirit, and teamwork. They may also select, store, issue, and inventory equipment, materials, and supplies. During competitions, for example, coaches substitute players for optimum team chemistry and success. In addition, coaches direct team strategy and may call specific plays during competition to surprise or overpower the opponent. To choose the best plays, coaches evaluate or "scout" the opposing team prior to the competition, allowing them to determine game strategies and practice specific plays.

Many coaches in high schools are primarily teachers of academic subjects who supplement their income by coaching part time. College coaches consider coaching a full-time discipline and may be away from home frequently as they travel to scout and recruit prospective players.

Sports instructors teach professional and nonprofessional athletes on an individual basis. They organize, instruct, train, and lead athletes of indoor and outdoor sports such as bowling, tennis, golf, and swimming. Because activities are as diverse as weight lifting, gymnastics, and scuba diving, and may include self-defense training such as karate, instructors tend to specialize in one or a few types of activities. Like coaches, sports instructors also may hold daily practice sessions and be responsible for any needed equipment and supplies. Using their knowledge of their sport, physiology, and corrective techniques, they determine the type and level of difficulty of exercises, prescribe specific drills, and correct the athlete's techniques. Some instructors also teach and demonstrate use of training apparatus, such as trampolines or weights, while correcting athletes' weaknesses and enhancing their conditioning. Using their expertise in the sport, sports instructors evaluate the athlete and the athlete's opponents to devise a competitive game strategy.



Athletes spend many hours practicing skills under the guidance of a coach or sports instructor.

Coaches and sports instructors sometimes differ in their approach to athletes because of the focus of their work. For example, while coaches manage the team during a game to optimize its chance for victory, sports instructors—such as those who work for professional tennis players—often are not permitted to instruct their athletes during competition. Sports instructors spend more of their time with athletes working one-on-one, which permits them to design customized training programs for each individual. Motivating athletes to play hard challenges most coaches and sports instructors but is vital for the athlete's success. Many coaches and instructors derive great satisfaction working with children or young adults, helping them to learn new physical and social skills and to improve their physical condition, as well as helping them to achieve success in their sport.

Umpires, referees, and other sports officials officiate at competitive athletic and sporting events. They observe the play, detect infractions of rules, and impose penalties established by the sports' rules and regulations. Umpires, referees, and sports officials anticipate play and position themselves to best see the action, assess the situation, and determine any violations. Some sports officials, such as boxing referees, may work independently, while others such as umpires—the sports officials of baseball—work in groups. Regardless of the sport, the job is highly stressful because officials are often required to make a decision in a matter of a split second, sometimes resulting in strong disagreement among competitors, coaches, or spectators.

Professional *scouts* evaluate the skills of both amateur and professional athletes to determine talent and potential. As a sports intelligence agent, the scout's primary duty is to seek out top athletic candidates for the team he or she represents, ultimately contributing to team success. At the professional level, scouts typically work for scouting organizations, or as freelance scouts. In locating new talent, scouts perform their work in secrecy so as to not "tip off" their opponents about their interest in certain players. At the college level, the head scout is often an assistant coach, although freelance scouts may aid colleges by providing reports about exceptional players to coaches. Scouts at this level seek talented high school athletes by reading newspapers, contacting high school coaches and alumni, attending high school games, and studying videotapes of prospects' performances.

Working Conditions

Irregular work hours are the trademark of the athlete. They also are common for the coach, as well as umpires, referees, and other sports officials. Athletes, coaches, umpires, and related workers often work Saturdays, Sundays, evenings, and holidays. Athletes and full-time coaches usually work more than 40 hours a week for several months during the sports season, if not most of the year. Some coaches in educational institutions may coach more than one sport, particularly at the high school level.

Athletes, coaches, and sports officials who participate in competitions that are held outdoors may be exposed to all weather conditions of the season; those involved in events that are held indoors tend to work in climate-controlled comfort, often in arenas, enclosed stadiums, or gymnasiums. Athletes, coaches, and some sports officials frequently travel to sporting events by bus or airplane. Scouts also travel extensively in locating talent, often by automobile.

Employment

Athletes, coaches, umpires, and related workers held about 158,000 jobs in 2002. Coaches and scouts held 130,000 jobs; athletes, 15,000; and umpires, referees, and other sports officials, 14,000. Large proportions of athletes, coaches, umpires, and related workers worked part time—about 37 percent, while 17 percent maintained variable schedules. Many sports officials and coaches receive such a small and irregular payment for their services (occasional officiating at club games, for example) that they may not consider themselves employed in these occupations, even part time.

About 27 percent of workers in this occupation were self-employed, earning prize money or fees for lessons, scouting, or officiating assignments, and many other coaches and sports officials, although technically not self-employed, have such irregular or tenuous working arrangements that their working conditions resemble self-employment.

Among those employed in wage and salary jobs, 20 percent held jobs in private educational services. About 12 percent worked in amusement, gambling, and recreation industries, including golf and tennis clubs, gymnasiums, health clubs, judo and karate schools, riding stables, swim clubs, and other sports and recreation-related facilities. Another 7 percent worked in the spectator sports industry.

Training, Other Qualifications, and Advancement

Education and training requirements for athletes, coaches, umpires, and related workers vary greatly by the level and type of sport. Regardless of the sport or occupation, jobs require immense overall knowledge of the game, usually acquired through years of experience at lower levels. Athletes usually begin competing in their sports while in elementary or middle school and continue through high school and sometimes college. They play in amateur tournaments and on high school and college teams, where the best attract the attention of professional scouts. Most schools require that participating athletes maintain specific academic standards to remain eligible to play. Becoming a professional athlete is the culmination of years of effort. Athletes who seek to compete professionally must have extraordinary talent, desire, and dedication to training.

For high school coach and sports instructor jobs, schools usually prefer to hire teachers willing to take on the jobs part time. If no one suitable is found, they hire someone from outside. Some entry-level positions for coaches or instructors require only experience derived as a participant in the sport or activity. Many coaches begin their careers as assistant coaches to gain the necessary knowledge and experience needed to become a head coach. Head coaches at larger schools that strive to compete at the highest levels of a sport require substantial experience as a head coach at another school or as an assistant coach. To reach the ranks of professional coaching, it usually takes years of coaching experience and a winning record in the lower ranks.

Public secondary school head coaches and sports instructors at all levels usually must have a bachelor's degree. (For information on teachers, including those specializing in physical education, see the section on teachers—preschool, kindergarten, elementary, middle, and secondary elsewhere in the *Handbook.)* Those who are not teachers must meet State requirements for certification in order to become a head coach. Certification, however, may not be required for coach and sports instructor jobs in private schools. Degree programs specifically related to coaching include exercise and sports science, physiology, kine-

siology, nutrition and fitness, physical education, and sports medicine.

For sports instructors, certification is highly desirable for those interested in becoming a tennis, golf, karate, or any other kind of instructor. Often, one must be at least 18 years old and CPR certified. There are many certifying organizations specific to the various sports, and their training requirements vary depending on their standards. Participation in a clinic, camp, or school usually is required for certification. Part-time workers and those in smaller facilities are less likely to need formal education or training.

Each sport has specific requirements for umpires, referees, and other sports officials. Referees, umpires, and other sports officials often begin their careers by volunteering for intramural, community, and recreational league competitions. For college refereeing, candidates must be certified by an officiating school and be evaluated during a probationary period. Some larger college conferences require officials to have certification and other qualifications, such as residence in or near the conference boundaries along with previous experience that typically includes several years officiating at high school, community college, or other college conference games.

Standards are even more stringent for officials in professional sports. For umpire jobs in professional baseball, for example, a high school diploma or equivalent is usually sufficient, plus 20/20 vision and quick reflexes. To qualify for the professional ranks, however, prospective candidates must attend professional umpire training school. Currently, there are two schools whose curriculums have been approved by the Professional Baseball Umpires Corporation (PBUC) for training. Top graduates are selected for further evaluation while officiating in a rookie minor league. Umpires then usually need 8 to 10 years of experience in various minor leagues before being considered for major league jobs. Football also is competitive, as candidates must have at least 10 years of officiating experience, with 5 of them at a collegiate varsity or minor professional level. For the National Football League (NFL), prospects are interviewed by clinical psychologists to determine levels of intelligence and ability to handle extremely stressful situations. In addition, the NFL's security department conducts thorough background checks. Potential candidates are likely to be interviewed by a panel from the NFL officiating department and are given a comprehensive examination on the rules of the sport.

Jobs as scouts require experience playing a sport at the college or professional level that enables them to spot young players who possess extraordinary athletic abilities and skills. Most beginning scout jobs are as part-time talent spotters in a particular area or region. Hard work and a record of success often lead to full-time jobs responsible for bigger territories. Some scouts advance to scouting director jobs or various administrative positions in sports.

Athletes, coaches, umpires, and related workers must relate well to others and possess good communication and leadership skills. Coaches also must be resourceful and flexible to successfully instruct and motivate individuals or groups of athletes.

Job Outlook

Employment of athletes, coaches, umpires, and related workers is expected to increase about as fast as the average for all occupations through the year 2012. Employment will grow as the general public continues to increasingly participate in organized sports as a form of entertainment, recreation, and physical conditioning. Job growth also will be driven by the increasing numbers of baby boomers approaching retirement, during which they are expected to become more active participants of leisure-time activities, such as golf and tennis, and require instruction. The large numbers of the children of baby boomers in high schools and colleges also will be active participants in athletics and require coaches and instructors.

Expanding opportunities are expected for coaches and instructors, as a higher value is being placed upon physical fitness in our society. Americans of all ages are engaging in more physical fitness activities, such as participating in amateur athletic competition and joining athletic clubs, and are being encouraged to participate in physical education. Employment of coaches and instructors also will increase with expansion of school and college athletic programs and growing demand for private sports instruction. Sports-related job growth within education also will be driven by the decisions of local school boards. Population growth dictates the construction of additional schools, particularly in the expanding suburbs. However, funding for athletic programs is often one of the first areas to be cut when budgets become tight, but the popularity of team sports often enables shortfalls to be offset somewhat by assistance from fundraisers, booster clubs, and parents. Persons who are State-certified to teach academic subjects in addition to physical education are likely to have the best prospects for obtaining coach and instructor jobs. The need to replace many high school coaches also will provide some coaching opportunities.

Competition for professional athlete jobs will continue to be extremely intense. Opportunities to make a living as a professional in individual sports such as golf or tennis may grow as new tournaments are established and prize money distributed to participants increases. Most professional athletes' careers last only several years due to debilitating injuries and age, so a large proportion of the athletes in these jobs is replaced every year, creating some job opportunities. However, a far greater number of talented young men and women dream of becoming a sports superstar and will be competing for a very limited number of job openings.

Opportunities should be best for persons seeking part-time umpire, referee, and other sports official jobs at the high school level, but competition is expected for higher paying jobs at the college level, and even greater competition for jobs in professional sports. Competition should be very keen for jobs as scouts, particularly for professional teams, as the number of available positions is limited.

Earnings

Median annual earnings of athletes were $45,320 in 2002. The lowest 10 percent earned less than $14,090, and the highest 10 percent earned more than $145,600. However, the highest paid professional athletes earn salaries far in excess of these estimates.

Median annual earnings of umpires and related workers were $20,540 in 2002. The middle 50 percent earned between $16,210 and $29,490. The lowest 10 percent earned less than $13,760, and the highest 10 percent earned more than $40,350.

Median annual earnings of coaches and scouts were $27,880 in 2002. The middle 50 percent earned between $17,890 and $42,250. The lowest 10 percent earned less than $13,370, and the highest 10 percent earned more than $60,230. Median annual earnings in the industries employing the largest numbers of coaches and scouts in 2002 were as follows:

Colleges, universities, and professional schools	$36,170
Other amusement and recreation industries	25,900
Elementary and secondary schools	24,740
Other schools and instruction	22,570

Earnings vary by education level, certification, and geographic region. Some instructors and coaches are paid a salary, while others may be paid by the hour, per session, or based on the number of participants.

Related Occupations

Athletes and coaches have extensive knowledge of physiology and sports, and instruct, inform, and encourage participants. Other workers with similar duties include dietitians and nutritionists; physical therapists; recreation and fitness workers; recreational therapists; and teachers—preschool, kindergarten, elementary, middle, and secondary.

Sources of Additional Information

For general information on coaching, contact:

➤ National High School Athletic Coaches Association, P.O. Box 4342, Hamden, CT 06514. Internet: **http://www.hscoaches.org**

For information about sports officiating for team and individual sports, contact:

➤ National Association of Sports Officials, 2017 Lathrop Ave., Racine, WI 53405. Internet: **http://www.naso.org**

Broadcast and Sound Engineering Technicians and Radio Operators

(0*NET 27-4011.00, 27-4012.00, 27-4013.00, 27-4014.00)

Significant Points

- Job applicants face strong competition for jobs in major metropolitan areas, where pay generally is higher; prospects are better in small cities and towns.
- Technical school, community college, or college training in electronics, computer networking, or broadcast technology provides the best preparation.
- About 32 percent work in broadcasting, mainly for radio and television stations, and 16 percent work in the motion picture and sound recording industries.
- Evening, weekend, and holiday work is common.

Nature of the Work

Broadcast and sound engineering technicians and radio operators set up, operate, and maintain a wide variety of electrical and electronic equipment involved in almost any radio or television broadcast, concert, play, musical recording, television show, or movie. With such a range of work, there are many specialized occupations within the field.

Audio and video equipment technicians set up and operate audio and video equipment, including microphones, sound speakers, video screens, projectors, video monitors, recording equipment, connecting wires and cables, sound and mixing boards, and related electronic equipment for concerts, sports events, meetings and conventions, presentations, and news conferences. They may also set up and operate associated spotlights and other custom lighting systems.

Broadcast technicians set up, operate, and maintain equipment that regulates the signal strength, clarity, and range of sounds and colors of radio or television broadcasts. They also operate control panels to select the source of the material. Technicians may switch from one camera or studio to another, from film to live programming, or from network to local programming.

Sound engineering technicians operate machines and equipment to record, synchronize, mix, or reproduce music, voices, or sound effects in recording studios, sporting arenas, theater productions, or movie and video productions.

Radio operators mainly receive and transmit communications using a variety of tools. They also are responsible for repairing equipment, using such devices as electronic testing equipment, handtools, and power tools. One of their major duties is to help to maintain communication systems in good condition.

Broadcast and sound engineering technicians and radio operators perform a variety of duties in small stations. In large stations and at the networks, technicians are more specialized, although job assignments may change from day to day. The terms "operator," "engineer," and "technician" often are used interchangeably to describe these jobs. Workers in these positions may monitor and log outgoing signals and operate transmitters; set up, adjust, service, and repair electronic broadcasting equipment; and regulate fidelity, brightness, contrast, volume, and sound quality of television broadcasts.

Technicians also work in program production. *Recording engineers* operate and maintain video and sound recording equipment. They may operate equipment designed to produce special effects, such as the illusions of a bolt of lightning or a police siren. *Sound mixers* or *rerecording mixers* produce the soundtrack of a movie or television program. After filming or recording is complete, they may use a process called "dubbing" to insert sounds. *Field technicians* set up and operate portable transmission equipment outside the studio. Television news coverage requires so much electronic equipment, and the technology is changing so rapidly, that many stations assign technicians exclusively to news.

Chief engineers, *transmission engineers*, and *broadcast field supervisors* oversee other technicians and maintain broadcasting equipment.

The transition to digital recording, editing, and broadcasting has greatly changed the work of broadcast and sound engineering technicians and radio operators. Software on desktop computers has replaced specialized electronic equipment in many recording and editing functions. Most radio and television stations have replaced video and audio tapes with computer hard drives and other computer data storage systems. Computer networks linked to the specialized equipment dominate modern broadcasting. This transition has forced technicians to learn computer networking and software skills. (See the statement on computer support specialists and systems administrators elsewhere in the *Handbook.*)

Working Conditions

Broadcast and sound engineering technicians and radio operators generally work indoors in pleasant surroundings. However, those who broadcast news and other programs from locations outside the studio may work outdoors in all types of weather. Technicians doing maintenance may climb poles or antenna towers, while those setting up equipment do heavy lifting.

Technicians at large stations and the networks usually work a 40-hour week under great pressure to meet broadcast deadlines, and may occasionally work overtime. Technicians at small stations routinely work more than 40 hours a week.

Audio and video equipment technicians monitor and adjust sound and mixing boards.

Evening, weekend, and holiday work is usual, because most stations are on the air 18 to 24 hours a day, 7 days a week. Even though a technician may not be on duty when the station is broadcasting, some technicians may be on call during nonwork hours; that is, they must handle any problems that occur when they are on call.

Those who work on motion pictures may be on a tight schedule and may work long hours to meet contractual deadlines.

Employment

Broadcast and sound engineering technicians and radio operators held about 93,000 jobs in 2002. Their employment was distributed among the following detailed occupations:

Audio and video equipment technicians	42,000
Broadcast technicians	5,000
Sound engineering technicians	13,000
Radio operators	3,000

About 32 percent worked in broadcasting (except Internet) and 16 percent worked in the motion picture and sound recording industries. Almost 1 in 10 were self-employed. Television stations employ, on average, many more technicians than do radio stations. Some technicians are employed in other industries, producing employee communications, sales, and training programs. Technician jobs in television are located in virtually all cities, whereas jobs in radio also are found in many small towns. The highest paying and most specialized jobs are concentrated in New York City, Los Angeles, Chicago, and Washington, DC—the originating centers for most network or news programs. Motion picture production jobs are concentrated in Los Angeles and New York City.

Training, Other Qualifications, and Advancement

The best way to prepare for a broadcast and sound engineering technician job is to obtain technical school, community college, or college training in electronics, computer networking, or broadcast technology. In the motion picture industry, people are hired as apprentice editorial assistants and work their way up to more skilled jobs. Employers in the motion picture industry usually hire experienced freelance technicians on a picture-by-picture basis. Reputation and determination are important in getting jobs.

Beginners learn skills on the job from experienced technicians and supervisors. They often begin their careers in small stations and, once experienced, move on to larger ones. Large stations usually hire only technicians with experience. Many employers pay tuition and expenses for courses or seminars to help technicians keep abreast of developments in the field.

Audio and video equipment technicians generally need a high school diploma. Many recent entrants have a community college degree or various other forms of postsecondary degrees, although that is not always a requirement. They may substitute on-the-job training for formal education requirements. Working in a studio, as an assistant, is a great way of gaining experience and knowledge.

Radio operators do not usually require any formal training. This is an entry-level position that generally requires on-the-job training.

The Federal Communications Commission no longer requires the licensing of broadcast technicians, as the Telecommunications Act of 1996 eliminated this licensing requirement. Certification by the Society of Broadcast Engineers is a mark of competence and experience. The certificate is issued to experienced technicians who pass an examination.

Prospective technicians should take high school courses in math, physics, and electronics. Building electronic equipment from hobby kits and operating a "ham," or amateur, radio are good experience, as is work in college radio and television stations.

Broadcast and sound engineering technicians and radio operators must have manual dexterity and an aptitude for working with electrical, electronic, and mechanical systems and equipment.

Experienced technicians can become supervisory technicians or chief engineers. A college degree in engineering is needed in order to become chief engineer at a large television station.

Job Outlook

People seeking entry-level jobs as technicians in broadcasting are expected to face strong competition in major metropolitan areas, where pay generally is higher and the number of qualified jobseekers typically exceeds the number of openings. There, stations seek highly experienced personnel. Prospects for entry-level positions usually are better in small cities and towns for beginners with appropriate training.

Overall employment of broadcast and sound engineering technicians and radio operators is expected to about as fast as the average for all occupations through the year 2012. Job growth in radio and television broadcasting will be limited by consolidation of ownership of radio and television stations, and by laborsaving technical advances such as computer-controlled programming and remotely controlled transmitters. Changes to Federal Communications Commission (FCC) regulations now allow a single owner for up to eight radio stations in a single large market, and rules changes under consideration may have a similar impact on the ownership of television stations. Owners of multiple stations often consolidate the stations into a single location, reducing employment because one or a few technicians can provide support to multiple stations. Technicians who know how to install transmitters will be in demand as television stations install digital transmitters. Although most television stations are broadcasting in both analog and digital formats and plan to switch entirely to digital, radio stations are only beginning to broadcast digital signals.

Employment of broadcast and sound engineering technicians in the cable and pay television portion of the broadcasting industry should grow as the range of services is expanded to provide, such products as cable Internet access and video-on-demand. Employment of these workers in the motion picture industry will grow rapidly. However, job prospects are expected to remain competitive because of the large number of people who are attracted by the glamour of working in motion pictures.

Projected job growth varies among detailed occupations in this field. Employment of broadcast technicians is expected to grow about as fast as the average for all occupations through 2012, as advancements in technology enhance the capabilities of technicians to produce higher quality radio and television programming. Employment of radio operators is expected to

decline as more stations operate transmitters that control programming remotely. Employment of audio and video equipment technicians and sound engineering technicians is expected to grow faster than the average for all occupations. Not only will these workers have to set up audio and video equipment, but it will be necessary for them to maintain and repair this equipment.

In addition to employment growth, job openings also will result from the need to replace experienced technicians who leave this field. Some of these workers leave for other jobs that require knowledge of electronics, such as computer repairer or industrial machinery repairer.

Earnings

Television stations usually pay higher salaries than do radio stations; commercial broadcasting usually pays more than public broadcasting; and stations in large markets pay more than those in small markets.

Median annual earnings of broadcast technicians in 2002 were $27,760. The middle 50 percent earned between $18,860 and $45,200. The lowest 10 percent earned less than $14,600, and the highest 10 percent earned more than $65,970.

Median annual earnings of sound engineering technicians in 2002 were $36,970. The middle 50 percent earned between $24,330 and $57,350. The lowest 10 percent earned less than $18,540, and the highest 10 percent earned more than $82,510.

Median annual earnings of audio and video equipment technicians in 2002 were $31,110. The middle 50 percent earned between $22,670 and $43,950. The lowest 10 percent earned less than $17,710, and the highest 10 percent earned more than $61,420.

Median annual earnings of radio operators in 2002 were $31,530. The middle 50 percent earned between $24,000 and $41,430. The lowest 10 percent earned less than $17,380, and the highest 10 percent earned more than $56,340.

Related Occupations

Broadcast and sound engineering technicians and radio operators need the electronics training necessary to operate technical equipment, and they generally complete specialized postsecondary programs. Occupations with similar characteristics include engineering technicians, science technicians, and electrical and electronics installers and repairers. Broadcast and sound engineering technicians also may operate computer networks, as do computer support specialists and systems administrators. Broadcast technicians on some live radio and television programs are responsible for screening incoming calls, similar to the work of communications equipment operators.

Sources of Additional Information

For career information and links to employment resources, contact:

➤ National Association of Broadcasters, 1771 N St. NW., Washington, DC 20036. Internet: **http://www.nab.org**

For information on certification, contact:

➤ Society of Broadcast Engineers, 9247 North Meridian St., Suite 305, Indianapolis, IN 46260. Internet: **http://www.sbe.org**

Dancers and Choreographers

(0*NET 27-2031.00, 27-2032.00)

Significant Points

- Many dancers stop performing by their late thirties; however, some remain in the field as choreographers, dance teachers, or artistic directors.
- Most dancers begin formal training at an early age—between 5 and 15—and many have their first professional audition by age 17 or 18.
- Dancers and choreographers face intense competition—only the most talented find regular work.

Nature of the Work

From ancient times to the present, dancers have expressed ideas, stories, and rhythm with their bodies. They use a variety of dance forms that allow free movement and self-expression, including classical ballet, modern dance, and culturally specific dance styles. Many dancers combine performance work with teaching or choreography.

Dancers perform in a variety of settings, such as musical productions, and may present folk, ethnic, tap, jazz, and other popular kinds of dance. They also perform in opera, musical theater, television, movies, music videos, and commercials, in which they also may sing and act. Dancers most often perform as part of a group, although a few top artists perform solo.

Many dancers work with choreographers, who create original dances and develop new interpretations of existing dances. Because few dance routines are written down, choreographers instruct performers at rehearsals to achieve the desired effect. In addition, choreographers often are involved in auditioning performers.

Working Conditions

Dance is strenuous. Many dancers stop performing by their late thirties because of the physical demands on the body. However, some continue to work in the field as choreographers, dance teachers and coaches, or artistic directors. Others move into administrative positions, such as company managers. A few celebrated dancers, however, continue performing beyond the age of 50.

Daily rehearsals require very long hours. Many dance companies tour for part of the year to supplement a limited performance schedule at home. Dancers who perform in musical productions and other family entertainment spend much of their time on the road; others work in nightclubs or on cruise ships. Most dance performances are in the evening, whereas rehearsals and practice take place during the day. As a result, dancers often work very long and late hours. Generally, dancers and choreographers work in modern and temperature-controlled facilities; however, some studios may be older and less comfortable.

Employment

Professional dancers and choreographers held about 37,000 jobs in 2002. Many others were between engagements, so that the total number of people available for work as dancers over the course of the year was greater. Dancers and choreographers worked in a variety of industries, such as private educational services, which includes dance studios and schools, as well as colleges and universities; food services and drinking establishments; performing arts companies, which includes dance, theater, and opera companies; and amusement and recreation venues, such as casinos and theme parks. Almost one fifth of dancers and choreographers are self-employed.

New York City is home to many major dance companies; however, full-time professional dance companies operate in most major cities.

Training, Other Qualifications, and Advancement

Training varies with the type of dance and is a continuous part of all dancers' careers. Many dancers and dance instructors believe that dancers should start with a good foundation in classical dance before selecting a particular dance style. Ballet training for women usually begins at 5 to 8 years of age with a private teacher or through an independent ballet school. Serious training traditionally begins between the ages of 10 and 12. Men often begin their ballet training between the ages of 10 and 15. Students who demonstrate potential in their early teens receive more intensive and advanced professional training. At about this time, students should begin to focus their training on a particular style and decide whether to pursue additional training through a dance company's school or a college dance program. Leading dance school companies often have summer training programs from which they select candidates for admission to their regular full-time training programs. Formal training for modern and culturally specific dancers often begins later than training in ballet; however, many folk dance forms are taught to very young children.

Many dancers have their first professional auditions by age 17 or 18. Training is an important component of professional dancers' careers. Dancers normally spend 8 hours a day in class and rehearsal, keeping their bodies in shape and preparing for performances. Their daily training period includes time to warm up and cool down before and after classes and rehearsals.

Because of the strenuous and time-consuming dance training required, some dancers view formal education as secondary. However, a broad, general education including music, literature, history, and the visual arts is helpful in the interpretation of dramatic episodes, ideas, and feelings. Dancers some-

Dancers spend considerable time warming up and practicing in rehearsal halls or dance studios.

times conduct research to learn more about the part they are playing.

Many colleges and universities award bachelor's or master's degrees in dance, typically through departments of music, theater, or fine arts. The National Association of Schools of Dance accredits 57 programs in dance. Many programs concentrate on modern dance, but some also offer courses in jazz, culturally specific, ballet, or classical techniques; dance composition, history, and criticism; and movement analysis.

A college education is not essential to obtaining employment as a professional dancer; however, many dancers obtain degrees in unrelated fields to prepare themselves for careers after dance. The completion of a college program in dance and education is essential in order to qualify to teach dance in college, high school, or elementary school. Colleges and conservatories sometimes require graduate degrees, but may accept performance experience. A college background is not necessary, however, for teaching dance or choreography in local recreational programs. Studio schools usually require teachers to have experience as performers.

Because of the rigorous practice schedules of most dancers, self-discipline, patience, perseverance, and a devotion to dance are essential for success in the field. Dancers also must possess good problem-solving skills and an ability to work with people. Good health and physical stamina also are necessary attributes. Above all, dancers must have flexibility, agility, coordination, grace, a sense of rhythm, a feeling for music, and a creative ability to express themselves through movement.

Dancers seldom perform unaccompanied, so they must be able to function as part of a team. They should also be highly motivated and prepared to face the anxiety of intermittent employment and rejections when auditioning for work. For dancers, advancement takes the form of a growing reputation, more frequent work, bigger and better roles, and higher pay.

Choreographers typically are older dancers with years of experience in the theater. Through their performance as dancers, they develop reputations that often lead to opportunities to choreograph productions.

Job Outlook

Dancers and choreographers face intense competition for jobs. Only the most talented find regular employment.

Employment of dancers and choreographers is expected to grow about as fast as the average for all occupations through 2012. The public's continued interest in dance will sustain larger dance companies; however, funding from public and private organizations is not expected to keep pace with rising production costs. For many small and midsize organizations, the result will be fewer performances and more limited employment opportunities. Although job openings will arise each year because dancers and choreographers retire or leave the occupation for other reasons, the number of applicants will continue to vastly exceed the number of job openings.

National dance companies should continue to provide jobs in this field. Opera companies and dance groups affiliated with colleges and universities and with television and motion pictures also will offer some opportunities. Moreover, the growing popularity of dance in recent years has resulted in increased opportunities to teach dance. Finally, music video channels will provide some opportunities for both dancers and choreographers.

Earnings

Median annual earnings of salaried dancers were $21,100 in 2002. The middle 50 percent earned between $14,570 and $34,660. The lowest 10 percent earned less than $12,880, and the highest 10 percent earned more than $53,350.

Median annual earnings of salaried choreographers were $29,470 in 2002. The middle 50 percent earned between $19,590 and $43,720. The lowest 10 percent earned less than $14,000, and the highest 10 percent earned more than $57,590. Median annual earnings were $29,820 in other schools and instruction, which includes dance studios and schools.

Dancers who were on tour received an additional allowance for room and board, as well as extra compensation for overtime. Earnings from dancing are usually low, because employment is part year and irregular. Dancers often supplement their income by working as guest artists with other dance companies, teaching dance, or taking jobs unrelated to the field.

Earnings of many professional dancers are governed by union contracts. Dancers in the major opera ballet, classical ballet, and modern dance corps belong to the American Guild of Musical Artists, Inc. of the AFL-CIO; those who appear on live or videotaped television programs belong to the American Federation of Television and Radio Artists; those who perform in films and on television belong to the Screen Actors Guild; and those in musical theater are members of the Actors' Equity Association. The unions and producers sign basic agreements specifying minimum salary rates, hours of work, benefits, and other conditions of employment. However, the contract each dancer signs with the producer of the show may be more favorable than the basic agreement.

Dancers and choreographers covered by union contracts are entitled to some paid sick leave, paid vacations, and various health and pension benefits, including extended sick pay and family-leave benefits provided by their unions. Employers contribute toward these benefits. Those not covered by union contracts usually do not enjoy such benefits.

Related Occupations

People who work in other performing arts occupations include actors, producers, and directors; and musicians, singers, and related workers. Those directly involved in the production of dance programs include set and exhibit designers; fashion designers; and barbers, cosmetologists, and other personal appearance workers. Like dancers, athletes, coaches, umpires, and related workers need strength, flexibility, and agility.

Sources of Additional Information

For general information about dance and a list of accredited college-level programs, contact:

➤ National Association of Schools of Dance, 11250 Roger Bacon Dr., Suite 21, Reston, VA 20190. Internet: **http://nasd.arts-accredit.org**

For information about dance and dance companies, contact:

➤ Dance/USA, 1156 15th St. NW., Suite 820, Washington, DC 20005. Internet: **http://www.danceusa.org**

Designers

(0*NET 27-1021.00, 27-1022.00, 27-1023.00, 27-1024.00, 27-1025.00, 27-1026.00, 27-1027.01, 27-1027.02)

Significant Points

- Nearly one-third of designers were self-employed—almost five times the proportion for all professional and related occupations.
- Creativity is crucial in all design occupations; most designers need a bachelor's degree, and candidates with a master's degree hold an advantage.
- Keen competition is expected for most jobs, despite average projected employment growth, because many talented individuals are attracted to careers as designers.

Nature of the Work

Designers are people with a desire to create. They combine practical knowledge with artistic ability to turn abstract ideas into formal designs for the merchandise we buy, the clothes we wear, the Web sites we use, the publications we read, and the living and office space we inhabit. Designers usually specialize in a particular area of design, such as automobiles, industrial or medical equipment, home appliances, clothing and textiles, floral arrangements, publications, Web sites, logos, signage, movie or TV credits, interiors of homes or office buildings, merchandise displays, or movie, television, and theater sets.

The first step in developing a new design or altering an existing one is to determine the needs of the client, the ultimate function for which the design is intended, and its appeal to customers or users. When creating a design, designers often begin by researching the desired design characteristics, such as size, shape, weight, color, materials used, cost, ease of use, fit, and safety.

Designers then prepare sketches or diagrams—by hand or with the aid of a computer—to illustrate the vision for the design. After consulting with the client, a creative director, or a product development team, designers create detailed designs, using drawings, a structural model, computer simulations, or a full-scale prototype. Many designers use computer-aided design (CAD) tools to create and better visualize the final product. Computer models allow ease and flexibility in exploring a greater number of design alternatives, thus reducing design costs and cutting the time it takes to deliver a product to market. Industrial designers use computer-aided industrial design (CAID) tools to create designs and machine-readable instructions that communicate with automated production tools.

Designers sometimes supervise assistants who carry out their creations. Designers who run their own businesses also may devote a considerable amount of time to developing new business contacts, examining equipment and space needs, and performing administrative tasks, such as reviewing catalogues and ordering samples. The need for up-to-date computer and communications equipment is an ongoing consideration for many designers, especially those in industrial and graphic design.

Design encompasses a number of different fields. Many designers specialize in a particular area of design, whereas others work in more than one area.

Commercial and industrial designers develop countless manufactured products, including airplanes; cars; children's toys; computer equipment; furniture; home appliances; and medical, office, and recreational equipment. They combine artistic talent with research on the use of a product, on customer needs, and on marketing, materials, and production methods to create the most functional and appealing design that will be competitive with others in the marketplace. Industrial designers typically concentrate in a subspecialty such as kitchen appliances, auto interiors, or plastic-molding machinery.

Fashion designers design clothing and accessories. Some high-fashion designers are self-employed and design for individual clients. Other high-fashion designers cater to specialty stores or high-fashion department stores. These designers create original garments, as well as clothing that follows established fashion trends. Most fashion designers, however, work for apparel manufacturers, creating designs of men's, women's, and children's fashions for the mass market.

Floral designers cut and arrange live, dried, or artificial flowers and foliage into designs, according to the customer's order. They design arrangements by trimming flowers and arranging bouquets, sprays, wreaths, dish gardens, and terrariums. They may either meet with customers to discuss the arrangement or work from a written order. Floral designers make note of the occasion, the customer's preference with regard to the color and type of flower involved, the price of the completed order, the time at which the floral arrangement or plant is to be ready, and

Interior designers refer to swatches from sample books to plan the space and furnish the interiors of buildings.

the place to which it is to be delivered. The variety of duties performed by floral designers depends on the size of the shop and the number of designers employed. In a small operation, floral designers may own their shops and do almost everything, from growing and purchasing flowers to keeping financial records.

Graphic designers plan, analyze, and create visual solutions to communications problems. They use a variety of print, electronic, and film media and technologies to execute a design that meet clients' communication needs. They consider cognitive, cultural, physical, and social factors in planning and executing designs appropriate for a given context. Graphic designers use computer software to develop the overall layout and production design of magazines, newspapers, journals, corporate reports, and other publications. They also produce promotional displays and marketing brochures for products and services, design distinctive logos for products and businesses, and develop signs and signage systems—called environmental graphics—for business and government. An increasing number of graphic designers are developing material for Internet Web pages, computer interfaces, and multimedia projects. Graphic designers also produce the credits that appear before and after television programs and movies.

Interior designers enhance the function, safety, and quality of interior spaces of private homes, public buildings, and business or institutional facilities, such as offices, restaurants, retail establishments, hospitals, hotels, and theaters. They also plan the interiors of existing structures that are undergoing renovation or expansion. Most interior designers specialize. For example, some may concentrate on residential design, while others focus on business design. Still others may specialize further by focusing on particular rooms, such as kitchens or baths. With a client's tastes, needs, and budget in mind, interior designers prepare drawings and specifications for non-load-bearing interior construction, furnishings, lighting, and finishes. Increasingly, designers are using computers to plan layouts, because computers make it easy to change plans to include ideas received from the client. Interior designers also design lighting and architectural details—such as crown molding, built-in bookshelves, or cabinets—coordinate colors, and select furniture, floor coverings, and window treatments. Interior designers must design space to conform to Federal, State, and local laws, including building codes. Designs for public areas also must meet accessibility standards for the disabled and the elderly.

Merchandise displayers and window dressers, or *visual merchandisers*, plan and erect commercial displays, such as those in windows and interiors of retail stores or at trade exhibitions. Those who work on building exteriors erect major store decorations, including building and window displays and lights. Those who design store interiors outfit store departments, arrange table displays, and dress mannequins. In large retail chains, store layouts typically are designed corporately, through a central design department. To retain the chain's visual identity and ensure that a particular image or theme is promoted in each store, designs are distributed to individual stores by e-mail, downloaded to computers equipped with the appropriate design software, and adapted to meet the size and dimension requirements of each individual store.

Set and exhibit designers create sets for movie, television, and theater productions and design special exhibition displays. Set designers study scripts, confer with directors and other designers, and conduct research to determine the historical period, fashion, and architectural styles appropriate for the production on which they work. They then produce sketches or scale models to guide in the construction of the actual sets or exhibit spaces. Exhibit designers work with curators, art and museum directors, and trade-show sponsors to determine the most effective use of available space.

Working Conditions

Working conditions and places of employment vary. Designers employed by manufacturing establishments, large corporations, or design firms generally work regular hours in well-lighted and comfortable settings. Designers in smaller design consulting firms, or those who freelance, generally work on a contract, or job, basis. They frequently adjust their workday to suit their clients' schedules and deadlines, meeting with the clients during evening or weekend hours when necessary. Consultants and self-employed designers tend to work longer hours and in smaller, more congested, environments.

Designers may transact business in their own offices or studios or in clients' homes or offices. They also may travel to other locations, such as showrooms, design centers, clients' exhibit sites, and manufacturing facilities. Designers who are paid by the assignment are under pressure to please clients and to find new ones in order to maintain a steady income. All designers sometimes face frustration when their designs are rejected or when their work is not as creative as they wish. With the increased speed and sophistication of computers and advanced communications networks, designers may form international design teams, serve a geographically more dispersed clientele, research design alternatives by using information on the Internet, and purchase supplies electronically, all with the aid of a computer in their workplace or studio.

Occasionally, industrial designers may work additional hours to meet deadlines. Similarly, graphic designers usually work regular hours, but may work evenings or weekends to meet production schedules. In contrast, set and exhibit designers work long and irregular hours; often, they are under pressure to make rapid changes. Merchandise displayers and window trimmers may spend much of their time designing displays in their office or studio, but those who also construct and install the displays may have to move lumber and heavy materials and perform some carpentry and painting. Fashion designers may work long hours to meet production deadlines or prepare for fashion shows. In addition, fashion designers may be required to travel to production sites across the United States and overseas. Interior designers generally work under deadlines and may put in extra hours to finish a job. Also, they typically carry heavy, bulky sample books to meetings with clients. Floral designers generally work regular hours in a pleasant work environment, but holiday, wedding, and funeral orders often require overtime.

Employment

Designers held about 532,000 jobs in 2002. Approximately one-third were self-employed. Employment was distributed as follows:

Graphic designers	212,000
Floral designers	104,000
Merchandise displayers and window trimmers	77,000
Interior designers	60,000
Commercial and industrial designers	52,000
Fashion designers	15,000
Set and exhibit designers	12,000

Salaried designers worked in a number of different industries, depending on their design specialty. Graphic designers, for example, worked primarily in specialized design services; newspaper, periodical, book, and directory publishers; and advertising and related services. Floral designers were concentrated in retail florists or floral departments of grocery stores. Merchandise displayers and window trimmers were dispersed across a variety of retailers and wholesalers. Interior designers generally worked in specialized design services or in retail furniture stores. Most commercial and industrial designers were employed in manufacturing or architectural, engineering, and related services. Fashion designers generally worked in apparel manufacturing or wholesale distribution of apparel, piece goods, and notions. Set and exhibit designers worked primarily for performing arts companies, movie and video industries, and radio and television broadcasting.

In 2002, a large proportion of designers were self-employed and did freelance work—full time or part time—in addition to holding a salaried job in design or in another occupation.

Training, Other Qualifications, and Advancement

Creativity is crucial in all design occupations. People in this field must have a strong sense of the esthetic—an eye for color and detail, a sense of balance and proportion, and an appreciation for beauty. Designers also need excellent communication and problem-solving skills. Despite the advancement of computer-aided design, sketching ability remains an important advantage in most types of design, especially fashion design. A good portfolio—a collection of examples of a person's best work—often is the deciding factor in getting a job.

A bachelor's degree is required for most entry-level design positions, except for floral design and visual merchandising. Esthetic ability is important in floral design and visual merchandising, but formal preparation typically is not necessary. Many candidates in industrial design pursue a master's degree to increase their chances of selection for open positions.

Interior design is the only design field subject to government regulation. According to the American Society of Interior Designers, 22 States and the District of Columbia register or license interior designers. Passing the National Council for Interior Design Qualification examination is required for registration or licensure in these jurisdictions. To be eligible to take the exam, an applicant must have at least 6 years of combined education and experience in interior design, of which at least 2 years constitute postsecondary education in design. Because registration or licensure is not mandatory in all States, membership in a professional association is an indication of an interior designer's qualifications and professional standing, and can aid in obtaining clients.

In fashion design, employers seek individuals with a 2- or 4-year degree who are knowledgeable in the areas of textiles, fabrics, and ornamentation, and about trends in the fashion world. Set and exhibit designers typically have college degrees in design. A Master of Fine Arts degree from an accredited university program further establishes one's design credentials. For set designers, membership in the United Scenic Artists, Local 829, is recognized nationally as the attainment of professional standing in the field.

Most floral designers learn their skills on the job. When employers hire trainees, they generally look for high school graduates who have a flair for arranging and a desire to learn. The completion of formal design training, however, is an asset for floral designers, particularly those interested in advancing to chief floral designer or in opening their own businesses. Vocational and technical schools offer programs in floral design, usually lasting less than a year, while 2- and 4-year programs in floriculture, horticulture, floral design, or ornamental horticulture are offered by community and junior colleges, colleges, and universities. The American Institute of Floral Designers offers an accreditation examination to its members as an indication of professional achievement in floral design.

Formal training for some design professions also is available in 2- and 3-year professional schools that award certificates or associate degrees in design. Graduates of 2-year programs normally qualify as assistants to designers, or they may enter a formal bachelor's degree program. The Bachelor of Fine Arts degree is granted at 4-year colleges and universities. The curriculum in these schools includes art and art history, principles of design, designing and sketching, and specialized studies for each of the individual design disciplines, such as garment construction, textiles, mechanical and architectural drawing, computerized design, sculpture, architecture, and basic engineering. A liberal arts education or a program that includes training in business or project management, together with courses in merchandising, marketing, and psychology, along with training in art, is recommended for designers who want to freelance. In addition, persons with training or experience in architecture qualify for some design occupations, particularly interior design.

Employers increasingly expect new designers to be familiar with computer-aided design software as a design tool. For example, industrial designers use computers extensively in the aerospace, automotive, and electronics industries. Interior designers use computers to create numerous versions of interior space designs—images can be inserted, edited, and replaced easily and without added cost—making it possible for a client to see and choose among several designs.

The National Association of Schools of Art and Design accredits more than 200 postsecondary institutions with programs in art and design. Most of these schools award a degree in art, and some award degrees in industrial, interior, textile, graphic, or fashion design. Many schools do not allow formal entry into a bachelor's degree program until a student has successfully finished a year of basic art and design courses. Applicants may be required to submit sketches and other examples of their artistic ability.

The Foundation for Interior Design Education Research also accredits interior design programs that lead to a bachelor's degree. There are about 120 accredited professional programs in the United States, located primarily in schools of art, architecture, and home economics.

Individuals in the design field must be creative, imaginative, and persistent and must be able to communicate their ideas in writing, visually, and verbally. Because tastes in style and fashion can change quickly, designers need to be well read, open to new ideas and influences, and quick to react to changing trends. Problem-solving skills and the ability to work independently and under pressure are important traits. People in this field need self-discipline to start projects on their own, to budget their time, and to meet deadlines and production schedules. Good business sense and sales ability also are important, especially for those who freelance or run their own business.

Beginning designers usually receive on-the-job training and normally need 1 to 3 years of training before they can advance to higher level positions. Experienced designers in large firms may advance to chief designer, design department head, or other

supervisory positions. Some designers leave the occupation to become teachers in design schools or in colleges and universities. Many faculty members continue to consult privately or operate small design studios to complement their classroom activities. Some experienced designers open their own firms.

Job Outlook

Overall employment of designers is expected to grow about as fast as the average for all occupations through the year 2012 as the economy expands and consumers, businesses, and manufacturers continue to rely on the services provided by designers. However, designers in most fields—with the exception of floral design—are expected to face keen competition for available positions. Many talented individuals are attracted to careers as designers. Individuals with little or no formal education in design, as well as those who lack creativity and perseverance, will find it very difficult to establish and maintain a career in the occupation.

Among the design specialties, graphic designers are projected to provide the most new jobs. Demand for graphic designers should increase because of the rapidly expanding market for Web-based information and expansion of the video entertainment market, including television, movies, video, and made-for-Internet outlets.

Rising demand for interior design of private homes, offices, restaurants and other retail establishments, and institutions that care for the rapidly growing elderly population should spur employment growth of interior designers. New jobs for floral designers are expected to stem mostly from the relatively high replacement needs in retail florists that result from comparatively low starting pay and limited opportunities for advancement. The majority of new jobs for merchandise displayers and window trimmers will also result from the need to replace workers who retire, transfer to other occupations, or leave the labor force for other reasons.

Increased demand for industrial designers will stem from continued emphasis on the quality and safety of products, demand for new products that are easy and comfortable to use, and the development of high-technology products in medicine, transportation, and other fields. Demand for fashion designers should remain strong, because many consumers continue to seek new fashions and fresh styles of apparel. Employment growth for fashion designers will be slowed, however, by declines in the apparel manufacturing industries. Despite faster-than-average growth for set and exhibit designers, few job openings will result because the occupation is small.

Earnings

Median annual earnings for commercial and industrial designers were $52,260 in 2002. The middle 50 percent earned between $39,240 and $67,430. The lowest 10 percent earned less than $28,820, and the highest 10 percent earned more than $82,130. Median annual earnings were $61,530 in architectural, engineering, and related services.

Median annual earnings for fashion designers were $51,290 in 2002. The middle 50 percent earned between $35,550 and $75,970. The lowest 10 percent earned less than $25,350, and the highest 10 percent earned more than $105,280.

Median annual earnings for floral designers were $19,480 in 2002. The middle 50 percent earned between $15,880 and $23,560. The lowest 10 percent earned less than $13,440, and the highest 10 percent earned more than $29,830. Median annual earnings were $21,610 in grocery stores and $18,950 in florists.

Median annual earnings for graphic designers were $36,680 in 2002. The middle 50 percent earned between $28,140 and $48,820. The lowest 10 percent earned less than $21,860, and the highest 10 percent earned more than $64,160. Median annual earnings in the industries employing the largest numbers of graphic designers were as follows:

Advertising and related services	$39,510
Specialized design services	38,710
Printing and related support activities	31,800
Newspaper, periodical, book, and directory publishers	31,670

Median annual earnings for interior designers were $39,180 in 2002. The middle 50 percent earned between $29,070 and $53,060. The lowest 10 percent earned less than $21,240, and the highest 10 percent earned more than $69,640. Median annual earnings in the industries employing the largest numbers of interior designers were as follows:

Architectural, engineering, and related services	$41,680
Specialized design services	39,870
Furniture stores	36,320

Median annual earnings of merchandise displayers and window dressers were $22,550 in 2002. The middle 50 percent earned between $18,320 and $29,070. The lowest 10 percent earned less than $15,100, and the highest 10 percent earned more than $40,020. Median annual earnings were $22,130 in department stores.

Median annual earnings for set and exhibit designers were $33,870 in 2002. The middle 50 percent earned between $24,780 and $46,350. The lowest 10 percent earned less than $17,830, and the highest 10 percent earned more than $63,280.

The American Institute of Graphic Arts reported 2002 median annual earnings for graphic designers with increasing levels of responsibility. Staff-level graphic designers earned $40,000, while senior designers, who may supervise junior staff or have some decisionmaking authority that reflects their knowledge of graphic design, earned $55,000. Solo designers, who freelanced or worked under contract to another company, reported median earnings of $55,000. Design directors, the creative heads of design firms or in-house corporate design departments, earned $85,000. Graphic designers with ownership or partnership interests in a firm or who were principals of the firm in some other capacity earned $93,000.

Related Occupations

Workers in other occupations who design or arrange objects, materials, or interiors to enhance their appearance and function include artists and related workers; architects, except landscape and naval; engineers; landscape architects; and photographers. Some computer-related occupations, including computer software engineers and desktop publishers, require design skills.

Sources of Additional Information

For general information about art and design and a list of accredited college-level programs, contact:

➤ National Association of Schools of Art and Design, 11250 Roger Bacon Dr., Suite 21, Reston, VA 20190. Internet: **http://nasad.arts-accredit.org**

For information about graphic, communication, or interaction design careers, contact:

➤ American Institute of Graphic Arts, 164 Fifth Ave., New York, NY 10010. Internet: **http://www.aiga.org**

For information on degree, continuing education, and licensure programs in interior design and interior design research, contact:

➤ American Society for Interior Designers, 608 Massachusetts Ave. NE., Washington, DC 20002-6006. Internet: **http://www.asid.org**

For a list of schools with accredited programs in interior design, contact:

➤ Foundation for Interior Design Education Research, 146 Monroe Center NW., Suite 1318, Grand Rapids, MI 49503. Internet: **http://www.fider.org**

For information on careers, continuing education, and certification programs in the interior design specialty of residential kitchen and bath design, contact:

➤ National Kitchen and Bath Association, 687 Willow Grove St., Hackettstown, NJ 07840. Internet: **http://www.nkba.org/student**

For information about careers in floral design, contact:

➤ Society of American Florists, 1601 Duke St., Alexandria, VA 22314. Internet: **http://www.safnow.org**

Interpreters and Translators

(0*NET 27-3091.00)

Significant Points

- Twenty percent of these workers are self-employed.
- Work is often sporadic and many interpreters and translators work part time.
- Although training requirements can vary, almost all interpreters and translators have a bachelor's degree.
- Job outlook varies by specialty and language combination.

Nature of the Work

Interpreters and translators enable the cross-cultural communication necessary in today's society by converting one language into another. However, these language specialists do more than simply translate words—they relay concepts and ideas between languages. They must thoroughly understand the subject matter in which they work, so that they are able to convert information from one language, known as the source language, into another, the target language. In addition, they must remain sensitive to the cultures associated with their languages of expertise.

Interpreters and translators are often discussed together because they share some common traits. For example, both need a special ability, known as language combination. This enables them to be fluent in at least two languages—a native, or active, language and a secondary, or passive, language. Their active language is the one they know best and into which they interpret or translate, and their passive language is one of which they have nearly perfect knowledge.

Although some people do both, interpretation and translation are different professions. Each requires a distinct set of skills and aptitudes, and most people are better suited for one or the other. While interpreters often work into and from both languages, translators generally work only into their active language.

Interpreters convert one spoken language into another—or, in the case of sign-language interpreters, between spoken communication and sign language. This requires interpreters to pay attention carefully, understand what is communicated in both languages, and express thoughts and ideas clearly. Strong research and analytical skills, mental dexterity, and an exceptional memory also are important.

The first part of an interpreter's work begins before arriving at the jobsite. The interpreter must become familiar with the subject matter that the speakers will cover, a task that may involve research to create a list of common words and phrases associated with the topic. Next, the interpreter usually travels to the location where his or her services are needed. Physical presence may not be required for some work, such as telephone interpretation. But it is usually important that the interpreter see the communicators in order to hear and observe the person speaking and to relay the message to the other party.

There are two types of interpretation: simultaneous and consecutive. Simultaneous interpretation requires interpreters to listen and speak (or sign) at the same time. In simultaneous interpretation, the interpreter begins to convey a sentence being spoken while the speaker is still talking. Ideally, simultaneous interpreters should be so familiar with a subject that they are able to anticipate the end of the speaker's sentence. Because they need a high degree of concentration, simultaneous interpreters work in pairs, with each interpreting for 20- to 30-minute segments. This type of interpretation is required at international conferences and is sometimes used in the courts.

In contrast to simultaneous interpretation's immediacy, consecutive interpretation begins only after the speaker has verbalized a group of words or sentences. Consecutive interpreters often take notes while listening to the speakers, so they must develop some type of note-taking or shorthand system. This form of interpretation is used most often for person-to-person communication, during which the interpreter sits near both parties.

Translators convert written materials from one language into another. They must have excellent writing and analytical ability. And because the documents they translate must be as flawless as possible, they also need good editing skills.

Translators' assignments may vary in length, writing style, and subject matter. When they first receive text to convert into another language, translators usually read it in its entirety to get an idea of the subject. Next, they identify and look up any unfamiliar words. Translators also might do additional reading on the subject matter if they are unclear about anything in the text. However, they also consult with the text's originator or issuing agency to clarify unclear or unfamiliar ideas, words, or acronyms.

Translating involves more than replacing a word with its equivalent in another language; sentences and ideas must be manipulated to flow with the same coherence as those in the source document, so that the translation reads as though it originated in the target language. Translators also must bear in mind any cultural references that may need to be explained to the intended audience, such as colloquialisms, slang, and other expressions that do not translate literally. Some subjects may be more difficult than others to translate because words or passages may have multiple meanings that make several translations possible. Not surprisingly, translated work often goes through multiple revisions before final text is submitted.

The way in which translators do their jobs has changed with advancements in technology. Today, nearly all translation work is done on a computer, and most assignments are received and submitted electronically. This enables translators to work from

Interpreters help people who speak different languages to communicate with each other.

almost anywhere, and a large percentage of them work from home. The Internet provides advanced research capabilities and valuable language resources, such as specialized dictionaries and glossaries. In some cases, use of machine-assisted translation—including memory tools that provide comparisons of previous translations with current work—helps save time and reduce repetition.

The services of interpreters and translators are needed in a number of subject areas. While these workers may not completely specialize in a particular field or industry, many do focus on one area of expertise. Some of the most common areas are described below; however, interpreters and translators also may work in a variety of other areas, including business, social services, or entertainment.

Conference interpreters work at conferences that involve non-English-speaking attendees. This work includes international business and diplomacy, although conference interpreters also may interpret for any organization that works with foreign language speakers. Employers prefer high-level interpreters who have at least two language combinations—for example, the ability to interpret from English to French and English to Spanish. For some positions, such as those with the United Nations, this qualification is mandatory.

Much of the interpreting performed at conferences is simultaneous; however, at some meetings with a small number of attendees, consecutive interpreting also may be used. Usually, interpreters sit in soundproof booths, listening to the speakers through headphones and interpreting into a microphone what is said. The interpreted speech is then relayed to the listener through headsets. When interpreting is needed for only one or two people, the *chuchotage*, or *whispering*, method may be used. The interpreter sits behind or next to the attendee and whispers a translation of the proceedings.

Guide or escort interpreters accompany either U.S. visitors abroad or foreign visitors in the United States to ensure that they are able to communicate during their stay. These specialists interpret on a variety of subjects, both on an informal basis and on a professional level. Most of their interpretation is consecutive, and work is generally shared by two interpreters when the assignment requires more than an 8-hour day. Frequent travel, often for days or weeks at a time, is common, a factor which some find particularly appealing.

Judiciary interpreters and translators help people appearing in court who are unable or unwilling to communicate in English. These workers must remain detached from the content of their work and not alter or modify the meaning or tone of what is said. Legal translators must be thoroughly familiar with the language and functions of the U.S. judicial system, as well as other countries' legal systems. Court interpreters work in a variety of legal settings, such as attorney-client meetings, preliminary hearings, depositions, trials, and arraignments. Success as a court interpreter requires an understanding of both legal terminology and colloquial language. In addition to interpreting what is said, court interpreters also may be required to translate written documents and read them aloud, also known as sight translation.

Literary translators adapt written literature from one language into another. They may translate any number of documents, including journal articles, books, poetry, and short stories. Literary translation is related to creative writing; literary translators must create a new text in the target language that reproduces the content and style of the original. Whenever possible, literary translators work closely with authors in order to best capture their intended meanings and literary characteristics.

This type of work often is done as a sideline by university professors; however, opportunities exist for well-established literary translators. As is the case with writers, finding a publisher is a critical part of the job. Most aspiring literary translators begin by submitting a short sample of their work, in the hope that it will be printed and give them recognition. For example, after receiving permission from the author, they might submit to a publishing house a previously unpublished short work, such as a poem or essay.

Localization translators constitute a relatively recent and rapidly expanding specialty. Localization involves the complete adaptation of a product for use in a different language and culture. At its earlier stages, this work dealt primarily with software localization, but the specialty has expanded to include the adaptation of Internet sites and products in manufacturing and other business sectors.

Translators working in localization need a solid grasp of the languages to be translated, a thorough understanding of technical concepts and vocabulary, and a high degree of knowledge about the intended target audience or users of the product. The goal of these specialists is for the product to appear as if it were originally manufactured in the country where it will be sold and supported. Because software often is involved, it is not uncommon for people who work in this area of translation to have a strong background in computer science or computer-related work experience.

Providing language services to healthcare patients with limited English proficiency is the realm of *medical interpreters and translators*. Medical interpreters help patients to communicate with doctors, nurses, and other medical staff. Translators working in this specialty primarily convert patient materials and informational brochures, issued by hospitals and medical facilities, into the desired language. Medical interpreters need a strong grasp of medical and colloquial terminology in both languages, along with cultural sensitivity regarding how the patient receives the information. They must remain detached but aware of the patient's feelings and pain.

Sign language interpreters facilitate communication between people who are deaf or hard of hearing and people who can hear. Sign language interpreters must be fluent in English and American Sign Language (ASL), which combines signing, finger spelling, and specific body language. ASL has its own grammatical rules, sentence structure, idioms, historical contexts, and cultural nuances. Sign language interpreting, like foreign language interpreting, involves more than simply replacing a word of spoken English with a sign representing that word.

Most sign language interpreters either interpret, aiding communication between English and ASL, or transliterate, facilitating communication between English and contact signing—a form of signing that uses a more English language-based word order. Some interpreters specialize in oral interpreting for deaf or hard of hearing persons who lipread instead of sign. Other specialties include tactile signing, interpreting for persons who are deaf-blind; cued speech; and signing exact English.

Working Conditions

Working environments of interpreters and translators vary. Interpreters work in a variety of settings, such as hospitals, courtrooms and conference centers. They are required to travel

to the site—whether it is a neighboring town or the other side of the world—where their services are needed. Interpreters who work over the telephone generally work on call or in call centers in urban areas and keep to a standard 5-day, 40-hour workweek. Interpreters for deaf students in schools usually work in a school setting and work 9 months out of the year. Translators usually work alone, and they must frequently perform under pressure of deadlines and tight schedules. Many translators choose to work at home; however, technology allows translators to work from virtually anywhere.

Because many interpreters and translators freelance, their schedules are often erratic, with extensive periods of no work interspersed with others requiring long, irregular hours. For those who freelance, a significant amount of time must be dedicated to looking for jobs. In addition, freelancers must manage their own finances, and payment for their services may not always be prompt. Freelancing, however, offers variety and flexibility, and allows many workers to choose which jobs to accept or decline.

The number of work-related accidents in these occupations is relatively low. The work can be stressful and exhausting and translation can be lonesome or dull. However, interpreters and translators may use their irregular schedules to pursue other interests, such as traveling, dabbling in a hobby, or working a second job. Many interpreters and translators enjoy what they do and value the ability to control their schedules and workloads.

Employment

Interpreters and translators held about 24,000 jobs in 2002. Because of the large number of people who work in the occupation sporadically, however, the actual number of interpreters and translators is probably significantly higher. Reflecting the diversity of employment options in the field, interpreters and translators are employed in a variety of industries. Nearly 3 in 10 worked in public and private educational institutions, such as schools, colleges, and universities. About 1 in 10 worked in healthcare, many of which worked for hospitals. More than 1 in 10 worked in other areas of government, such as Federal, State and local courts. Other employers of interpreters and translators include publishing companies, telephone companies, airlines, and interpreting and translating agencies.

More than 2 in 10 interpreters and translators are self-employed. To find work, these interpreters and translators may submit resumes to 100 or more employment agencies, and then wait to be contacted when an agency matches their skills with a job. After establishing a few regular clients, interpreters and translators often hear of subsequent jobs by word of mouth; or, they may receive enough work from a few clients to stay busy. Many who freelance in the occupation work only part time, relying on other sources of income to supplement earnings from interpreting or translation.

Training, Other Qualifications, and Advancement

The educational backgrounds of interpreters and translators vary. Knowing a language in addition to a native language is a given. Although it is not necessary to have been raised bilingual to succeed, many interpreters and translators grew up speaking two languages.

In high school, students can begin to prepare for these careers by taking a broad range of courses that include English writing and comprehension, foreign languages, and basic computer proficiency. Other helpful pursuits include spending time abroad, or comparable forms of direct contact with foreign cultures, and extensive reading on a variety of subjects in English and at least one other language.

Beyond high school, there are many educational options. Although a bachelor's degree is almost always required, interpreters and translators note that it is acceptable to major in something other than a language. However, specialized training in how to do the work is generally required. A number of formal programs in interpreting and translation are available at colleges nationwide and through nonuniversity training programs, conferences, and courses. Many people who work as conference interpreters or in more technical areas—such as localization, engineering, or finance—have master's degrees, while those working in the community as court or medical interpreters or translators are more likely to complete job-specific training programs.

There is currently no universal form of certification required of all interpreters and translators in the United States, but there are a variety of different tests that workers can take to demonstrate proficiency. The American Translators Association provides accreditation in more than 24 language combinations for its members; other options include a certification program offered by The Translators and Interpreters Guild. Many interpreters are not certified. Federal courts have certification for Spanish, Navaho, and Haitian Creole interpreters, and many State and municipal courts offer their own forms of certification. The National Association of Judiciary Interpreters and Translators also offers certification for court interpreting.

The U.S. Department of State has a three-test series for interpreters, including simple consecutive interpreting (escort), simultaneous interpreting (court/seminar), and conference-level interpreting (international conferences). These tests are not referred to directly as certification, but successful completion often indicates that a person has an adequate level of skill to work in the field.

Both the National Association of the Deaf and the Registry of Interpreters for the Deaf offer certification for sign interpreters and have recently collaborated to develop a joint exam.

Experience is an essential part of a successful career in either interpreting or translation. In fact, many agencies or companies use only the services of people who have worked in the field for 3 to 5 years or who have a degree in translation studies or both.

A good way for translators to learn firsthand about the profession is to start out working in-house for a company; however, such jobs are not very numerous. Advice for new entrants to the field is to begin getting experience whatever way they can—even if it means doing informal or unpaid work. Mentoring relationships and internships are other ways to build skills and confidence. Escort interpreting may offer an opportunity for inexperienced candidates to work alongside a more seasoned interpreter. Interpreters might also find it easier to break into areas with particularly high demand for language services, such as court or medical interpretation. Once interpreters and translators have gained sufficient experience, they may then move up to more difficult or prestigious assignments, may be given editorial responsibility, or may eventually manage or start their own translation agency.

Job Outlook

Employment of interpreters and translators is projected to grow faster than the average for all occupations over the 2002-12

period, reflecting growth in the industries employing interpreters and translators. Higher demand for interpreters and translators in recent years has resulted directly from the broadening of international ties and the increase in foreign language speakers in the United States. Both of these trends are expected to continue, contributing to relatively rapid growth in the number of jobs for interpreters and translators.

Technology has made the work of interpreters and translators easier. However, technology is not likely to have a negative impact on employment of interpreters and translators because such innovations are incapable of producing work comparable with work produced by these professionals.

Translators are most in demand for the languages referred to as "PFIGS"—Portuguese, French, Italian, German, and Spanish—and the principal Asian languages—Chinese, Japanese, and Korean. Current events and changing political environments, often difficult to foresee, sometimes increase the need for persons who can work with other languages.

Urban areas, especially those in California, New York, and Washington, DC, provide the largest numbers of employment possibilities, especially for interpreters; however, as the immigrant population spreads into more rural areas, jobs in smaller communities will become more widely available.

Job prospects for interpreters and translators vary by specialty. In particular, there should be strong demand for specialists in localization, driven by imports and exports, the expansion of the Internet, and demand in other technical areas such as medicine or law. Rapid employment growth among interpreters and translators in health services industries will be fueled by relatively recent guidelines regarding compliance with Title VI of the Civil Rights Act, which requires all healthcare providers receiving Federal aid to provide language services to non-English speakers. Similarly, the Americans with Disabilities Act and other laws, such as the Rehabilitation Act, mandate that, in certain situations, an interpreter must be available for people who are deaf or hard of hearing. Given the lack of qualified candidates meeting these requirements, interpreters for the deaf will continue to have favorable employment prospects. On the other hand, job growth is expected to be limited for both conference interpreters and literary translators.

Earnings

Salaried interpreters and translators had median hourly earnings of $15.67 in 2002. The middle 50 percent earned between $11.97 and $20.33. The lowest 10 percent earned less than $9.37, and the highest 10 percent earned more than $25.99. Limited information suggests that highly skilled interpreters and translators—for example, high-level conference interpreters—working full time can earn more than $100,000 annually. Earnings depend on language, subject matter, skill, experience, education, certification, and type of employer, and salaries of interpreters and translators can vary widely. Interpreters and translators with language skills for which there is a greater demand, or for which there are relatively few people with the skills, often have higher earnings. According to a 2001 salary survey by the American Translators Association, Chinese and Japanese interpreters and translators earned the highest median hourly rates—ranging from $45 to $50 an hour. Interpreters and translators with specialized expertise, such as those working in software localization, also generally command higher rates. Individuals classified as language specialists for the Federal Government earned an average of $64,234 annually in 2003.

For those who are not salaried, earnings may fluctuate, depending on the availability of work. Furthermore, freelancers do not have any employer-paid benefits. Freelance interpreters usually earn an hourly rate, whereas translators who freelance typically earn a rate per word or per hour.

Related Occupations

Interpreters and translators use their multilingual skills, as do teachers of languages. These include teachers—preschool, kindergarten, elementary, middle, and secondary; teachers—postsecondary; teachers—special education; and teachers—adult literacy and remedial and self-enrichment education. The work of interpreters, particularly guide or escort interpreters, can be likened to that of tour and travel guides, in that they accompany individuals or groups on tours or to places of interest. Similarly, interpreters may share some common work characteristics with announcers, who also work in soundproof environments relaying information to listeners.

The work of translators is similar to that of writers and editors, in that they communicate information and ideas through the written word and prepare texts for publication or dissemination. Those working in localization of software have skills similar to those of computer software engineers, in that they analyze users' needs and design, create, and modify computer software, and many possess strong programming skills. Furthermore, interpreters or translators working in a legal or healthcare environment are required to have a knowledge of terms and concepts that is similar to that of professionals working in these fields, such as court reporters or medical transcriptionists.

Sources of Additional Information

Organizations dedicated to these professions can provide valuable advice and guidance for people interested in learning more about interpretation and translation. The language services division of local hospitals or courthouses also may be able to offer information about available opportunities.

For career information, contact the organizations listed below:

➤ American Translators Association, 225 Reinekers Lane, Suite 590, Alexandria, VA 22314. Internet: **http://www.atanet.org**

➤ The Translators and Interpreters Guild, 8611 Second Ave., Suite 203, Silver Spring, MD 20910. Internet: **http://www.ttig.org**

➤ U.S. Department of State, Office of Language Services, Room 2212, Washington, DC 20520.

For more detailed information by specialty, contact the association affiliated with that subject area:

➤ National Association of Judiciary Interpreters and Translators, 2150 N. 107th St., Suite 205, Seattle, WA 98133. Internet: **http://www.najit.org**

➤ American Literary Translators Association, PO Box 830688, Richardson, TX 75083. Internet: **http://www.literarytranslators.org**

➤ The Localisation Industry Standards Association, 7 Route du Monastère-CH-1173, Féchy, Switzerland. Internet: **http://www.lisa.org**

➤ Massachusetts Medical Interpreters Association, New England Medical Center, 750 Washington St., NEMC Box 271, Boston, MA 02111. Internet: **http://www.mmia.org**

➤ Registry of Interpreters for the Deaf, 333 Commerce St., Alexandria, VA 22314. Internet: **http://www.rid.org**

Musicians, Singers, and Related Workers

(0*NET 27-2041.01, 27-2041.02, 27-2041.03, 27-2042.01, 27-2042.02)

Significant Points

- Part-time schedules and intermittent unemployment are common; many musicians supplement their income with earnings from other sources.
- Aspiring musicians begin studying an instrument or training their voices at an early age.
- Competition for jobs is keen; those who can play several instruments and perform a wide range of music styles should enjoy the best job prospects.

Nature of the Work

Musicians, singers, and related workers play musical instruments, sing, compose or arrange music, or conduct groups in instrumental or vocal performances. They may perform solo or as part of a group. Musicians, singers, and related workers entertain live audiences in nightclubs, concert halls, and theaters featuring opera, musical theater, or dance. Although most of these entertainers play for live audiences, many perform exclusively for recording or production studios. Regardless of the setting, musicians, singers, and related workers spend considerable time practicing, alone and with their band, orchestra, or other musical ensemble.

Musicians often gain their reputation or professional standing in a particular kind of music or performance. However, those who learn several related instruments, such as the flute and clarinet, and who can perform equally well in several musical styles, have better employment opportunities. Instrumental musicians, for example, may play in a symphony orchestra, rock group, or jazz combo one night, appear in another ensemble the next, and work in a studio band the following day. Some play a variety of string, brass, woodwind, or percussion instruments or electronic synthesizers.

Singers interpret music, using their knowledge of voice production, melody, and harmony. They sing character parts or perform in their own individual style. Singers are often classified according to their voice range—soprano, contralto, tenor, baritone, or bass—or by the type of music they sing, such as opera, rock, popular, folk, rap, or country and western.

Music directors conduct, direct, plan, and lead instrumental or vocal performances by musical groups, such as orchestras, choirs, and glee clubs. Conductors lead instrumental music groups, such as symphony orchestras, dance bands, show bands, and various popular ensembles. These leaders audition and select musicians, choose the music most appropriate for their talents and abilities, and direct rehearsals and performances. Choral directors lead choirs and glee clubs, sometimes working with a band or an orchestra conductor. Directors audition and select singers and lead them at rehearsals and performances in order to achieve harmony, rhythm, tempo, shading, and other desired musical effects.

Composers create original music such as symphonies, operas, sonatas, radio and television jingles, film scores, or popular songs. They transcribe ideas into musical notation, using harmony, rhythm, melody, and tonal structure. Although most composers and songwriters practice their craft on instruments and transcribe the notes with pen and paper, some use computer software to compose and edit their music.

Arrangers transcribe and adapt musical compositions to a particular style for orchestras, bands, choral groups, or individuals. Components of music—including tempo, volume, and the mix of instruments needed—are arranged to express the composer's message. While some arrangers write directly into a musical composition, others use computer software to make changes.

Working Conditions

Musicians typically perform at night and on weekends. They spend much of their remaining time practicing or in rehearsal. Full-time musicians with long-term employment contracts, such as those with symphony orchestras or television and film production companies, enjoy steady work and less travel. Nightclub, solo, or recital musicians frequently travel to perform in a variety of local settings and may tour nationally or internationally. Because many musicians find only part-time or intermittent work, experiencing unemployment between engagements, they often supplement their income with other types of jobs. The stress of constantly looking for work leads many musicians to accept permanent, full-time jobs in other occupations, while working only part time as musicians.

Most instrumental musicians work closely with a variety of other people, including their colleagues, agents, employers, sponsors, and audiences. Although they usually work indoors, some perform outdoors for parades, concerts, and dances. In some nightclubs and restaurants, smoke and odors may be present, and lighting and ventilation may be inadequate.

Employment

Musicians, singers, and related workers held about 215,000 jobs in 2002. Almost 40 percent worked part time, and more than one third were self-employed. Many found jobs in cities in which entertainment and recording activities are concentrated, such as New York, Los Angeles, Chicago, and Nashville.

Musicians, singers, and related workers are employed in a variety of settings. Of those who earn a wage or salary, more than one half are employed by religious organizations and one

Singers interpret music, using their knowledge of voice production, melody, and harmony.

fourth by performing arts companies, such as professional orchestras, small chamber music groups, opera companies, musical theater companies, and ballet troupes. Musicians and singers also perform in nightclubs and restaurants and for weddings and other events. Well-known musicians and groups may perform in concerts, appear on radio and television broadcasts, and make recordings and music videos. The Armed Forces also offer careers in their bands and smaller musical groups.

Training, Other Qualifications, and Advancement

Aspiring musicians begin studying an instrument at an early age. They may gain valuable experience playing in a school or community band or an orchestra or with a group of friends. Singers usually start training when their voices mature. Participation in school musicals or choirs often provides good early training and experience.

Musicians need extensive and prolonged training to acquire the necessary skills, knowledge, and ability to interpret music. Like other artists, musicians and singers continually strive to stretch themselves—exploring different forms of music. Formal training may be obtained through private study with an accomplished musician, in a college or university music program, or in a music conservatory. For university or conservatory study, an audition generally is necessary. The National Association of Schools of Music accredits nearly 600 college-level programs in music. Courses typically include musical theory, music interpretation, composition, conducting, and performance in a particular instrument or in voice. Music directors, composers, conductors, and arrangers need considerable related work experience or advanced training in these subjects.

Many colleges, universities, and music conservatories grant bachelor's or higher degrees in music. A master's or doctoral degree is usually required to teach advanced music courses in colleges and universities; a bachelor's degree may be sufficient to teach basic courses. A degree in music education qualifies graduates for a State certificate to teach music in public elementary or secondary schools. Musicians who do not meet public school music education requirements may teach in private schools and recreation associations or instruct individual students in private sessions.

Musicians must be knowledgeable about a broad range of musical styles, but keenly aware of the form that interests them most. This broader range of interest, knowledge, and training can help expand employment opportunities and musical abilities. Voice training and private instrumental lessons, taken especially when the individual is young, also help develop technique and enhance one's performance.

Young persons considering careers in music should have musical talent, versatility, creativity, poise, and a good stage presence. Because quality performance requires constant study and practice, self-discipline is vital. Moreover, musicians who play in concerts or in nightclubs and those who tour must have physical stamina to endure frequent travel and an irregular performance schedule. Musicians and singers always must make their performances look effortless; therefore, preparation and practice are important. They also must be prepared to face the anxiety of intermittent employment and of rejection when auditioning for work.

Advancement for musicians usually means becoming better known and performing for higher earnings. Successful musicians often rely on agents or managers to find them performing engagements, negotiate contracts, and develop their careers.

Job Outlook

Competition for jobs for musicians, singers, and related workers is expected to be keen. The vast number of persons with the desire to perform will exceed the number of openings. Talent alone is no guarantee of success: many people start out to become musicians or singers, but leave the profession because they find the work difficult, the discipline demanding, and the long periods of intermittent unemployment unendurable.

Overall employment of musicians, singers, and related workers is expected to grow about as fast as the average for all occupations through 2012. Most new wage and salary jobs for musicians will arise in religious organizations. Slower-than-average growth is expected for self-employed musicians, who generally perform in nightclubs, concert tours, and other venues. Although growth in demand for musicians will generate a number of job opportunities, many openings also will arise from the need to replace those who leave the field each year because they are unable to make a living solely as musicians or for other reasons.

Earnings

Median annual earnings of salaried musicians and singers were $36,290 in 2002. The middle 50 percent earned between $18,660 and $59,970. The lowest 10 percent earned less than $13,040, and the highest 10 percent earned more than $96,250. Median annual earnings were $43,060 in performing arts companies and $18,160 in religious organizations.

Median annual earnings of salaried music directors and composers were $31,310 in 2002. The middle 50 percent earned between $23,820 and $46,350. The lowest 10 percent earned less than $14,590, and the highest 10 percent earned more than $67,330.

Earnings often depend on the number of hours and weeks worked, a performer's professional reputation, and the setting. The most successful musicians earn performance or recording fees that far exceed the median earnings.

According to the American Federation of Musicians, weekly minimum salaries in major orchestras ranged from $734 to $1,925 during the 2002-03 performing season. Each orchestra works out a separate contract with its local union, with individual musicians eligible to negotiate a higher salary. Top orchestras have a season ranging from 24 to 52 weeks, with 18 orchestras reporting 52-week contracts. In regional orchestras, minimum salaries are often less, because fewer performances are scheduled. Community orchestras often have yet more limited levels of funding and offer salaries that are much lower for seasons of shorter duration. Regional orchestra musicians often are paid for their services, without any guarantee of future employment.

Although musicians employed by some symphony orchestras work under master wage agreements, which guarantee a season's work up to 52 weeks, many other musicians face relatively long periods of unemployment between jobs. Even when employed, many musicians and singers work part time in unrelated occupations. Thus, their earnings usually are lower than earnings in many other occupations. Moreover, because they may not work steadily for one employer, some performers cannot qualify for unemployment compensation, and few have typical benefits such as sick leave or paid vacations. For these reasons, many musicians give private lessons or take jobs unrelated to music to supplement their earnings as performers.

Many musicians belong to a local of the American Federation of Musicians. Professional singers who perform live often belong to a branch of the American Guild of Musical Artists;

those who record for the broadcast industries may belong to the American Federation of Television and Radio Artists.

Related Occupations

Musical instrument repairers and tuners (part of precision instrument and equipment repairers) require technical knowledge of musical instruments. Others whose work involves music include actors, producers, and directors; announcers; and dancers and choreographers.

Sources of Additional Information

For general information about music and music teacher education and a list of accredited college-level programs, contact:

➤ National Association of Schools of Music, 11250 Roger Bacon Dr., Suite 21, Reston, VA 22091. Internet: **http://nasm.arts-accredit.org**

News Analysts, Reporters, and Correspondents

(0*NET 27-3021.00, 27-3022.00)

Significant Points

- Most employers prefer experienced individuals with a bachelor's degree in journalism or mass communications.
- Competition will be keen for jobs at large metropolitan and national newspapers, broadcast stations, and magazines; most entry-level openings arise at small broadcast stations and publications.
- Jobs often involve irregular hours, night and weekend work, and pressure to meet deadlines.

Nature of the Work

News analysts, reporters, and correspondents play a key role in our society. They gather information, prepare stories, and make broadcasts that inform us about local, State, national, and international events; present points of view on current issues; and report on the actions of public officials, corporate executives, special-interest groups, and others who exercise power.

News analysts examine, interpret, and broadcast news received from various sources. They also are called *newscasters* or *news anchors*. News anchors present news stories and introduce videotaped news or live transmissions from on-the-scene reporters. Some newscasters at large stations and networks specialize in a particular type of news, such as sports or weather. *Weathercasters*, also called weather reporters, report current and forecasted weather conditions. They gather information from national satellite weather services, wire services, and local and regional weather bureaus. Some weathercasters are trained meteorologists and can develop their own weather forecasts. (See the statement on atmospheric scientists elsewhere in the *Handbook*.) *Sportscasters* select, write, and deliver sports news. This may include interviews with sports personalities and coverage of games and other sporting events.

In covering a story, *reporters* investigate leads and news tips, look at documents, observe events at the scene, and interview people. Reporters take notes and also may take photographs or shoot videos. At their office, they organize the material, determine the focus or emphasis, write their stories, and edit accompanying video material. Many reporters enter information or write stories on laptop computers, and electronically submit the material to their offices from remote locations. In some cases, *newswriters* write a story from information collected and submitted by reporters. Radio and television reporters often compose stories and report "live" from the scene. At times, they later tape an introduction to or commentary on their story in the studio. Some journalists also interpret the news or offer opinions to readers, viewers, or listeners. In this role, they are called *commentators* or *columnists*.

General assignment reporters write about newsworthy occurrences, such as an accident, a political rally, the visit of a celebrity, or a company going out of business, as assigned. Large newspapers and radio and television stations assign reporters to gather news about specific topics or "beats," such as crime or education. Some reporters specialize in fields such as health, politics, foreign affairs, sports, theater, consumer affairs, social events, science, business, or religion. Investigative reporters cover stories that may take many days or weeks of information gathering. Some publications use teams of reporters instead of assigning specific beats, allowing reporters to cover a greater variety of stories. News teams may include reporters, editors, graphic artists, and photographers, working together to complete a story.

News *correspondents* report on news occurring in the large U.S. and foreign cities where they are stationed. Reporters on small publications cover all aspects of the news. They take photographs, write headlines, lay out pages, edit wire service stories, and write editorials. Some also solicit advertisements, sell subscriptions, and perform general office work.

Working Conditions

The work of news analysts, reporters, and correspondents is usually hectic. They are under great pressure to meet deadlines. Broadcasts sometimes are made with little or no time for preparation. Some news analysts, reporters, and correspondents work in comfortable, private offices; others work in large rooms filled with the sound of keyboards and computer printers, as well as the voices of other reporters. Curious onlookers, police, or other emergency workers can distract those reporting from the scene for radio and television. Covering wars, political uprisings, fires, floods, and similar events is often dangerous.

Working hours vary. Reporters on morning papers often work from late afternoon until midnight. Radio and television reporters usually are assigned to a day or evening shift. Magazine reporters usually work during the day.

Reporters sometimes have to change their work hours to meet a deadline, or to follow late-breaking developments. Their work demands long hours, irregular schedules, and some travel. Many stations and networks are on the air 24 hours a day, so newscasters can expect to work unusual hours.

Employment

News analysts, reporters, and correspondents held about 66,000 jobs in 2002. About 60 percent worked for newspaper, periodical, book, and directory publishers. Another 25 percent worked in radio and television broadcasting. About 4,100 news analysts, reporters, and correspondents were self-employed.

Reporters often travel to sporting events.

Training, Other Qualifications, and Advancement

Most employers prefer individuals with a bachelor's degree in journalism or mass communications, but some hire graduates with other majors. They look for experience on school newspapers or broadcasting stations and internships with news organizations. Large-city newspapers and stations also may prefer candidates with a degree in a subject-matter specialty such as economics, political science, or business. Some large newspapers and broadcasters may hire only experienced reporters.

Bachelor's degree programs in journalism are available at more than 400 colleges or universities. About three-fourths of the courses in a typical curriculum are in liberal arts; the remaining courses are in journalism. Examples of journalism courses are introductory mass media, basic reporting and copy editing, history of journalism, and press law and ethics. Students planning a career in broadcasting take courses in radio and television news and production. Those planning newspaper or magazine careers usually specialize in news-editorial journalism. To create a story for an online presentation, they need to know how to use computer software to combine online story text with audio and video elements and graphics.

Many community and junior colleges offer journalism courses or programs; credits may be transferable to 4-year journalism programs. About 120 schools offered a master's degree in journalism in 2002; about 35 schools offered a Ph.D. degree. Some graduate programs are intended primarily as preparation for news careers, while others prepare journalism teachers, researchers and theorists, and advertising and public relations workers.

High school courses in English, journalism, and social studies provide a good foundation for college programs. Useful college liberal arts courses include English with an emphasis on writing, sociology, political science, economics, history, and psychology. Courses in computer science, business, and speech are useful as well. Fluency in a foreign language is necessary in some jobs.

Although reporters need good word processing skills, computer graphics and desktop publishing skills also are useful. Computer-assisted reporting involves the use of computers to analyze data in search of a story. This technique and the interpretation of the results require computer skills and familiarity with databases. Knowledge of news photography also is valuable for entry-level positions, which sometimes combine the responsibilities of a reporter with those of a camera operator or photographer.

Employers report that practical experience is the most important part of education and training. Upon graduation many students have already gained much practical experience through part-time or summer jobs or through internships with news organizations. Most newspapers, magazines, and broadcast news organizations offer reporting and editing internships. Work on high school and college newspapers, at broadcasting stations, or on community papers or U.S. Armed Forces publications also provides practical training. In addition, journalism scholarships, fellowships, and assistantships awarded to college journalism students by universities, newspapers, foundations, and professional organizations are helpful. Experience as a stringer or freelancer—a part-time reporter who is paid only for stories printed—is advantageous.

Reporters should be dedicated to providing accurate and impartial news. Accuracy is important, both to serve the public and because untrue or libelous statements can lead to lawsuits. A nose for news, persistence, initiative, poise, resourcefulness, a good memory, and physical stamina are important, as is the emotional stability to deal with pressing deadlines, irregular hours, and dangerous assignments. Broadcast reporters and news analysts must be comfortable on camera. All reporters must be at ease in unfamiliar places and with a variety of people. Positions involving on-air work require a pleasant voice and appearance.

Most reporters start at small publications or broadcast stations as general assignment reporters or copy editors. Large publications and stations hire few recent graduates; as a rule, they require new reporters to have several years of experience.

Beginning reporters cover court proceedings and civic and club meetings, summarize speeches, and write obituaries. With experience, they report more difficult assignments, cover an assigned beat, or specialize in a particular field.

Some news analysts and reporters can advance by moving to larger newspapers or stations. A few experienced reporters become columnists, correspondents, writers, announcers, or public relations specialists. Others become editors in print journalism or program managers in broadcast journalism, who supervise reporters. Some eventually become broadcasting or publishing industry managers.

Job Outlook

Employment of news analysts, reporters, and correspondents is expected to grow more slowly than the average for all occupations through the year 2012—the result of mergers, consolidations, and closures of newspapers; decreased circulation; increased expenses; and a decline in advertising profits. In addition to consolidation of local newspaper and television and radio station ownership, increasing competition for viewers from cable networks also should limit employment growth. Some job growth is expected in new media areas, such as online newspapers and magazines. Job openings also will result from the need to replace workers who leave their occupations permanently. Some news analysts, reporters, and correspondents find the work too stressful and hectic or do not like the lifestyle, and transfer to other occupations.

Most opportunities will be with smalltown and suburban newspapers and radio and television stations. Competition will continue to be keen for more sought-after jobs on large metropolitan and national newspapers, broadcast stations and networks, and magazines. Talented writers who can handle highly specialized scientific or technical subjects have an advantage. Also, newspapers increasingly are hiring stringers and freelancers.

Journalism graduates have the background for work in closely related fields such as advertising and public relations, and many take jobs in these fields. Other graduates accept sales, managerial, or other nonmedia positions.

The number of job openings in the newspaper and broadcasting industries—in which news analysts, reporters, and correspondents are employed—is sensitive to economic ups and downs, because these industries depend on advertising revenue.

Earnings

Salaries for news analysts, reporters, and correspondents vary widely. Median annual earnings of news analysts, reporters, and correspondents were $30,510 in 2002. The middle 50 percent earned between $22,350 and $47,170. The lowest 10 percent earned less than $17,620, and the highest 10 percent earned more than $69,450. Median annual earnings of news analysts,

reporters, and correspondents were $33,320 in radio and television broadcasting and $29,090 in newspaper, periodical, book, and directory publishers in 2002.

Related Occupations

News analysts, reporters, and correspondents must write clearly and effectively to succeed in their profession. Others for whom good writing ability is essential include writers and editors, and public relations specialists. Many news analysts, reporters, and correspondents also must communicate information orally. Others for whom oral communication skills are important are announcers, interpreters and translators, sales and related occupations, and teachers.

Sources of Additional Information

For information on broadcasting education and scholarship resources, contact:

➤ National Association of Broadcasters, 1771 N St. NW., Washington, DC 20036. Internet: **http://www.nab.org**

Information on careers in journalism, colleges and universities offering degree programs in journalism or communications, and journalism scholarships and internships may be obtained from:

➤ Dow Jones Newspaper Fund, Inc., P.O. Box 300, Princeton, NJ 08543-0300.

Information on union wage rates for newspaper and magazine reporters is available from:

➤ Newspaper Guild, Research and Information Department, 501 3rd St. NW., Suite 250, Washington, DC 20001.

For a list of schools with accredited programs in journalism and mass communications, send a stamped, self-addressed envelope to:

➤ Accrediting Council on Education in Journalism and Mass Communications, University of Kansas School of Journalism and Mass Communications, Stauffer-Flint Hall, 1435 Jayhawk Blvd., Lawrence, KS 66045. Internet: **http://www.ku.edu/~acejmc/STUDENT/STUDENT.SHTML**

Names and locations of newspapers and a list of schools and departments of journalism are published in the *Editor and Publisher International Year Book*, available in most public libraries and newspaper offices.

Photographers

(0*NET 27-4021.01, 27-4021.02)

Significant Points

- Competition for jobs is expected to be keen because the work is attractive to many people.
- Technical expertise, a "good eye," imagination, and creativity are essential.
- More than half of all photographers are self-employed; the most successful are able to adapt to rapidly changing technologies and are adept at operating a business.

Nature of the Work

Photographers produce and preserve images that paint a picture, tell a story, or record an event. To create commercial quality photographs, photographers need both technical expertise and creativity. Producing a successful picture requires choosing and presenting a subject to achieve a particular effect, and selecting the appropriate equipment. For example, photographers may enhance the subject's appearance with natural or artificial light, use a particular lens depending on the desired range or level of detail, or draw attention to a particular aspect of the subject by blurring the background.

Today, many cameras adjust settings such as shutter speed and aperture automatically. They also let the photographer adjust these settings manually, allowing greater creative and technical control over the picture-taking process. In addition to automatic and manual cameras, photographers use an array of film, lenses, and equipment—from filters, tripods, and flash attachments to specially constructed lighting equipment.

Photographers use either a traditional camera that records images on silver halide film that is developed into prints or a digital camera that electronically records images. Some photographers send their film to laboratories for processing. Color film requires expensive equipment and exacting conditions for correct processing and printing. (See the statement on photographic process workers and processing machine operators elsewhere in the *Handbook*.) Other photographers, especially those who use black and white film or who require special effects, prefer to develop and print their own photographs. Photographers who do their own film developing must have the technical skill to operate a fully equipped darkroom or the appropriate computer software to process prints digitally.

Recent advances in electronic technology now make it possible for the professional photographer to develop and scan standard 35mm or other types of film, and use flatbed scanners and photofinishing laboratories to produce computer-readable, digital images from film. After converting the film to a digital image, photographers can edit and electronically transmit images using a method as simple as e-mail or as advanced as a satellite phone. This makes it easier and faster to shoot, develop, and transmit pictures from remote locations.

Using computers and specialized software, photographers also can manipulate and enhance the scanned or digital image to create a desired effect. Images can be stored on portable memory devices including compact disks (CDs) or on new types of smaller "mini pocket" storage devices such as flash disks, which are small memory cards used in digital cameras. Digital technology also allows the production of larger, more colorful, and more accurate prints or images for use in advertising, photographic art, and scientific research. Some photographers use this technology to create electronic portfolios as well. Because much photography now involves the use of computer technology, photographers must have hands-on knowledge of computer editing software.

Some photographers specialize in areas such as portrait, commercial and industrial, scientific, news, or fine arts photography. *Portrait photographers* take pictures of individuals or groups of people and often work in their own studios. Some specialize in weddings, religious ceremonies, or school photographs and may work on location. Portrait photographers who are business owners arrange for advertising, schedule appointments, set and adjust equipment, develop and retouch negatives, and mount and frame pictures. They also purchase supplies, keep records, bill customers, and may hire and train employees.

Commercial and industrial photographers take pictures of various subjects, such as buildings, models, merchandise, artifacts, and landscapes. These photographs are used in a variety of media, including books, reports, advertisements, and catalogs. Industrial photographers often take pictures of equipment, machinery, products, workers, and company officials. The pictures are used for various purposes—for example, analysis of engineering projects, publicity, or records of equipment development or deployment, such as placement of an offshore rig. This photography frequently is done on location.

Scientific photographers take images of a variety of subjects to illustrate or record scientific or medical data or phenomena, using knowledge of scientific procedures. They typically possess additional knowledge in areas such as engineering, medicine, biology, or chemistry.

News photographers, also called *photojournalists*, photograph newsworthy people, places, and sporting, political, and community events for newspapers, journals, magazines, or television. Some news photographers are salaried staff; others are self-employed and are known as freelance photographers.

Fine arts photographers sell their photographs as fine artwork. In addition to technical proficiency, fine arts photographers need artistic talent and creativity.

Self-employed, or freelance, photographers may license the use of their photographs through stock photo agencies or con-

Portrait photographers take pictures of individuals or groups of people and often work in their own studios.

tract with clients or agencies to provide photographs as necessary. Stock agencies grant magazines and other customers the right to purchase the use of photographs, and, in turn, pay the photographer on a commission basis. Stock photo agencies require an application from the photographer and a sizable portfolio. Once accepted, a large number of new submissions usually is required from the photographer each year.

Working Conditions

Working conditions for photographers vary considerably. Photographers employed in government and advertising agencies usually work a 5-day, 40-hour week. On the other hand, news photographers often work long, irregular hours and must be available to work on short notice. Many photographers work part-time or variable schedules.

Portrait photographers usually work in their own studios but also may travel to take photographs at the client's location, such as a school, a company office, or a private home. News and commercial photographers frequently travel locally, stay overnight on assignments, or travel to distant places for long periods.

Some photographers work in uncomfortable or even dangerous surroundings, especially news photographers covering accidents, natural disasters, civil unrest, or military conflicts. Many photographers must wait long hours in all kinds of weather for an event to take place and stand or walk for long periods while carrying heavy equipment. News photographers often work under strict deadlines.

Self-employment allows for greater autonomy, freedom of expression, and flexible scheduling. However, income can be uncertain and the continuous, time-consuming search for new clients can be stressful. Some self-employed photographers hire assistants who help seek out new business.

Employment

Photographers held about 130,000 jobs in 2002. More than half were self-employed, a much higher proportion than the average for all occupations. Some self-employed photographers have contracts with advertising agencies, magazines, or others to do individual projects at a predetermined fee, while others operate portrait studios or provide photographs to stock photo agencies.

Most salaried photographers work in portrait or commercial photography studios. Newspapers, magazines, television broadcasters, and advertising agencies employ most of the others. Most photographers work in metropolitan areas.

Training, Other Qualifications, and Advancement

Employers usually seek applicants with a "good eye," imagination, and creativity, as well as a good technical understanding of photography. Entry-level positions in photojournalism or in industrial or scientific photography generally require a college degree in journalism or photography. Freelance and portrait photographers need technical proficiency, whether gained through a degree program, vocational training, or extensive work experience.

Many universities, community and junior colleges, vocational-technical institutes, and private trade and technical schools offer photography courses. Basic courses in photography cover equipment, processes, and techniques. Bachelor's degree programs, especially those including business courses, provide a well-rounded education. Art schools offer useful training in design and composition.

Individuals interested in photography should subscribe to photographic newsletters and magazines, join camera clubs, and seek summer or part-time employment in camera stores, newspapers, or photo studios.

Photographers may start out as assistants to experienced photographers. Assistants learn to mix chemicals, develop film, and print photographs, and acquire the other skills necessary to run a portrait or commercial photography business. Freelance photographers also should develop an individual style of photography in order to differentiate themselves from the competition. Some photographers enter the field by submitting unsolicited photographs to magazines and to art directors at advertising agencies. For freelance photographers, a good portfolio of their work is critical.

Photographers need good eyesight, artistic ability, and good hand-eye coordination. They should be patient, accurate, and detail-oriented. Photographers should be able to work well with others, as they frequently deal with clients, graphic designers, or advertising and publishing specialists. Increasingly, photographers need to know how to use computer software programs and applications that allow them to prepare and edit images.

Portrait photographers need the ability to help people relax in front of the camera. Commercial and fine arts photographers must be imaginative and original. News photographers not only must be good with a camera, but also must understand the story behind an event so that their pictures match the story. They must be decisive in recognizing a potentially good photograph and act quickly to capture it.

Photographers who operate their own businesses, or freelance, need business skills as well as talent. These individuals must know how to prepare a business plan; submit bids; write contracts; market their work; hire models, if needed; get permission to shoot on locations that normally are not open to the public; obtain releases to use photographs of people; license and price photographs; secure copyright protection for their work; and keep financial records. Knowledge of licensing and copyright laws as well as contract negotiation procedures is especially important for self-employed photographers, in order to protect their rights and their work.

After several years of experience, magazine and news photographers may advance to photography or picture editor positions. Some photographers teach at technical schools, film schools, or universities.

Job Outlook

Photographers can expect keen competition for job openings because the work is attractive to many people. The number of individuals interested in positions as commercial and news photographers usually is much greater than the number of openings. Those who succeed in landing a salaried job or attracting enough work to earn a living by freelancing are likely to be the most creative, able to adapt to rapidly changing technologies, and adept at operating a business. Related work experience, job-related training, or some unique skill or talent—such as a background in computers or electronics—also are beneficial to prospective photographers.

Employment of photographers is expected to increase about as fast as the average for all occupations through 2012. Demand

for portrait photographers should increase as the population grows. As the number of electronic versions of magazines, journals, and newspapers increases on the Internet, commercial photographers will be needed to provide digital images.

Job growth, however, will be constrained somewhat by the widespread use of digital photography and the falling price of digital equipment. Besides increasing photographers' productivity, improvements in digital technology reduce barriers of entry into this profession and allow more individual consumers and businesses to produce, store, and access photographic images on their own. Declines in the newspaper industry also will reduce demand for photographers to provide still images for print.

Earnings

Median annual earnings of salaried photographers were $24,040 in 2002. The middle 50 percent earned between $17,740 and $34,910. The lowest 10 percent earned less than $14,640, and the highest 10 percent earned more than $49,920. Median annual earnings in the industries employing the largest numbers of salaried photographers were $31,460 for newspapers and periodicals and $21,860 for other professional or scientific services.

Salaried photographers—more of whom work full time—tend to earn more than those who are self-employed. Because most freelance and portrait photographers purchase their own equipment, they incur considerable expense acquiring and maintaining cameras and accessories. Unlike news and commercial photographers, few fine arts photographers are successful enough to support themselves solely through their art.

Related Occupations

Other occupations requiring artistic talent and creativity include architects, except landscape and naval; artists and related workers; designers; news analysts, reporters, and correspondents; and television, video, and motion picture camera operators and editors.

Sources of Additional Information

Career information on photography is available from:

➤ Professional Photographers of America, Inc., 229 Peachtree St. NE., Suite 2200, Atlanta, GA 30303.

➤ National Press Photographers Association, Inc., 3200 Croasdaile Dr., Suite 306, Durham, NC 27705. Internet: **http://www.nppa.org**

Public Relations Specialists

(0*NET 27-3031.00)

Significant Points

- Although employment is projected to increase faster than average, keen competition is expected for entry-level jobs.
- Opportunities should be best for college graduates who combine a degree in public relations, journalism, or another communications-related field with a public relations internship or other related work experience.
- The ability to communicate effectively is essential.

Nature of the Work

An organization's reputation, profitability, and even its continued existence can depend on the degree to which its targeted "publics" support its goals and policies. Public relations specialists—also referred to as communications specialists and media specialists, among other titles—serve as advocates for businesses, nonprofit associations, universities, hospitals, and other organizations, and build and maintain positive relationships with the public. As managers recognize the growing importance of good public relations to the success of their organizations, they increasingly rely on public relations specialists for advice on the strategy and policy of such programs.

Public relations specialists handle organizational functions such as media, community, consumer, industry, and governmental relations; political campaigns; interest-group representation; conflict mediation; or employee and investor relations. They help an organization and its public adapt mutually to each other. However, public relations are not only about "telling the organization's story." Understanding the attitudes and concerns of consumers, employees, and various other groups also is a vital part of the job. To improve communication, public relations specialists establish and maintain cooperative relationships with representatives of community, consumer, employee, and public interest groups, and with representatives from print and broadcast journalism.

Informing the general public, interest groups, and stockholders of an organization's policies, activities, and accomplishments is an important part of a public relations specialist's job. The work also involves keeping management aware of public attitudes and the concerns of the many groups and organizations with which they must deal.

Media specialists draft press releases and contact people in the media who might print or broadcast their material. Many radio or television special reports, newspaper stories, and magazine articles start at the desks of public relations specialists. Sometimes, the subject is an organization and its policies towards its employees or its role in the community. Often, the subject is a public issue, such as health, energy, or the environment.

Public affairs specialists also arrange and conduct programs to keep up contact between organization representatives and the public. For example, they set up speaking engagements and often prepare speeches for company officials. These media specialists represent employers at community projects; make film, slide, or other visual presentations at meetings and school assemblies; and plan conventions. In addition, they are responsible for preparing annual reports and writing proposals for various projects.

In government, public relations specialists—who may be called press secretaries, information officers, public affairs specialists, or communication specialists—keep the public informed about the activities of government agencies and officials. For example, public affairs specialists in the U.S. Department of State keep the public informed of travel advisories and of U.S. positions on foreign issues. A press secretary for a member of Congress keeps constituents aware of the representative's accomplishments.

In large organizations, the key public relations executive, who often is a vice president, may develop overall plans and policies with other executives. In addition, public relations departments employ public relations specialists to write, research, prepare materials, maintain contacts, and respond to inquiries.

People who handle publicity for an individual or who direct public relations for a small organization may deal with all aspects of the job. They contact people, plan and research, and prepare materials for distribution. They also may handle advertising or sales promotion work to support marketing.

Working Conditions

Some public relations specialists work a standard 35- to 40-hour week, but unpaid overtime is common. Occasionally, they must be at the job or on call around the clock, especially if there is an emergency or crisis. Public relations offices are busy places; work schedules can be irregular and frequently interrupted. Schedules often have to be rearranged so that workers can meet deadlines, deliver speeches, attend meetings and community activities, or travel.

Employment

Public relations specialists held about 158,000 jobs in 2002. Public relations specialists are concentrated in service-providing industries such as advertising and related services; health care and social assistance; educational services; and govern-

Public relations specialists serve as advocates for organizations and build and maintain positive relationships with the public.

ment. Others worked for communications firms, financial institutions, and government agencies. About 11,000 public relations specialists were self-employed.

Public relations specialists are concentrated in large cities, where press services and other communications facilities are readily available and many businesses and trade associations have their headquarters. Many public relations consulting firms, for example, are in New York, Los Angeles, San Francisco, Chicago, and Washington, DC. There is a trend, however, for public relations jobs to be dispersed throughout the Nation, closer to clients.

Training, Other Qualifications, and Advancement

There are no defined standards for entry into a public relations career. A college degree combined with public relations experience, usually gained through an internship, is considered excellent preparation for public relations work; in fact, internships are becoming vital to obtaining employment. The ability to communicate effectively is essential. Many entry-level public relations specialists have a college major in public relations, journalism, advertising, or communication. Some firms seek college graduates who have worked in electronic or print journalism. Other employers seek applicants with demonstrated communication skills and training or experience in a field related to the firm's business—information technology, health, science, engineering, sales, or finance, for example.

Many colleges and universities offer bachelor's and postsecondary degrees in public relations, usually in a journalism or communications department. In addition, many other colleges offer at least one course in this field. A common public relations sequence includes courses in public relations principles and techniques; public relations management and administration, including organizational development; writing, emphasizing news releases, proposals, annual reports, scripts, speeches, and related items; visual communications, including desktop publishing and computer graphics; and research, emphasizing social science research and survey design and implementation. Courses in advertising, journalism, business administration, finance, political science, psychology, sociology, and creative writing also are helpful. Specialties are offered in public relations for business, government, and nonprofit organizations.

Many colleges help students gain part-time internships in public relations that provide valuable experience and training. The U.S. Armed Forces also can be an excellent place to gain training and experience. Membership in local chapters of the Public Relations Student Society of America (affiliated with the Public Relations Society of America) or the International Association of Business Communicators provides an opportunity for students to exchange views with public relations specialists and to make professional contacts that may help them find a job in the field. A portfolio of published articles, television or radio programs, slide presentations, and other work is an asset in finding a job. Writing for a school publication or television or radio station provides valuable experience and material for one's portfolio.

Creativity, initiative, good judgment, and the ability to express thoughts clearly and simply are essential. Decision making, problem-solving, and research skills also are important. People who choose public relations as a career need an outgoing personality, self-confidence, an understanding of human psychology, and an enthusiasm for motivating people. They should be competitive, yet able to function as part of a team and open to new ideas.

Some organizations, particularly those with large public relations staffs, have formal training programs for new employees. In smaller organizations, new employees work under the guidance of experienced staff members. Beginners often maintain files of material about company activities, scan newspapers and magazines for appropriate articles to clip, and assemble information for speeches and pamphlets. They also may answer calls from the press and public, work on invitation lists and details for press conferences, or escort visitors and clients. After gaining experience, they write news releases, speeches, and articles for publication or design and carry out public relations programs. Public relations specialists in smaller firms usually get all-around experience, whereas those in larger firms tend to be more specialized.

The Public Relations Society of America accredits public relations specialists who have at least 5 years of experience in the field and have passed a comprehensive 6-hour examination (5 hours written, 1 hour oral). The International Association of Business Communicators also has an accreditation program for professionals in the communication field, including public relations specialists. Those who meet all the requirements of the program earn the Accredited Business Communicator (ABC) designation. Candidates must have at least 5 years of experience in a communication field and pass a written and oral examination. They also must submit a portfolio of work samples demonstrating involvement in a range of communication projects and a thorough understanding of communication planning. Employers may consider professional recognition through accreditation a sign of competence in this field, which could be especially helpful in a competitive job market.

Promotion to supervisory jobs may come as public relations specialists show that they can handle more demanding assignments. In public relations firms, a beginner might be hired as a research assistant or account coordinator and be promoted to account executive, senior account executive, account manager, and, eventually, vice president. A similar career path is followed in corporate public relations, although the titles may differ. Some experienced public relations specialists start their own consulting firms. (For more information on public relations managers, see the *Handbook* statement on advertising, marketing, promotions, public relations, and sales managers.)

Job Outlook

Keen competition will likely continue for entry-level public relations jobs, as the number of qualified applicants is expected to exceed the number of job openings. Many people are attracted to this profession due to the high-profile nature of the work. Opportunities should be best for college graduates who combine a degree in journalism, public relations, advertising, or another communications-related field with a public relations internship or other related work experience. Applicants without the appropriate educational background or work experience will face the toughest obstacles.

Employment of public relations specialists is expected to increase faster than the average for all occupations through 2012. The need for good public relations in an increasingly competitive business environment should spur demand for public relations specialists in organizations of all types and sizes. The value of a company is measured not just by its balance sheet, but also by the strength of its relationships with those upon whom it depends for its success. And, in the wake

of corporate scandals, more emphasis will be placed on improving the image of the client, as well as building public confidence.

Employment in public relations firms should grow as firms hire contractors to provide public relations services rather than support full-time staff. In addition to those arising from employment growth, job opportunities should result from the need to replace public relations specialists who take other jobs or who leave the occupation altogether.

Earnings

Median annual earnings for salaried public relations specialists were $41,710 in 2002. The middle 50 percent earned between $31,300 and $56,180; the lowest 10 percent earned less than $24,240, and the top 10 percent earned more than $75,100. Median annual earnings in the industries employing the largest numbers of public relations specialists in 2002 were:

Advertising and related services	$48,070
Local government	42,000
Business, professional, labor, political, and similar organizations	39,330
Colleges, universities, and professional schools	36,820

According to a joint survey conducted by the International Association of Business Communicators and the Public Relations Society of America, the median annual income for a public relations specialist was $66,800 in 2002.

Related Occupations

Public relations specialists create favorable attitudes among various organizations, special interest groups, and the public through effective communication. Other workers with similar jobs include advertising, marketing, promotions, public relations, and sales managers; demonstrators, product promoters, and models; news analysts, reporters, and correspondents; lawyers; market and survey researchers; sales representatives, wholesale and manufacturing; and police and detectives involved in community relations.

Sources of Additional Information

A comprehensive directory of schools offering degree programs, a sequence of study in public relations, a brochure on careers in public relations, and a $5 brochure entitled *Where Shall I go to Study Advertising and Public Relations?* are available from:

➤ Public Relations Society of America, Inc., 33 Irving Place, New York, NY 10003-2376. Internet: **http://www.prsa.org**

For information on accreditation for public relations professionals, contact:

➤ International Association of Business Communicators, One Hallidie Plaza, Suite 600, San Francisco, CA 94102.

Television, Video, and Motion Picture Camera Operators and Editors

(0*NET 27-4031.00, 27-4032.00)

Significant Points

- Workers acquire their skills through on-the-job or formal postsecondary training.
- Technical expertise, a "good eye," imagination, and creativity are essential.
- Keen competition for job openings is expected, because many talented peopled are attracted to the field.
- About one in five camera operators are self-employed.

Nature of the Work

Television, video, and motion picture camera operators produce images that tell a story, inform or entertain an audience, or record an event. *Film and video editors* edit soundtracks, film, and video for the motion picture, cable, and broadcast television industries. Some camera operators do their own editing.

Making commercial-quality movies and video programs requires technical expertise and creativity. Producing successful images requires choosing and presenting interesting material, selecting appropriate equipment, and applying a good eye and steady hand to assure smooth, natural movement of the camera.

Camera operators use television, video, or motion picture cameras to shoot a wide range of material, including television series, studio programs, news and sporting events, music videos, motion pictures, documentaries, and training sessions. Some camera operators film or videotape private ceremonies and special events. Those who record images on videotape are often called *videographers*. Many are employed by independent television stations, local affiliates, large cable and television networks, or smaller, independent production companies. *Studio camera operators* work in a broadcast studio and usually videotape their subjects from a fixed position. *News camera operators*, also called *electronic news gathering (ENG) operators*, work as part of a reporting team, following newsworthy events as they unfold. To capture live events, they must anticipate the action and act quickly. ENG operators may need to edit raw footage on the spot for relay to a television affiliate for broadcast.

Camera operators employed in the entertainment field use motion picture cameras to film movies, television programs, and commercials. Those who film motion pictures are also known as *cinematographers*. Some specialize in filming cartoons or special effects. They may be an integral part of the action, using cameras in any of several different mounts. For example, the camera operator can be stationary and shoot whatever passes in front of the lens, or the camera can be mounted on a track, with the camera operator responsible for shooting the scene from different angles or directions. More recently, the introduction of digital cameras has enhanced the number of angles and the clarity that a camera operator can provide. Other camera operators sit on cranes and follow the action while crane operators move them into position. *Steadicam operators* mount a harness and carry the camera on their shoulders to provide a clear picture while they move about the action. Camera operators who work in the entertainment field often meet with directors, actors, editors, and camera assistants to discuss ways of filming, editing, and improving scenes.

Working Conditions

Working conditions for camera operators and editors vary considerably. Those employed in government, television and cable networks, and advertising agencies usually work a 5-day, 40-hour week. By contrast, ENG operators often work long, irregular hours and must be available to work on short notice. Camera operators and editors working in motion picture production also may work long, irregular hours.

ENG operators and those who cover major events, such as conventions or sporting events, frequently travel locally, stay overnight on assignments, or travel to distant places for longer periods. Camera operators filming television programs or motion pictures may travel to film on location.

Some camera operators—especially ENG operators covering accidents, natural disasters, civil unrest, or military conflicts—work in uncomfortable or even dangerous surroundings. Many camera operators must wait long hours in all kinds of weather for an event to take place and must stand or walk for long periods while carrying heavy equipment. ENG operators often work under strict deadlines.

Employment

Television, video, and motion picture camera operators held about 28,000 jobs in 2002, and film and video editors held about 19,000. About 1 in 5 camera operators were self-employed. Some self-employed camera operators contracted with television networks, documentary or independent filmmakers, advertising agencies, or trade show or convention sponsors to work on individual projects for a predetermined fee, often at a daily rate.

Most of the salaried camera operators were employed by television broadcasting stations or motion picture studios. More than half of the salaried film and video editors worked for motion picture studios. Most camera operators and editors worked in large metropolitan areas.

Training, Other Qualifications, and Advancement

Employers usually seek applicants with a "good eye," imagination, and creativity, as well as a good technical understanding of how the camera operates. Television, video, and motion picture camera operators and editors usually acquire their skills through on-the-job training or formal postsecondary training at vocational schools, colleges, universities, or photographic institutes. Formal education may be required for some positions.

Many universities, community and junior colleges, vocational-technical institutes, and private trade and technical

Film and video editors edit soundtracks, film, and video.

schools offer courses in camera operation and videography. Basic courses cover equipment, processes, and techniques. Bachelor's degree programs, especially those including business courses, provide a well-rounded education.

Individuals interested in camera operations should subscribe to videographic newsletters and magazines, join clubs, and seek summer or part-time employment in cable and television networks, motion picture studios, or camera and video stores.

Camera operators in entry-level jobs learn to set up lights, cameras, and other equipment. They may receive routine assignments requiring adjustments to their cameras or decisions on what subject matter to capture. Camera operators in the film and television industries usually are hired for a project on the basis of recommendations from individuals such as producers, directors of photography, and camera assistants from previous projects or through interviews with the producer. ENG and studio camera operators who work for television affiliates usually start in small markets to gain experience.

Camera operators need good eyesight, artistic ability, and hand-eye coordination. They should be patient, accurate, and detail oriented. Camera operators also should have good communication skills and, if needed, the ability to hold a camera by hand for extended periods.

Camera operators who run their own businesses, or freelance, need business skills as well as talent. These individuals must know how to submit bids, write contracts, get permission to shoot on locations that normally are not open to the public, obtain releases to use film or tape of people, price their services, secure copyright protection for their work, and keep financial records.

With increased experience, operators may advance to more demanding assignments or to positions with larger or network television stations. Advancement for ENG operators may mean moving to larger media markets. Other camera operators and editors may become directors of photography for movie studios, advertising agencies, or television programs. Some teach at technical schools, film schools, or universities.

Job Outlook

Television, video, and motion picture camera operators and editors can expect keen competition for job openings because the work is attractive to many people. The number of individuals interested in positions as videographers and movie camera operators usually is much greater than the number of openings. Those who succeed in landing a salaried job or attracting enough work to earn a living by freelancing are likely to be the most creative, highly motivated, able to adapt to rapidly changing technologies, and adept at operating a business. Related work experience or job-related training also can benefit prospective camera operators.

Employment of camera operators and editors is expected to grow about as fast as the average for all occupations through 2012. Rapid expansion of the entertainment market, especially motion picture production and distribution, will spur growth of camera operators. In addition, computer and Internet services will provide new outlets for interactive productions. Growth will be tempered, however, by the increased off-shore production of motion pictures. Camera operators will be needed to film made-for-the-Internet broadcasts, such as live music videos, digital movies, sports features, and general information or entertainment programming. These images can be delivered directly into the home either on compact discs or over the Internet. Job growth also is expected in radio and television broadcasting.

Earnings

Median annual earnings for television, video, and motion picture camera operators were $32,720 in 2002. The middle 50 percent earned between $20,610 and $51,000. The lowest 10 percent earned less than $14,710, and the highest 10 percent earned more than $65,070. Median annual earnings were $46,540 in the motion picture and video industries and $25,830 in radio and television broadcasting.

Median annual earnings for film and video editors were $38,270 in 2002. The middle 50 percent earned between $26,780 and $55,300. The lowest 10 percent earned less than $20,030, and the highest 10 percent earned more than $78,070. Median annual earnings were $41,440 in the motion picture and video industries, which employ the largest numbers of film and video editors.

Many camera operators who work in film or video are freelancers whose earnings tend to fluctuate each year. Because most freelance camera operators purchase their own equipment, they incur considerable expense acquiring and maintaining cameras and accessories. Some camera operators belong to unions, including the International Alliance of Theatrical Stage Employees and the National Association of Broadcast Employees and Technicians.

Related Occupations

Related arts and media occupations include artists and related workers, broadcast and sound engineering technicians and radio operators, designers, and photographers.

Sources of Additional Information

Information about career and employment opportunities for camera operators and film and video editors is available from local offices of State employment service agencies, local offices of the relevant trade unions, and local television and film production companies that employ these workers.

Writers and Editors

(0*NET 27-3041.00, 27-3042.00, 27-3043.01, 27-3043.02, 27-3043.03, 27-3043.04)

Significant Points

- Most jobs in this occupation require a college degree in communications, journalism, or English, although a degree in a technical subject may be useful for technical-writing positions.
- The outlook for most writing and editing jobs is expected to be competitive, because many people with writing or journalism training are attracted to the occupation.
- Online publications and services are growing in number and sophistication, spurring the demand for writers and editors, especially those with Web experience.

Nature of the Work

Communicating through the written word, writers and editors generally fall into one of three categories. *Writers and authors* develop original fiction and nonfiction for books, magazines, trade journals, online publications, company newsletters, radio and television broadcasts, motion pictures, and advertisements. (Reporters and correspondents who collect and analyze facts about newsworthy events are described elsewhere in the *Handbook.*) *Editors* examine proposals and select material for publication or broadcast. They review and revise a writer's work for publication or dissemination. *Technical writers* develop technical materials, such as equipment manuals, appendices, or operating and maintenance instructions. They also may assist in layout work.

Most writers and editors have at least a basic familiarity with technology, regularly using personal computers, desktop or electronic publishing systems, scanners, and other electronic communications equipment. Many writers prepare material directly for the Internet. For example, they may write for electronic newspapers or magazines, create short fiction or poetry, or produce technical documentation that is available only online. Also, they may write text for Web sites. These writers should be knowledgeable about graphic design, page layout, and desktop publishing software. In addition, they should be familiar with interactive technologies of the Web so that they can blend text, graphics, and sound together.

Writers—especially of nonfiction—are expected to establish their credibility with editors and readers through strong research and the use of appropriate sources and citations. Sustaining high ethical standards and meeting publication deadlines are essential.

Creative writers, poets, and lyricists, including novelists, playwrights, and screenwriters, create original works—such as prose, poems, plays, and song lyrics—for publication or performance. Some works may be commissioned (at the request of a sponsor); others may be written for hire (on the basis of the completion of a draft or an outline).

Nonfiction writers either propose a topic or are assigned one, often by an editor or publisher. They gather information about the topic through personal observation, library and Internet research, and interviews. Writers then select the material they want to use, organize it, and use the written word to express ideas and convey information. Writers also revise or rewrite sections, searching for the best organization or the right phrasing. *Copy writers* prepare advertising copy for use by publication or broadcast media or to promote the sale of goods and services. *Newsletter writers* produce information for distribution to association memberships, corporate employees, organizational clients, or the public.

Freelance writers sell their work to publishers, publication enterprises, manufacturing firms, public-relations departments, or advertising agencies. Sometimes, they contract with publishers to write a book or an article. Others may be hired to complete specific assignments, such as writing about a new product or technique.

Editors review, rewrite, and edit the work of writers. They may also do original writing. An editor's responsibilities vary with the employer and type and level of editorial position held. Editorial duties may include planning the content of books, technical journals, trade magazines, and other general-interest publications. Editors also decide what material will appeal to readers, review and edit drafts of books and articles, offer comments to improve the work, and suggest possible titles. In addition, they may oversee the production of the publications. In the book-publishing industry, an editor's primary responsibility is to review proposals for books and decide whether to buy the publication rights from the author.

Major newspapers and newsmagazines usually employ several types of editors. The *executive editor* oversees *assistant editors* who have responsibility for particular subjects, such as local news, international news, feature stories, or sports. Executive editors generally have the final say about what stories are published and how they are covered. The *managing editor* usually is responsible for the daily operation of the news department. *Assignment editors* determine which reporters will cover a given story. *Copy editors* mostly review and edit a reporter's copy for accuracy, content, grammar, and style.

In smaller organizations, such as small daily or weekly newspapers or membership or publications departments of nonprofit or similar organizations, a single editor may do everything or share responsibility with only a few other people. Executive and managing editors typically hire writers, reporters, and other employees. They also plan budgets and negotiate contracts

Most writers and editors use computers and other communications equipment to compose and transmit written information.

with freelance writers, sometimes called "stringers" in the news industry. In broadcasting companies, *program directors* have similar responsibilities.

Editors and program directors often have assistants, many of whom hold entry-level jobs. These assistants, such as copy editors and *production assistants*, review copy for errors in grammar, punctuation, and spelling and check the copy for readability, style, and agreement with editorial policy. They suggest revisions, such as changing words and rearranging sentences, to improve clarity or accuracy. They also carry out research for writers and verify facts, dates, and statistics. Production assistants arrange page layouts of articles, photographs, and advertising; compose headlines; and prepare copy for printing. *Publication assistants* who work for publishing houses may read and evaluate manuscripts submitted by freelance writers, proofread printers' galleys, or answer letters about published material. Production assistants on small newspapers or in radio stations compile articles available from wire services or the Internet, answer phones, and make photocopies.

Technical writers put technical information into easily understandable language. They prepare operating and maintenance manuals, catalogs, parts lists, assembly instructions, sales promotion materials, and project proposals. Many technical writers work with engineers on technical subject matters to prepare written interpretations of engineering and design specifications and other information for a general readership. They plan and edit technical materials and oversee the preparation of illustrations, photographs, diagrams, and charts.

Science and medical writers prepare a range of formal documents presenting detailed information on the physical or medical sciences. They convey research findings for scientific or medical professions and organize information for advertising or public-relations needs. Many writers work with researchers on technical subjects to prepare written interpretations of data and other information for a general readership.

Working Conditions

Some writers and editors work in comfortable, private offices; others work in noisy rooms filled with the sound of keyboards and computer printers, as well as the voices of other writers tracking down information over the telephone. The search for information sometimes requires that the writer travel to diverse workplaces, such as factories, offices, or laboratories, but many find their material through telephone interviews, the library, and the Internet.

For some writers, the typical workweek runs 35 to 40 hours. However, writers occasionally work overtime to meet publication deadlines. Those who prepare morning or weekend publications and broadcasts work some nights and weekends. Freelance writers generally work more flexible hours, but their schedules must conform to the needs of the client. Deadlines and erratic work hours, often part of the daily routine in these jobs, may cause stress, fatigue, or burnout.

Changes in technology and electronic communications also affect a writer's work environment. For example, laptops allow writers to work from home or on the road. Writers and editors who use computers for extended periods may experience back pain, eyestrain, or fatigue.

Employment

Writers and editors held about 319,000 jobs in 2002. More than one-third were self-employed. Writers and authors held about 139,000 jobs; editors, about 130,000 jobs; and technical writers, about 50,000 jobs. More than one-half of jobs for writers and editors were salaried positions in the information sector, which includes newspaper, periodical, book, and directory publishers; radio and television broadcasting; software publishers; motion picture and sound recording industries; Internet service providers, web search portals, and data processing services; and Internet publishing and broadcasting. Substantial numbers also worked in advertising and related services, computer systems design and related services, and public and private educational services. Other salaried writers and editors worked in computer and electronic product manufacturing, government agencies, religious organizations, and business, professional, labor, political, and similar organizations.

Jobs with major book publishers, magazines, broadcasting companies, advertising agencies, and public-relations firms are concentrated in New York, Chicago, Los Angeles, Boston, Philadelphia, and San Francisco. Jobs with newspapers, business and professional journals, and technical and trade magazines are more widely dispersed throughout the country.

Thousands of other individuals work as freelance writers, earning some income from their articles, books, and, less commonly, television and movie scripts. Most support themselves with income derived from other sources.

Training, Other Qualifications, and Advancement

A college degree generally is required for a position as a writer or editor. Although some employers look for a broad liberal arts background, most prefer to hire people with degrees in communications, journalism, or English. For those who specialize in a particular area, such as fashion, business, or legal issues, additional background in the chosen field is expected. Knowledge of a second language is helpful for some positions.

Increasingly, technical writing requires a degree in, or some knowledge about, a specialized field—engineering, business, or one of the sciences, for example. In many cases, people with good writing skills can learn specialized knowledge on the job. Some transfer from jobs as technicians, scientists, or engineers. Others begin as research assistants or as trainees in a technical information department, develop technical communication skills, and then assume writing duties.

Writers and editors must be able to express ideas clearly and logically and should love to write. Creativity, curiosity, a broad range of knowledge, self-motivation, and perseverance also are valuable. Writers and editors must demonstrate good judgment and a strong sense of ethics in deciding what material to publish. Editors also need tact and the ability to guide and encourage others in their work.

For some jobs, the ability to concentrate amid confusion and to work under pressure is essential. Familiarity with electronic publishing, graphics, and video production equipment increasingly is needed. Online newspapers and magazines require knowledge of computer software used to combine online text with graphics, audio, video, and animation.

High school and college newspapers, literary magazines, community newspapers, and radio and television stations all provide valuable, but sometimes unpaid, practical writing experience. Many magazines, newspapers, and broadcast stations have internships for students. Interns write short pieces, conduct research and interviews, and learn about the publishing or broadcasting business.

In small firms, beginning writers and editors hired as assistants may actually begin writing or editing material right away. Opportunities for advancement can be limited, however. Many writers look for work on a short-term, project-by-project basis. Many small or not-for-profit organizations either do not have enough regular work or cannot afford to employ writers on a full-time basis. However, they routinely contract out work to freelance writers as needed.

In larger businesses, jobs usually are more formally structured. Beginners generally do research, fact checking, or copy editing. Advancement to full-scale writing or editing assignments may occur more slowly for newer writers and editors in larger organizations than for employees of smaller companies. Advancement often is more predictable, though, coming with the assignment of more important articles.

Job Outlook

Employment of writers and editors is expected to grow about as fast as the average for all occupations through the year 2012. The outlook for most writing and editing jobs is expected to be competitive, because many people with writing or journalism training are attracted to the occupation.

Employment of salaried writers and editors for newspapers, periodicals, book publishers, and nonprofit organizations is expected to increase as demand grows for these publications. Magazines and other periodicals increasingly are developing market niches, appealing to readers with special interests. Businesses and organizations are developing newsletters and websites, and more companies are experimenting with publishing materials directly for the Internet. Online publications and services are growing in number and sophistication, spurring the demand for writers and editors, especially those with Web experience. Advertising and public-relations agencies, which also are growing, should be another source of new jobs.

Opportunities should be best for technical writers and those with training in a specialized field. Demand for technical writers and writers with expertise in specialty areas, such as law, medicine, or economics, is expected to increase because of the continuing expansion of scientific and technical information and the need to communicate it to others. Developments and discoveries in the law, science, and technology generate demand for people to interpret technical information for a more general audience. Rapid growth and change in the high-technology and electronics industries result in a greater need for people to write users' guides, instruction manuals, and training materials. This work requires people who are not only technically skilled as writers, but also familiar with the subject area.

In addition to job openings created by employment growth, some openings will arise as experienced workers retire, transfer to other occupations, or leave the labor force. Replacement needs are relatively high in this occupation; many freelancers leave because they cannot earn enough money.

Earnings

Median annual earnings for salaried writers and authors were $42,790 in 2002. The middle 50 percent earned between $29,150 and $58,930. The lowest 10 percent earned less than $21,320, and the highest 10 percent earned more than $85,140. Median annual earnings were $54,520 in advertising and related services and $33,550 in newspaper, periodical, book, and directory publishers.

Median annual earnings for salaried editors were $41,170 in 2002. The middle 50 percent earned between $30,770 and $56,360. The lowest 10 percent earned less than $24,010, and the highest 10 percent earned more than $76,620. Median annual earnings in newspaper, periodical, book, and directory publishers were $40,280.

Median annual earnings for salaried technical writers were $50,580 in 2002. The middle 50 percent earned between $39,100 and $64,750. The lowest 10 percent earned less than $30,270, and the highest 10 percent earned more than $80,900. Median annual earnings in computer systems design and related services were $51,730.

According to the Society for Technical Communication, the median annual salary for entry level technical writers was $41,000 in 2002. The median annual salary for mid-level non-supervisory technical writers was $49,900 and for senior-level non-supervisory technical writers, $66,000.

Related Occupations

Writers and editors communicate ideas and information. Other communications occupations include announcers; interpreters and translators; news analysts, reporters, and correspondents; and public relations specialists.

Sources of Additional Information

For information on careers in technical writing, contact:

➤ Society for Technical Communication, Inc., 901 N. Stuart St., Suite 904, Arlington, VA 22203. Internet: **http://www.stc.org**

Construction Equipment Operators

(0*NET 47-2071.00, 47-2072.00, 47-2073.01, 47-2073.02)

Significant Points

- Many construction equipment operators acquire their skills on the job, but formal apprenticeship programs provide more comprehensive training.
- Job opportunities are expected to be good, with as fast as average employment growth.
- Hourly pay is relatively high but, because some construction equipment operators cannot work in inclement weather, total annual earnings may be reduced.

Nature of the Work

Construction equipment operators use machinery to move construction materials, earth, and other heavy materials and to apply asphalt and concrete to roads and other structures. Operators control equipment by moving levers or foot pedals, operating switches, or turning dials. The operation of much of this equipment is becoming more complex as a result of computerized controls. Construction equipment operators may also set up and inspect equipment, make adjustments, and perform some maintenance and minor repairs.

Construction equipment operators include operating engineers and other construction equipment operators; paving, surfacing, and tamping equipment operators; and piledriver operators. *Operating engineers and other construction equipment operators* operate one or several types of power construction equipment. They may operate excavation and loading machines equipped with scoops, shovels, or buckets that dig sand, gravel, earth, or similar materials and load it into trucks or onto conveyors. In addition to the familiar bulldozers, they operate trench excavators, road graders, and similar equipment. Sometimes, they may drive and control industrial trucks or tractors equipped with forklifts or booms for lifting materials or with hitches for pulling trailers. They also may operate and maintain air compressors, pumps, and other power equipment at construction sites. Construction equipment operators who are classified as operating engineers are capable of operating several different types of construction equipment.

Paving and surfacing equipment operators use levers and other controls to operate machines that spread and level asphalt or spread and smooth concrete for roadways or other structures. *Asphalt paving machine operators* turn valves to regulate the temperature and flow of asphalt onto the roadbed. They must take care that the machine distributes the paving material evenly and without voids, and make sure that there is a constant flow of asphalt going into the hopper. *Concrete paving machine operators* control levers and turn handwheels to move attachments that spread, vibrate, and level wet concrete within forms. They must observe the surface of concrete to identify low spots into which workers must add concrete. They use other attachments to smooth the surface of the concrete, spray on a curing compound, and cut expansion joints. *Tamping equipment operators* operate tamping machines that compact earth and other fill materials for roadbeds. They also may operate machines with interchangeable hammers to cut or break up old pavement and drive guardrail posts into the earth.

Piledriver operators operate piledrivers—large machines, mounted on skids, barges, or cranes, that hammer piles into the ground. Piles are long heavy beams of wood or steel driven into the ground to support retaining walls, bulkheads, bridges, piers, or building foundations. Some piledriver operators work on offshore oil rigs. Piledriver operators move hand and foot levers and turn valves to activate, position, and control the pile-driving equipment.

Working Conditions

Many construction equipment operators work outdoors, in nearly every type of climate and weather condition, although in many areas of the country, construction operations must be suspended in winter and during periods of extremely wet weather. Bulldozers, scrapers, and especially tampers and piledrivers are noisy and shake or jolt the operator. Operating heavy construction equipment can be dangerous. As with most machinery, accidents generally can be avoided by observing proper operating procedures and safety practices. Construction equipment operators are cold in the winter and hot in the summer, and often get dirty, greasy, muddy, or dusty.

Operators may have irregular hours because work on some construction projects continues around the clock or must be performed late at night or early in the morning. Some operators work in remote locations on large construction projects, such as highways and dams, or in factory or mining operations.

Employment

Construction equipment operators held about 416,000 jobs in 2002. Jobs were found in every section of the country and were distributed among various types of operators as follows:

Operating engineers and other construction equipment operators operate one or several types of power construction equipment.

Operating engineers and other construction equipment operators	353,000
Paving, surfacing, and tamping equipment operators	58,000
Pile-driver operators	5,200

About three out of five construction equipment operators worked in the construction industry. Many equipment operators worked in heavy construction, building highways, bridges, or railroads. About one out of five of all construction equipment operators worked in State and local government. Others—mostly grader, bulldozer, and scraper operators—worked in mining. Some also worked in manufacturing and for utility companies. Less than one in twenty construction equipment operators were self-employed.

Training, Other Qualifications, and Advancement

Construction equipment operators usually learn their skills on the job. However, it is generally accepted that formal training provides more comprehensive skills. Some construction equipment operators train in formal 3-year operating engineer apprenticeship programs administered by union-management committees of the International Union of Operating Engineers and the Associated General Contractors of America. Because apprentices learn to operate a wider variety of machines than do other beginners, they usually have better job opportunities. Apprenticeship programs consist of at least 3 years, or 6,000 hours, of on-the-job training and 144 hours a year of related classroom instruction.

Employers of construction equipment operators generally prefer to hire high school graduates, although some employers may train nongraduates to operate some types of equipment. Technologically advanced construction equipment has computerized controls and improved hydraulics and electronics, requiring more skill to operate. Operators of such equipment may need more training and some understanding of electronics. Mechanical aptitude and high school training in automobile mechanics are helpful because workers may perform some maintenance on their machines. Also, high school courses in science and mechanical drawing are useful. Experience operating related mobile equipment, such as farm tractors or heavy equipment, in the Armed Forces or elsewhere is an asset.

Private vocational schools offer instruction in the operation of certain types of construction equipment. Completion of such a program may help a person get a job as a trainee or apprentice. However, persons considering such training should check the school's reputation among employers in the area.

Beginning construction equipment operators handle light equipment under the guidance of an experienced operator. Later, they may operate heavier equipment such as bulldozers and cranes. Operators need to be in good physical condition and have a good sense of balance, the ability to judge distance, and eye-hand-foot coordination. Some operator positions require the ability to work at heights.

Job Outlook

Job opportunities for construction equipment operators are expected to be good through 2012—due, in part, to the shortage of adequate training programs. In addition, many potential workers may choose not to enter training programs because they prefer work that is less strenuous and has more comfortable working conditions.

Employment of construction equipment operators is expected to increase as fast as the average for all occupations through the year 2012 even with improvements in equipment expected to continue to raise worker productivity and to moderate demand for these workers. Employment is expected to increase as population and business growth create a need for new houses, industrial facilities, schools, hospitals, offices, and other structures. More construction equipment operators also will be needed as a result of expected growth in highway, bridge, and street construction. Bridge construction is expected to grow the fastest, due to the need to repair or replace structures before they become unsafe. Poor highway conditions also will spur demand for highway maintenance and repair. In the last several years, Congress has passed substantial public works bills to provide money for such construction projects, including mass transit systems. In addition to job growth, many job openings will arise because of the need to replace experienced construction equipment operators who transfer to other occupations or leave the labor force.

Like that of other construction workers, employment of construction equipment operators is sensitive to fluctuations in the economy. Workers may experience periods of unemployment when the level of construction activity falls.

Earnings

Earnings for construction equipment operators vary. In 2002, median hourly earnings of operating engineers and other construction equipment operators were $16.94. The middle 50 percent earned between $12.96 and $22.98. The lowest 10 percent earned less than $10.61, and the highest 10 percent earned more than $28.93. Median hourly earnings in the industries employing the largest numbers of operating engineers in 2002 were:

Highway, street, and bridge construction	$19.81
Other specialty trade contractors	17.56
Utility system construction	17.48
Other heavy and civil engineering construction	16.89
Local government	14.88

Median hourly earnings of paving, surfacing, and tamping equipment operators were $13.87 in 2002. The middle 50 percent earned between $10.73 and $19.12. The lowest 10 percent earned less than $9.07, and the highest 10 percent earned more than $25.99. Median hourly earnings in the industries employing the largest numbers of paving, surfacing, and tamping equipment operators in 2002 were:

Highway, street, and bridge construction	$14.46
Other specialty trade contractors	14.40
Local government	13.07

In 2002, median hourly earnings of piledriver operators were $21.84. The middle 50 percent earned between $14.89 and $29.24. The lowest 10 percent earned less than $11.73, and the highest 10 percent earned more than $33.97.

Pay scales generally are higher in large metropolitan areas. Annual earnings of some workers may be lower than hourly rates would indicate because worktime may be limited by bad weather.

Related Occupations

Other workers who operate heavy mechanical equipment include bus drivers; truck drivers and driver/sales workers; farmers, ranchers, and agricultural managers; agricultural workers; and forest, conservation, and logging workers.

Sources of Additional Information

For further information about apprenticeships or work opportunities for construction equipment operators, contact a local of the International Union of Operating Engineers, a local apprenticeship committee, or the nearest office of the State apprenticeship agency or employment service. For general information about the work of construction equipment operators, contact:

➤ National Center for Construction Education and Research, University of Florida, P.O. Box 141104, Gainesville, FL 32614-1104. Internet: **http://www.nccer.org**

➤ Associated General Contractors of America, 333 John Carlyle St., Suite 200, Alexandria, VA 22314. Internet: **http://www.agc.org**

➤ International Union of Operating Engineers, 1125 17th St. NW., Washington, DC 20036. Internet: **http://www.iuoe.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their website: **http://www.doleta.gov**

Construction Laborers

(0*NET 47-2061.00)

Significant Points

- Job opportunities should be good.
- The work can be physically demanding and sometimes dangerous.
- Most construction laborers learn through informal on-the-job training, but formal apprenticeship programs provide more thorough preparation.
- Like many other construction occupations, employment opportunities are affected by the cyclical nature of the construction industry and can vary greatly by State and locality.

Nature of the Work

Construction laborers perform a wide range of physically demanding tasks involving building and highway construction, tunnel and shaft excavation, hazardous waste removal, environmental remediation, and demolition. Although the term "laborer" implies work that requires relatively little skill or training, many tasks that these workers perform require a fairly high level of training and experience. Construction laborers clean and prepare construction sites to eliminate possible hazards, dig trenches, mix and place concrete, and set braces to support the sides of excavations. They load, unload, identify, and distribute building materials to the appropriate location according to project plans and specifications on building construction projects. They also tend machines; for example, they may mix concrete using a portable mixer or tend a machine that pumps concrete, grout, cement, sand, plaster, or stucco through a spray gun for application to ceilings and walls. Construction laborers often help other craftworkers, including carpenters, plasterers, operating engineers, and masons.

At heavy and highway construction sites, construction laborers clear and prepare highway work zones and rights of way; install traffic barricades, cones, and markers; and control traffic passing near, in, and around work zones. They also install sewer, water, and storm drain pipes, and place concrete and asphalt on roads.

At hazardous waste removal sites, construction laborers prepare the site and safely remove asbestos, lead, radioactive waste, and other hazardous materials. They operate, read, and maintain air monitoring and other sampling devices in confined and/or hazardous environments. They also safely sample, identify, handle, pack, and transport hazardous and/or radioactive materials and clean and decontaminate equipment, buildings, and enclosed structures. Other highly specialized tasks include operating laser guidance equipment to place pipes, operating air, electric, and pneumatic drills, and transporting and setting explosives for tunnel, shaft, and road construction.

Construction laborers operate a variety of equipment including pavement breakers; jackhammers; earth tampers; concrete, mortar, and plaster mixers; electric and hydraulic boring machines; torches; small mechanical hoists; laser beam equipment; and surveying and measuring equipment. They may use computers and other high-tech input devices to control robotic pipe cutters and cleaners. To perform their jobs effectively, construction laborers must be familiar with the duties of other craftworkers and with the materials, tools, and machinery they use.

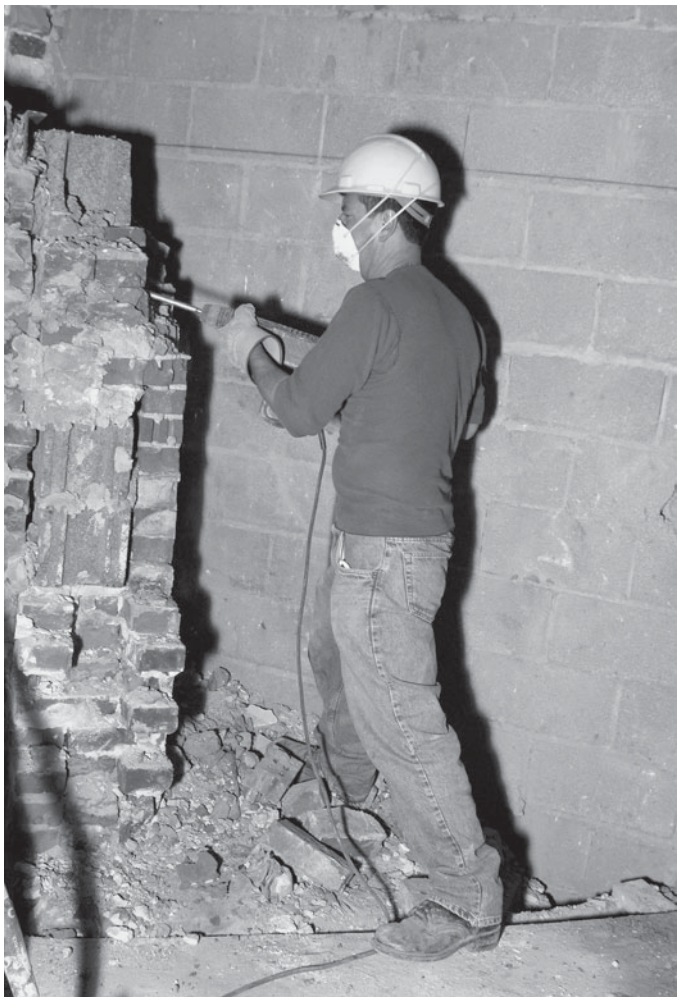
Construction laborers often work as part of a team with other skilled craftworkers, jointly carrying out assigned construction tasks. At other times, construction laborers may work alone, reading and interpreting instructions, plans, and specifications with little or no supervision.

While most construction laborers tend to specialize in a type of construction, such as highway or tunnel construction, they are generalists who perform many different tasks during all stages of construction. However, construction laborers who work in underground construction (such as in tunnels) or in demolition are more likely to specialize in only those areas.

Working Conditions

Most laborers do physically demanding work. They may lift and carry heavy objects, and stoop, kneel, crouch, or crawl in awkward positions. Some work at great heights, or outdoors in all weather conditions. Some jobs expose workers to harmful materials or chemicals, fumes, odors, loud noise, or dangerous machinery. To avoid injury, workers in these jobs wear safety clothing, such as gloves, hardhats, protective chemical suits, and devices to protect their eyes, respiratory system, or hearing. While working in underground construction, construction laborers must be especially alert to safely follow procedures and must deal with a variety of hazards.

Construction laborers generally work 8-hour shifts, although longer shifts also are common. They may work only during certain seasons, when the weather permits construction activity.



Construction laborers often help other craftworkers, including carpenters, plasterers, operating engineers, and masons.

Employment

Construction laborers held about 938,000 jobs in 2002. They worked throughout the country but, like the general population, were concentrated in metropolitan areas. Almost all construction laborers work in the construction industry and almost one-third work for special trade contractors. About 14 percent were self-employed in 2002.

Training, Other Qualifications, and Advancement

Many construction laborer jobs require no experience or training related to the occupation. Although many workers enter the occupation with few skills, training is encourage and available through apprenticeships and laborer training centers. However, the work requires more strength and stamina than do most occupations, as well as a basic education. The willingness to work outdoors or in confined spaces also is needed. Basic literacy is a must if a worker is to read and comprehend warning signs and labels and understand instructions and specifications.

Most construction laborers learn their skills informally, observing and learning from experienced workers. Individuals who learn the trade on the job usually start as helpers. These workers perform routine tasks, such as cleaning and preparing the worksite and unloading materials. When the opportunity arises, they learn how to do more difficult tasks, such as operating tools and equipment, from experienced craftworkers. Becoming a fully skilled construction laborer by training on the job normally takes longer than the 2 to 4 years required to complete a construction craft laborer apprenticeship program.

Formal apprenticeship programs provide more thorough preparation for jobs as construction laborers than does on-the-job training. Local apprenticeship programs are operated under guidelines established by the Laborers-Associated General Contractors of America Education and Training Fund. These programs typically require at least 4,000 hours of supervised on-the-job training and approximately 400 hours of classroom training. Depending on the availability of work and on local training schedules, it can take an individual from 2 to 4 years to complete the apprenticeship. A core curriculum consisting of basic construction skills such as blueprint reading, the correct use of tools and equipment, and knowledge of safety and health procedures comprises the first 200 hours. The remainder of the curriculum consists of specialized skills training in three of the largest segments of the construction industry: Building construction, heavy/highway construction, and environmental remediation (cleaning up debris, landscaping, and restoring the environment to its original state). Workers who use dangerous equipment or handle toxic chemicals usually receive specialized training in safety awareness and procedures. Apprentices must complete a minimum 144 hours of classroom work each year.

Most apprenticeship programs require workers to be at least 18 years old and physically able to perform the work. Many apprenticeship programs require a high school diploma or equivalent. High school and junior college courses in science, physics, chemistry, and mathematics are helpful. Vocational classes in welding, construction, and other general building skills can give anyone wishing to become a construction laborer a significant head start.

Experience and training is helpful but usually is not necessary to obtain a job. Relevant work experience that provides construction-related job skills can often reduce or eliminate a wide range of training and apprenticeship requirements. Finally, most apprenticeship programs, local unions, and employers look very favorably on military service and/or service in the Job Corps, as veterans and Job Corps graduates have already demonstrated a high level of responsibility and reliability and may have gained many valuable job skills.

Construction laborers need good manual dexterity, hand-eye coordination, and balance. They also need the ability to read and comprehend all warning signs and labels on a construction site and reading skills sufficient to understand and interpret plans, drawings, and written instructions and specifications. They should be capable of working as a member of a team and have basic problem-solving and math skills. Employers want workers who are hard-working, reliable, and diligent about being on time. Additionally, construction laborers who wish to work in environmental remediation must pass a physical test that measures the ability to wear protective equipment such as respirators. Computer skills also are important as construction becomes increasingly mechanized and computerized.

Experience in many construction laborer jobs may allow some workers to advance to positions such as supervisor or construction superintendent. Some construction laborers become skilled craftworkers, either through extensive on the job training or apprenticeships in a craft. A few become independent contractors.

Job Outlook

Job opportunities for construction laborers are expected to be good due to the numerous openings arising each year as laborers leave the occupation. In addition, many potential workers are not attracted to the occupation because they prefer work that is less strenuous and has more comfortable working conditions. Opportunities will be best for workers who are willing to relocate to different worksites.

Employment of construction laborers is expected to grow about as fast as the average for all occupations through the year 2012. New jobs will arise from a continuing emphasis on environmental remediation and on rebuilding infrastructure—roads, airports, bridges, tunnels, and communications facilities, for example. However, employment growth will be adversely affected by automation as some jobs are replaced by new machines and equipment that improve productivity and quality.

Employment of construction laborers, like that of many other construction workers, can be variable or intermittent due to the limited duration of construction projects and the cyclical nature of the construction industry. Employment opportunities can vary greatly by State and locality. During economic downturns, job openings for construction laborers decrease as the level of construction activity declines.

Earnings

Median hourly earnings of construction laborers in 2002 were $11.90. The middle 50 percent earned between $9.33 and $17.06. The lowest 10 percent earned less than $7.58, and the highest 10 percent earned more than $23.36. Median hourly earnings in the industries employing the largest number of construction laborers in 2002 were as follows:

Highway, street, and bridge construction	$14.48
Nonresidential building construction	12.97
Other specialty trade contractors	12.35
Foundation, structure, and building exterior contractors	11.89
Residential building construction	11.42

Earnings for construction laborers can be reduced by poor weather or by downturns in construction activity, which sometimes result in layoffs.

Apprentices or helpers usually start at about 50 percent of the wage rate paid to experienced workers. Pay increases as apprentices gain experience and learn new skills.

Some laborers belong to the Laborers' International Union of North America.

Related Occupations

The work of construction laborers is closely related to other construction occupations. Other workers who perform similar physical work include persons in material-moving occupations; forest, conservation, and logging workers; and grounds maintenance workers.

Sources of Additional Information

For information about jobs as construction laborers, contact local building or construction contractors, local joint labor-management apprenticeship committees, apprenticeship agencies, or the local office of your State Employment Service.

For general information about the work of construction laborers, contact:

➤ Laborers' International Union of North America, 905 16th St. NW., Washington, DC 20006. Internet: **http://www.liuna.org**

For information on education programs for laborers, contact:

➤ Laborers-AGC Education and Training Fund, 37 Deerfield Road, P.O. Box 37, Pomfret Center, CT 06259. Internet: **http://www.laborerslearn.org**

➤ National Center for Construction Education and Research, P.O. Box 141104, Gainesville FL 32614-1104. Internet: **http://www.nccer.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their website: **http://doleta.gov**

Archivists, Curators, and Museum Technicians

(0*NET 25-4011.00, 25-4012.00, 25-4013.00)

Significant Points

- Employment in this occupation usually requires graduate education and related work experience.
- Keen competition is expected for the most desirable job openings, which generally attract a large number of applicants.

Nature of the Work

Archivists, curators, and museum technicians acquire and preserve important documents and other valuable items for permanent storage or display. They work for museums, governments, zoos, colleges and universities, corporations, and other institutions that require experts to preserve important records. They also describe, catalogue, analyze, exhibit, and maintain valuable objects and collections for the benefit of researchers and the public. These documents and collections may include works of art, transcripts of meetings, coins and stamps, living and preserved plants and animals, and historic buildings and sites.

Archivists and curators plan and oversee the arrangement, cataloguing, and exhibition of collections and, along with technicians and conservators, maintain collections. Archivists and curators may coordinate educational and public outreach programs, such as tours, workshops, lectures, and classes, and may work with the boards of institutions to administer plans and policies. They also may research topics or items relevant to their collections. Although some duties of archivists and curators are similar, the types of items they deal with differ: curators usually handle objects with cultural, biological, or historical significance, such as sculptures, textiles, and paintings, while archivists handle mainly records and documents that are retained because of their importance and potential value in the future.

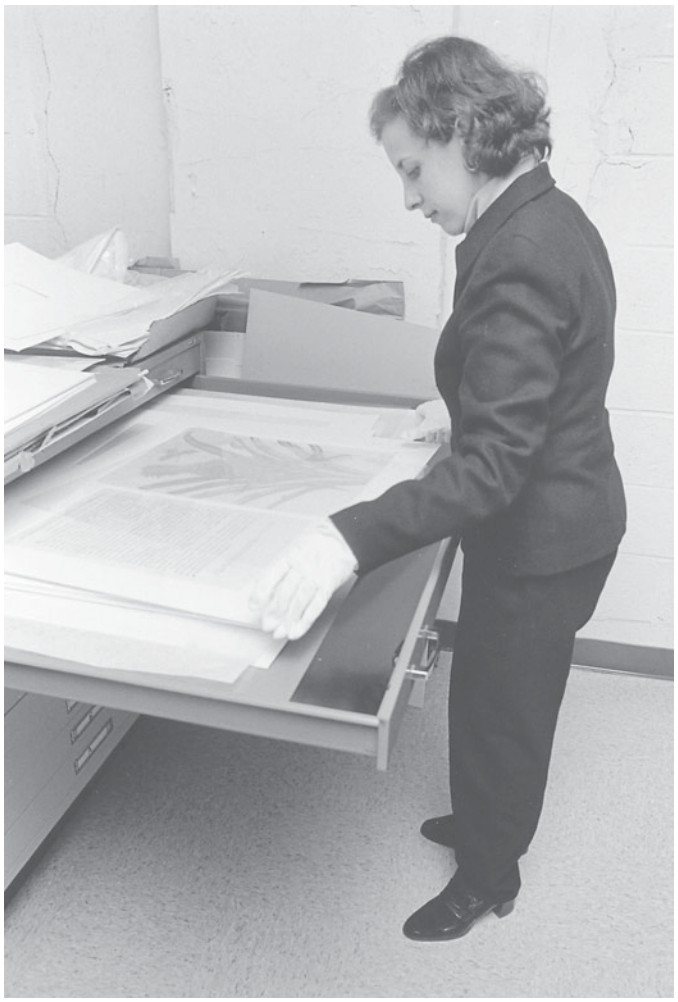
Archivists collect, organize, and maintain control over a wide range of information deemed important enough for permanent safekeeping. This information takes many forms: photographs, films, video and sound recordings, computer tapes, and video and optical disks, as well as more traditional paper records, letters, and documents. Archivists work for a variety of organizations, including government agencies, museums, historical societies, corporations, and educational institutions that use or generate records of great potential value to researchers, exhibitors, genealogists, and others who would benefit from having access to original source material.

Archivists maintain records in accordance with accepted standards and practices, that ensure the long-term preservation and easy retrieval of the documents. Records may be saved on any medium, including paper, film, videotape, audiotape, electronic disk, or computer. They also may be copied onto some other format to protect the original and to make them more accessible to researchers who use the records. As various storage media evolve, archivists must keep abreast of technological advances in electronic information storage.

Archivists often specialize in an area of history or technology so they can more accurately determine what records in that area qualify for retention and should become part of the archives. Archivists also may work with specialized forms of records, such as manuscripts, electronic records, photographs, cartographic records, motion pictures, and sound recordings.

Computers are increasingly being used to generate and maintain archival records. Professional standards for the use of computers in handling archival records are still evolving. However, computers are expected to transform many aspects of archival collections as computer capabilities and the use of multimedia and the Internet expand and allow more records to be stored and exhibited electronically.

Curators administer the affairs of museums, zoos, aquariums, botanical gardens, nature centers, and historic sites. The head curator of the museum is usually called the *museum director*. Curators direct the acquisition, storage, and exhibition of collections, including negotiating and authorizing the purchase, sale, exchange, or loan of collections. They are also responsible for authenticating, evaluating, and categorizing the specimens in a collection. Curators oversee and help conduct the institution's research projects and related educational programs. However, an increasing part of a curator's duties involves fundraising and promotion, which may include the writing and reviewing of grant proposals, journal articles, and publicity materials, as well as attendance at meetings, conventions, and civic events.



Archivists and curators oversee the cataloguing and display of collections of artwork, documents, and other valuable items.

Most curators specialize in a particular field, such as botany, art, paleontology, or history. Those working in large institutions may be highly specialized. A large natural-history museum, for example, would employ separate curators for its collections of birds, fishes, insects, and mammals. Some curators maintain their collections, others do research, and others perform administrative tasks. In small institutions, with only one or a few curators, one curator may be responsible for multiple tasks, from maintaining collections to directing the affairs of the museum.

Conservators manage, care for, preserve, treat, and document works of art, artifacts, and specimens, work that may require substantial historical, scientific, and archaeological research. They use x rays, chemical testing, microscopes, special lights, and other laboratory equipment and techniques to examine objects and determine their condition, their need for treatment or restoration, and the appropriate method for preserving them. Conservators document their findings and treat items to minimize their deterioration or to restore them to their original state. Conservators usually specialize in a particular material or group of objects, such as documents and books, paintings, decorative arts, textiles, metals, or architectural material.

Museum technicians assist curators by performing various preparatory and maintenance tasks on museum items. Some museum technicians also may assist curators with research. Archives technicians help archivists organize, maintain, and provide access to historical documentary materials.

Working Conditions

The working conditions of archivists and curators vary. Some spend most of their time working with the public, providing reference assistance and educational services. Others perform research or process records, which often means working alone or in offices with only a few people. Those who restore and install exhibits or work with bulky, heavy record containers may climb, stretch, or lift. Those in zoos, botanical gardens, and other outdoor museums or historic sites frequently walk great distances.

Curators who work in large institutions may travel extensively to evaluate potential additions to the collection, organize exhibitions, and conduct research in their area of expertise. However, travel is rare for curators employed in small institutions.

Employment

Archivists, curators, and museum technicians held about 22,000 jobs in 2002. About 35 percent were employed in museums, historical sites, and similar institutions, and 15 percent worked for State and private educational institutions, mainly college and university libraries. Nearly 40 percent worked in Federal, State, and local government. Most Federal archivists work for the National Archives and Records Administration; others manage military archives in the U.S. Department of Defense. Most Federal Government curators work at the Smithsonian Institution, in the military museums of the Department of Defense, and in archaeological and other museums and historic sites managed by the U.S. Department of the Interior. All State governments have archival or historical-record sections employing archivists. State and local governments also have numerous historical museums, parks, libraries, and zoos employing curators.

Some large corporations that have archives or record centers employ archivists to manage the growing volume of records created or maintained as required by law or necessary to the firms' operations. Religious and fraternal organizations, professional associations, conservation organizations, major private collectors, and research firms also employ archivists and curators.

Conservators may work under contract to treat particular items, rather than as regular employees of a museum or other institution. These conservators may work on their own as private contractors, or they may work as an employee of a conservation laboratory or regional conservation center that contracts their services to museums.

Training, Other Qualifications, and Advancement

Employment as an archivist, conservator, or curator usually requires graduate education and related work experience. While completing their formal education, many archivists and curators work in archives or museums to gain the "hands-on" experience that many employers seek.

Although most archivists have a variety of undergraduate degrees, a graduate degree in history or library science, with courses in archival science, is preferred by most employers. Some positions may require knowledge of the discipline related to the collection, such as business or medicine. Currently, no programs offer bachelor's or master's degrees in archival science. However, approximately 65 colleges and universities offer courses or practical training in archival science as part of their history, library science, or other curriculum. The Academy of Certified Archivists offers voluntary certification for archivists. The designation "Certified Archivist" is obtained by those with at least a master's degree and a year of appropriate archival experience. The certification process requires candidates to pass a written examination, and they must renew their certification periodically.

Archivists need research and analytical ability to understand the content of documents and the context in which they were created and to decipher deteriorated or poor-quality printed matter, handwritten manuscripts, or photographs and films. A background in preservation management is often required of archivists because they are responsible for taking proper care of their records. Archivists also must be able to organize large amounts of information and write clear instructions for its retrieval and use. In addition, computer skills and the ability to work with electronic records and databases are becoming increasingly important.

Many archives, including one-person shops, are very small and have limited opportunities for promotion. Archivists typically advance by transferring to a larger unit with supervisory positions. A doctorate in history, library science, or a related field may be needed for some advanced positions, such as director of a State archive.

For employment as a curator, most museums require a master's degree in an appropriate discipline of the museum's specialty—art, history, or archaeology—or museum studies. Many employers prefer a doctoral degree, particularly for curators in natural history or science museums. Earning two graduate degrees—in museum studies (museology) and a specialized subject—gives a candidate a distinct advantage in this competitive job market. In small museums, curatorial positions may be available to individuals with a bachelor's degree. For some positions, an internship of full-time museum work supplemented by courses in museum practices is needed.

Curatorial positions often require knowledge in a number of fields. For historic and artistic conservation, courses in chemis-

try, physics, and art are desirable. Since curators—particularly those in small museums—may have administrative and managerial responsibilities, courses in business administration, public relations, marketing, and fundraising also are recommended. Like archivists, curators need computer skills and the ability to work with electronic databases. Many curators are responsible for posting information on the Internet, so they also need to be familiar with digital imaging, scanning technology, and copyright law.

Curators must be flexible because of their wide variety of duties, among which are the design and presentation of exhibits. In small museums, curators need manual dexterity, to build exhibits or restore objects. Leadership ability and business skills are important for museum directors, while marketing skills are valuable in increasing museum attendance and fundraising.

In large museums, curators may advance through several levels of responsibility, eventually becoming the museum director. Curators in smaller museums often advance to larger ones. Individual research and publications are important for advancement in larger institutions.

When hiring conservators, employers look for a master's degree in conservation or in a closely related field, together with substantial experience. There are only a few graduate programs in museum conservation techniques in the United States. Competition for entry to these programs is keen; to qualify, a student must have a background in chemistry, archaeology or studio art, and art history, as well as work experience. For some programs, knowledge of a foreign language is also helpful. Conservation apprenticeships or internships as an undergraduate can enhance one's admission prospects. Graduate programs last 2 to 4 years, the latter years of which include internship training. A few individuals enter conservation through apprenticeships with museums, nonprofit organizations, and conservators in private practice. Apprenticeships should be supplemented with courses in chemistry, studio art, and history. Apprenticeship training, although accepted, usually is a more difficult route into the conservation profession.

Museum technicians usually need a bachelor's degree in an appropriate discipline of the museum's specialty, training in museum studies, or previous experience working in museums, particularly in the design of exhibits. Similarly, archives technicians usually need a bachelor's degree in library science or history, or relevant work experience. Technician positions often serve as a steppingstone for individuals interested in archival and curatorial work. Except in small museums, a master's degree is needed for advancement.

Relatively few schools grant a bachelor's degree in museum studies. More common are undergraduate minors or tracks of study that are part of an undergraduate degree in a related field, such as art history, history, or archaeology. Students interested in further study may obtain a master's degree in museum studies, offered in colleges and universities throughout the country. However, many employers feel that, while museum studies are helpful, a thorough knowledge of the museum's specialty and museum work experience are more important.

Continuing education, which enables archivists, curators, and museum technicians to keep up with developments in the field, is available through meetings, conferences, and workshops sponsored by archival, historical, and museum associations. Some larger organizations, such as the National Archives, offer such training in-house.

Job Outlook

Competition for jobs as archivists, curators, and museum technicians is expected to be keen because qualified applicants outnumber job openings. Graduates with highly specialized training, such as master's degrees in both library science and history, with a concentration in archives or records management and extensive computer skills should have the best opportunities for jobs as archivists. A curator job also is attractive to many people, and many applicants have the necessary training and knowledge of the subject, but there are only a few openings. Consequently, candidates may have to work part time, as an intern, or even as a volunteer assistant curator or research associate after completing their formal education. Substantial work experience in collection management, exhibit design, or restoration, as well as database management skills, will be necessary for permanent status. Job opportunities for curators should be best in art and history museums, since these are the largest employers in the museum industry.

The job outlook for conservators may be more favorable, particularly for graduates of conservation programs. However, competition is stiff for the limited number of openings in these programs, and applicants need a technical background. Students who qualify and successfully complete the program, have knowledge of a foreign language, and are willing to relocate will have an advantage over less qualified candidates.

Employment of archivists, curators, and museum technicians is expected to increase about as fast as the average for all occupations through 2012. Jobs are expected to grow as public and private organizations emphasize establishing archives and organizing records and information and as public interest in science, art, history, and technology increases. Museum and zoo attendance has been on the rise and is expected to continue increasing, which will generate demand for curators and museum technicians and conservators. However, museums and other cultural institutions can be subject to cuts in funding during recessions or periods of budget tightening, reducing demand for archivists and curators. Although the rate of turnover among archivists and curators is relatively low, the need to replace workers who leave the occupation or stop working will create some additional job openings.

Earnings

Median annual earnings of archivists, curators, and museum technicians in 2002 were $35,270. The middle 50 percent earned between $26,400 and $48,460. The lowest 10 percent earned less than $20,010, and the highest 10 percent earned more than $66,050.

Earnings of archivists and curators vary considerably by type and size of employer and often by specialty. Median annual earnings of archivists, curators, and museum technicians in 2002 were $33,720 in museums, historical sites, and similar institutions.. Salaries, though, of curators in large, well-funded museums can be several times higher than those in small ones. The average annual salary for archivists in the Federal Government in nonsupervisory, supervisory, and managerial positions was $69,706 in 2003; for museum curators, $70,100; museum specialists and technicians, $48,414; and for archives technicians, $37,067.

Related Occupations

The skills that archivists, curators, and museum technicians use in preserving, organizing, and displaying objects or information of historical interest are shared by artists and related workers; librarians; and anthropologists and archeologists, historians, and other social scientists.

Sources of Additional Information

For information on archivists and on schools offering courses in archival studies, contact

➤ Society of American Archivists, 527 South Wells St., 5th floor, Chicago, IL 60607-3922. Internet: **http://www.archivists.org**

For general information about careers as a curator and schools offering courses in museum studies, contact

➤ American Association of Museums, 1575 Eye St. NW., Suite 400, Washington, DC 20005. Internet: **http://www.aam-us.org**

For information about careers and education programs in conservation and preservation, contact

➤ American Institute for Conservation of Historic and Artistic Works, 1717 K St. NW., Suite 200, Washington, DC 20006. Internet: **http://aic.stanford.edu**

Clergy

(0*NET 21-2011.00)

Significant Points

- Many denominations require that clergy complete a bachelor's degree and a graduate-level program of theological study; others will admit anyone who has been "called" to the vocation.
- Individuals considering a career in the clergy should realize they are choosing not only a career but also a way of life; members of the clergy typically work irregular hours and many put in longer than average work days.
- Opportunities are expected in all faiths, but in some denominations competition is likely for positions leading large urban worship groups.

Nature of the Work

Religious beliefs—such as Buddhist, Christian, Jewish, or Moslem—are significant influences in the lives of millions of Americans, and prompt many to participate in organizations that reinforce their faith. Even within a religion many denominations may exist, with each group having unique traditions and responsibilities assigned to its clergy. For example, Christianity has more than 70 denominations, while Judaism has 4 major branches, as well as groups within each branch, with diverse customs.

Clergy are religious and spiritual leaders, and teachers and interpreters of their traditions and faith. Most members of the clergy serve in a pulpit. They organize and lead regular religious services and officiate at special ceremonies, including confirmations, weddings, and funerals. They may lead worshipers in prayer, administer the sacraments, deliver sermons, and read from sacred texts such as the Bible, Torah, or Koran. When not conducting worship services, clergy organize, supervise, and lead religious education programs for their congregations. Clergy visit the sick or bereaved to provide comfort and counsel persons who are seeking religious or moral guidance or who are troubled by family or personal problems. They also may work to expand the membership of their congregations and solicit donations to support their activities and facilities.

Clergy who serve large congregations often share their duties with associates or more junior clergy. Senior clergy may spend considerable time on administrative duties. They oversee the management of buildings, order supplies, contract for services and repairs, and supervise the work of staff and volunteers. Associate or assistant members of the clergy sometimes specialize in an area of religious service, such as music, education, or youth counseling. Clergy also work with committees and officials, elected by the congregation, who guide the management of the congregation's finances and real estate.

Other members of the clergy serve their religious communities in ways that do not call for them to hold positions in congregations. Some serve as chaplains in the U.S. Armed Forces and in hospitals, while others help to carry out the missions of religious community and social services agencies. A few members of the clergy serve in administrative or teaching posts in schools at all grade levels, including seminaries.

Working Conditions

Members of the clergy typically work irregular hours and many put in longer than average work days. Those who do not work in congregational settings may have more routine schedules. In 2002, almost one-fifth of full-time clergy worked 60 or more hours a week, more than 3 times that of all workers in professional occupations. Although many of their activities are sedentary and intellectual in nature, clergy frequently are called on short notice to visit the sick, comfort the dying and their families, and provide counseling to those in need. Involvement in community, administrative, and educational activities sometimes require clergy to work evenings, early mornings, holidays, and weekends.

Because of their roles as leaders regarding spiritual and morality issues, some members of the clergy often feel obligated to address and resolve both societal problems and the personal problems of their congregants, which can lead to stress.

Training, Other Qualifications, and Advancement

Educational requirements for entry into the clergy vary greatly. Similar to other professional occupations, about 3 out of 4 members of the clergy have completed at least a bachelor's degree. Many denominations require that clergy complete a bachelor's degree and a graduate-level program of theological study; others will admit anyone who has been "called" to the vocation. Some faiths do not allow women to become clergy; however, others, mainly in Protestant churches, do. Men and women considering careers in the clergy should consult their religious leaders to verify specific entrance requirements.

Individuals considering a career in the clergy should realize they are choosing not only a career but also a way of life. In fact, most members of the clergy remain in their chosen vocation throughout their lives; in 2002, almost 10 percent of clergy were 65 or older, compared with only 3 percent of workers in all occupations.

Religious leaders must exude confidence and motivation, while remaining tolerant and able to listen to the needs of others. They should be capable of making difficult decisions, working under pressure, and living up to the moral standards set by their faith and community.

The sections that follow provide more detailed information on the three largest groups of clergy: Protestant ministers, Rabbis, and Roman Catholic priests.

Sources of Additional Information

For more information on careers in the ministry, contact the association affiliated with a particular denomination.

The following website provides links to many of these denominations. Internet:
http://www.hirr.hartsem.edu/org/faith_denominations_ homepages.html

Protestant Ministers

(0*NET 21-2011.00)

Significant Points

- Entry requirements vary greatly; many denominations require a bachelor's degree followed by study at a theological seminary, whereas others have no formal educational requirements.
- Competition for positions will vary among denominations and geographic regions.

Nature of the Work

Protestant ministers lead their congregations in worship services and administer the various rites of the church, such as baptism, confirmation, and Holy Communion. The services that ministers conduct differ among the numerous Protestant denominations and even among congregations within a denomination. In many denominations, ministers follow a traditional order of worship; in others, they adapt the services to the needs of youth and other groups within the congregation. Most services include Bible readings, hymn singing, prayers, and a sermon. In some denominations, Bible readings by members of the congregation and individual testimonials constitute a large part of the service. In addition to these duties, ministers officiate at weddings, funerals, and other occasions.

Each Protestant denomination has its own hierarchical structure. Some ministers are responsible only to the congregation they serve, whereas others are assigned duties by elder ministers or by the bishops of the diocese they serve. In some denominations, ministers are reassigned to a new pastorate by a central governing body or diocese every few years.

Ministers who serve small congregations usually work personally with parishioners. Those who serve large congregations may share specific aspects of the ministry with one or more associates or assistants, such as a minister of education or a minister of music.

Employment

There are many denominations; however, most ministers are employed by the five largest Protestant bodies—Baptist, Episcopalian, Lutheran, Methodist, and Presbyterian.

Although most ministers are located in urban areas, many serve two or more smaller congregations in less densely populated areas. Some small churches increasingly employ part-time ministers who are seminary students, retired ministers, or holders of secular jobs. Unpaid pastors serve other churches with meager funds. In addition, some churches employ specially trained members of the laity to conduct nonliturgical functions.

Training and Other Qualifications

Educational requirements for entry into the Protestant ministry vary greatly. Many denominations require, or at least strongly prefer, a bachelor's degree followed by study at a theological seminary. However, some denominations have no formal educational requirements, and others ordain persons having various types of training from Bible colleges or liberal arts colleges. Many denominations now allow women to be ordained, but some do not. Persons considering a career in the ministry should first verify the ministerial requirements with their particular denomination.

In general, each large denomination has its own schools of theology that reflect its particular doctrine, interests, and needs. However, many of these schools are open to students from other denominations. Several interdenominational schools associated with universities give both undergraduate and graduate training covering a wide range of theological points of view.

In 2002, the Association of Theological Schools in the United States and Canada accredited 216 Protestant denominational theological schools. These schools only admit students who have received a bachelor's degree or its equivalent from an accredited college. After college graduation, many denominations require a 3-year course of professional study in one of these accredited schools, or seminaries, for the degree of Master of Divinity.

The standard curriculum for accredited theological schools consists of four major categories: Biblical studies, church history, theology and ethics, and practical theology. Other subjects taught include sociology and anthropology, comparative religions, spiritual formation, religion and the arts, and speech, among others. Many accredited schools require that students work under the supervision of a faculty member or experienced minister. Some institutions offer Doctor of Ministry degrees to students who have completed additional study—usually 2 or more years—and served at least 2 years as a minister. Scholarships and loans often are available for students of theological institutions.

Persons who have denominational qualifications for the ministry usually are ordained after graduation from a seminary or after serving a probationary pastoral period. Denominations that do not require seminary training ordain clergy at various appointed times. Some churches ordain ministers with only a high school education.

Women and men entering the clergy often begin their careers as pastors of small congregations or as assistant pastors in large churches. Pastor positions in large metropolitan areas or in large congregations often require many years of experience.

Job Outlook

Job opportunities as Protestant ministers should be best for graduates of theological schools. The degree of competition for positions will vary among denominations and geographic regions. For example, relatively favorable prospects are expected

Protestant ministers are trained to administer a particular denomination's unique expression of worship.

for ministers in evangelical churches. Competition, however, will be keen for responsible positions serving large, urban congregations. Ministers willing to work part time or for small, rural congregations should have better opportunities. Many job openings will stem from the need to replace ministers who retire, die, or leave the ministry.

For newly ordained Protestant ministers who are unable to find parish positions, employment alternatives include working in youth counseling, family relations, and social welfare organizations; teaching in religious educational institutions; or serving as chaplains in the Armed Forces, hospitals, universities, and correctional institutions.

Earnings

Salaries of Protestant clergy vary substantially, depending on experience, denomination, size and wealth of the congregation, and geographic location. For example, some denominations tie a minister's pay to the average pay of the congregation or the community. As a result, ministers serving larger, wealthier congregations often earned significantly higher salaries than those in smaller, less affluent areas or congregations. Ministers with modest salaries sometimes earn additional income from employment in secular occupations.

Sources of Additional Information

Persons who are interested in entering the Protestant ministry should seek the counsel of a minister or church guidance worker. Theological schools can supply information on admission requirements. For information on special requirements for ordination, prospective ministers also should contact the ordination supervision body of their particular denomination.

Rabbis

(0*NET 21-2011.00)

Significant Points

- Ordination usually requires completion of a college degree followed by a 4- to 6-year program at a Jewish seminary.
- Job opportunities for rabbis are expected in all four major branches of Judaism through the year 2012.

Nature of the Work

Rabbis serve Orthodox, Conservative, Reform, Reconstructionist, and unaffiliated Jewish congregations. Regardless of the branch of Judaism they serve or their individual points of view, all rabbis preserve the substance of Jewish religious worship. Congregations differ in the extent to which they follow the traditional form of worship—for example, in the wearing of head coverings, in the use of Hebrew as the language of prayer, and in the use of instrumental music or a choir. Additionally, the format of the worship service and, therefore, the ritual that the rabbi uses may vary even among congregations belonging to the same branch of Judaism.

Rabbis have greater independence in religious expression than other clergy, because of the absence of a formal religious hierarchy in Judaism. Instead, rabbis are responsible directly to the board of trustees of the congregation they serve. Those serving large congregations may spend considerable time in administrative duties, working with their staffs and committees. Large congregations frequently have associate or assistant rabbis, who often serve as educational directors. All rabbis play a role in community relations. For example, many rabbis serve on committees, alongside business and civic leaders in their communities to help find solutions to local problems.

Rabbis also may write for religious and lay publications and teach in theological seminaries, colleges, and universities.

Employment

Although the majority of rabbis served congregations representing the four main branches of Judaism, many rabbis functioned in other settings. Some taught in Jewish studies programs at colleges and universities, whereas others served as chaplains in hospitals, colleges, or the military. Additionally, some rabbis held positions in one of the many social service or Jewish community agencies.

Although rabbis serve Jewish communities throughout the Nation, they are concentrated in major metropolitan areas with large Jewish populations.

Training, Other Qualifications, and Advancement

To become eligible for ordination as a rabbi, a student must complete a course of study in a seminary. Entrance requirements and the curriculum depend upon the branch of Judaism with which the seminary is associated. Most seminaries require applicants to be college graduates.

Jewish seminaries typically take 5 years for completion of studies, with an additional preparatory year required for students without sufficient grounding in Hebrew and Jewish studies. In addition to the core academic program, training generally includes fieldwork and internships providing hands-on experience and, in some cases, study in Jerusalem. Seminary graduates are awarded the title Rabbi and earn the Master of Arts in Hebrew Letters degree. After more advanced study, some earn the Doctor of Hebrew Letters degree.

In general, the curricula of Jewish theological seminaries provide students with a comprehensive knowledge of the Bible, the Torah, rabbinic literature, Jewish history, Hebrew, theology, and courses in education, pastoral psychology, and public speaking. Students receive extensive practical training in dealing with social problems in the community. Training for alternatives to the pulpit, such as leadership in community services and religious education, is increasingly stressed. Some seminaries grant advanced academic degrees in such fields as biblical and Talmudic research. All Jewish theological seminaries make scholarships and loans available.

Major rabbinical seminaries include the Jewish Theological Seminary of America, which educates rabbis for the Conservative branch; the Hebrew Union College—Jewish Institute of Religion, which educates rabbis for the Reform branch; and the Reconstructionist Rabbinical College, which educates rabbis in the newest branch of Judaism. Orthodox rabbis may be trained at The Rabbi Isaac Elchanan Theological Seminary and the Beth Medrash Govoha Seminary. The number of Orthodox seminaries is relatively high, but the number of students attending each seminary is low. In all cases, rabbinic training is rigorous. When students have become sufficiently learned in the Torah, the Bible, and other religious texts, they may be ordained with the approval of an authorized rabbi, acting either independently or as a representative of a rabbinical seminary.

Newly ordained rabbis often begin as spiritual leaders of small congregations or as assistants to more experienced rabbis.

Newly ordained rabbis usually begin as spiritual leaders of small congregations, assistants to experienced rabbis, directors of Hillel Foundations on college campuses, teachers in educational institutions, or chaplains in the U.S. Armed Forces. As a rule, experienced rabbis fill the pulpits of large, well-established Jewish congregations.

Job Outlook

Job opportunities for rabbis are expected in all four major branches of Judaism through the year 2012. Rabbis willing to work in small, underserved communities should have the best prospects.

Graduates of Orthodox seminaries who seek pulpits should have opportunities as growth in enrollments slows and as many graduates seek alternatives to the pulpit. Rapidly expanding membership is expected to create employment opportunities for Reconstructionist rabbis. Conservative and Reform rabbis should have job opportunities serving congregations or in other settings because of the large size of these two branches of Judaism.

Earnings

In addition to their annual salary, benefits received by rabbis may include housing, health insurance, and a retirement plan. Income varies widely, depending on the size and financial status of the congregation, as well as denominational branch and geographic location. Rabbis may earn additional income from gifts or fees for officiating at ceremonies such as bar or bat mitzvahs and weddings.

Sources of Additional Information

Persons who are interested in becoming rabbis should discuss their plans with a practicing rabbi. Information on the work of rabbis and allied occupations can be obtained from:

➤ Rabbinical Council of America, 305 7th Ave., New York, NY 10001. Internet: **http://www.rabbis.org** (Orthodox)

➤ The Jewish Theological Seminary of America, 3080 Broadway, New York, NY 10027. Internet: **http://www.jtsa.edu** (Conservative)

➤ Hebrew Union College-Jewish Institute of Religion, One West 4th St., New York, NY 10012. Internet: **http://www.huc.edu** (Reform)

➤ Reconstructionist Rabbinical College, 1299 Church Rd., Wyncote, PA 19095. Internet: **http://www.rrc.edu** (Reconstructionist)

Roman Catholic Priests

(0*NET 21-2011.00)

Significant Points

- Preparation generally requires 8 years of study beyond high school, usually including a college degree followed by 4 or more years of theology study at a seminary.
- The shortage of Roman Catholic priests is expected to continue, resulting in a very favorable outlook.

Nature of the Work

Priests in the Catholic Church may be categorized as either diocesan or religious. Both types of priests have the same priesthood faculties, acquired through ordination by a bishop. Differences lie in their way of life, type of work, and the Church authority to which they are responsible. *Diocesan priests* commit their lives to serving the people of a diocese, a church administrative region, and generally work in parishes, schools, or other Catholic institutions as assigned by the bishop of their diocese. Diocesan priests take oaths of celibacy and obedience. *Religious priests* belong to a religious order, such as the Jesuits, Dominicans, or Franciscans. In addition to the vows taken by diocesan priests, religious priests take a vow of poverty.

Diocesan priests attend to the spiritual, pastoral, moral, and educational needs of the members of their church. A priest's day usually begins with morning meditation and mass and may end with an individual counseling session or an evening visit to a hospital or home. Many priests direct and serve on church committees, work in civic and charitable organizations, and assist in community projects. Some counsel parishioners preparing for marriage or the birth of a child.

Religious priests receive duty assignments from their superiors in their respective religious orders. Some religious priests specialize in teaching, whereas others serve as missionaries in foreign countries, where they may live under difficult and primitive conditions. Other religious priests live a communal life in monasteries, where they devote their lives to prayer, study, and assigned work.

Both religious and diocesan priests hold teaching and administrative posts in Catholic seminaries, colleges and universities, and high schools. Priests attached to religious orders staff many of the Church's institutions of higher education and many high schools, whereas diocesan priests usually are concerned with the parochial schools attached to parish churches and with diocesan high schools. Members of religious orders do much of the missionary work conducted by the Catholic Church in this country and abroad.

Employment

According to *The Official Catholic Directory*, there were approximately 45,000 priests in 2002; about 30,000 were diocesan priests. Priests are found in nearly every city and town and in many rural communities; however, the majority is in metropolitan areas, where most Catholics reside.

Training and Other Qualifications

Men exclusively are ordained as priests. Women may serve in church positions that do not require priestly ordination. Preparation for the priesthood generally requires 8 years of study beyond high school, usually including a college degree followed by 4 or more years of theology study at a seminary.

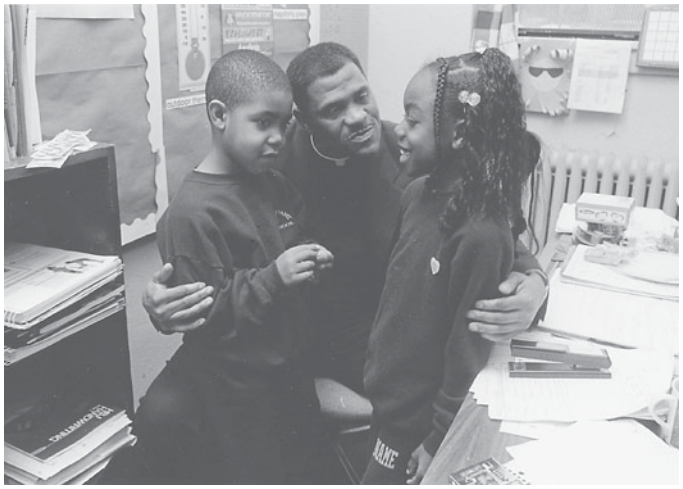
Preparatory study for the priesthood may begin in the first year of high school, at the college level, or in theological seminaries after college graduation. Seven high-school seminary programs—four free-standing high school seminaries and three programs within Catholic high schools—provided a college preparatory program in 2002. Programs emphasize and support religious formation in addition to a regular, college-preparatory curriculum. Latin may be required, and modern languages are encouraged. In Hispanic communities, knowledge of Spanish is mandatory.

Those who begin training for the priesthood in college do so in one of 39 priesthood formation programs offered either through Catholic colleges or universities or in freestanding college seminaries. Preparatory studies usually include training in philosophy, religious studies, and prayer.

Today, most candidates for the priesthood have a 4-year degree from an accredited college or university, then attend one of 46 theological seminaries (also called theologates) and earn either the Master of Divinity or the Master of Arts degree. Thirty-four theologates primarily train diocesan priests, whereas 12 theologates provide information mostly for priesthood candidates from religious orders. (Slight variations in training reflect the differences in their expected duties.) Theology coursework includes sacred scripture; dogmatic, moral, and pastoral theology; homiletics (art of preaching); church history; liturgy (sacraments); and canon (church) law. Fieldwork experience usually is required.

Young men are never denied entry into seminaries because of lack of funds. In seminaries for diocesan priests, scholarships or loans are available, and contributions of benefactors and the Catholic Church finance those in religious seminaries—who have taken a vow of poverty and are not expected to have personal resources.

Graduate work in theology beyond that required for ordination also is offered at a number of American Catholic universities or at ecclesiastical universities around the world, particularly in Rome. Also, many priests do graduate work in fields unrelated to theology. Priests are encouraged by the Catholic Church to continue their studies, at least informally, after ordination. In recent years, the Church has stressed continuing edu-



Many priests work with civic and charitable organizations and assist in community projects.

cation for ordained priests in the social sciences, such as sociology and psychology.

A newly ordained diocesan priest usually works as an assistant pastor. Newly ordained priests of religious orders are assigned to the specialized duties for which they have been trained. Depending on the talents, interests, and experience of the individual, many opportunities for additional responsibility exist within the Church.

Job Outlook

The shortage of Roman Catholic priests is expected to continue, resulting in a very favorable job outlook through the year 2012. Many priests will be needed in the years ahead to provide for the spiritual, educational, and social needs of the increasing number of Catholics. In recent years, the number of ordained priests has been insufficient to fill the needs of newly established parishes and other Catholic institutions and to replace priests who retire, die, or leave the priesthood. This situation is likely to continue, as seminary enrollments remain below the levels needed to overcome the current shortfall of priests.

In response to the shortage of priests, permanent deacons and teams of clergy and laity increasingly are performing certain traditional functions within the Catholic Church. The number of ordained deacons has increased 30 percent over the past 20 years, and this trend should continue. Throughout most of the country, permanent deacons have been ordained to preach and perform liturgical functions, such as baptisms, marriages, and funerals, and to provide service to the community. Deacons are not authorized to celebrate Mass, nor are they allowed to administer the Sacraments of Reconciliation and the Anointing of the Sick. Teams of clergy and laity undertake some liturgical and nonliturgical functions, such as hospital visits and religious teaching.

Earnings

Salaries of diocesan priests vary from diocese to diocese. According to a biennial survey of the National Federation of Priests' Council, low-end salaries averaged $15,291 per year in 2002; high-end salaries averaged $18,478 per year. In addition to a salary, diocesan priests receive a package of benefits that may include a car allowance, room and board in the parish rectory, health insurance, and a retirement plan.

Diocesan priests who do special work related to the church, such as teaching, usually receive a salary which is less than a lay person in the same position would receive. The difference between the usual salary for these jobs and the salary that the priest receives is called "contributed service." In some situations, housing and related expenses may be provided; in other cases, the priest must make his own arrangements. Some priests doing special work receive the same compensation that a lay person would receive.

Religious priests take a vow of poverty and are supported by their religious order. Any personal earnings are given to the order. Their vow of poverty is recognized by the Internal Revenue Service, which exempts them from paying Federal income tax.

Sources of Additional Information

Young men interested in entering the priesthood should seek the guidance and counsel of their parish priests and diocesan vocational office. For information regarding the different religious orders and the diocesan priesthood, as well as a list of the seminaries that prepare students for the priesthood, contact the diocesan director of vocations through the office of the local pastor or bishop.

Individuals seeking additional information about careers in the Catholic Ministry should contact their local diocese.

For information on training programs for the Catholic ministry, contact:

➤ Center for Applied Research in the Apostolate (CARA), Georgetown University, 2300 Wisconsin Ave. NW., Suite 400, Washington, DC 20007. Internet: **http://cara.georgetown.edu**

Counselors

(0*NET 21-1011.00, 21-1012.00, 21-1013.00, 21-1014.00, 21-1015.00))

Significant Points

- A master's degree is often required to be licensed or certified as a counselor.
- All but three States require some form of licensure or certification for practice outside of schools; all States require school counselors to hold a State school counseling certification.

Nature of the Work

Counselors assist people with personal, family, educational, mental health, and career decisions and problems. Their duties depend on the individuals they serve and on the settings in which they work.

Educational, vocational, and school counselors provide individuals and groups with career and educational counseling. In school settings—elementary through postsecondary—they are usually called school counselors and they work with students, including those considered to be at risk and those with special needs. They advocate for students and work with other individuals and organizations to promote the academic, career, and personal and social development of children and youths. School counselors help students evaluate their abilities, interests, talents, and personality characteristics in order to develop realistic academic and career goals. Counselors use interviews, counseling sessions, tests, or other methods in evaluating and advising students. They also operate career information centers and career education programs. High school counselors advise students regarding college majors, admission requirements, entrance exams, financial aid, trade or technical schools, and apprenticeship programs. They help students develop job search skills such as resume writing and interviewing techniques. College career planning and placement counselors assist alumni or students with career development and job-hunting techniques.

Elementary school counselors observe younger children during classroom and play activities and confer with their teachers and parents to evaluate the children's strengths, problems, or special needs. They also help students develop good study habits. Elementary school counselors do less vocational and academic counseling than do secondary school counselors.

School counselors at all levels help students understand and deal with social, behavioral, and personal problems. These counselors emphasize preventive and developmental counseling to provide students with the life skills needed to deal with problems before they occur and to enhance the student's personal, social, and academic growth. Counselors provide special services, including alcohol and drug prevention programs and conflict resolution classes. Counselors also try to identify cases of domestic abuse and other family problems that can affect a student's development. Counselors work with students individually, with small groups, or with entire classes. They consult and collaborate with parents, teachers, school administrators, school psychologists, medical professionals, and social workers in order to develop and implement strategies to help students be successful in the education system.

Vocational counselors who provide mainly career counseling outside the school setting are also referred to as *employment counselors* or *career counselors*. Their chief focus is helping individuals with their career decisions. Vocational counselors explore and evaluate the client's education, training, work history, interests, skills, and personality traits, and arrange for aptitude and achievement tests to assist in making career decisions. They also work with individuals to develop their job search skills, and they assist clients in locating and applying for jobs. In addition, career counselors provide support to persons experiencing job loss, job stress, or other career transition issues.

Rehabilitation counselors help people deal with the personal, social, and vocational effects of disabilities. They counsel people with disabilities resulting from birth defects, illness or disease, accidents, or the stress of daily life. They evaluate the strengths and limitations of individuals, provide personal and vocational counseling, and arrange for medical care, vocational training, and job placement. Rehabilitation counselors interview both individuals with disabilities and their families, evaluate school and medical reports, and confer and plan with physicians, psychologists, occupational therapists, and employers to determine the capabilities and skills of the individual. Conferring with the client, they develop a rehabilitation program that often includes training to help the person develop job skills. Rehabilitation counselors also work toward increasing the client's capacity to live independently.

Mental health counselors work with individuals, families, and groups to address and treat mental and emotional disorders and to promote optimum mental health. They are trained in a variety of therapeutic techniques used to address a wide range of issues, including depression, addiction and substance abuse, suicidal impulses, stress management, problems with self-esteem, issues associated with aging, job and career concerns, educational decisions, issues related to mental and emotional health, and family, parenting, and marital or other relationship problems. Mental health counselors often work closely with other mental health specialists, such as psychiatrists, psychologists, clinical social workers, psychiatric nurses, and school counselors. (Information on other mental health specialists appears in the *Handbook* statements on physicians and surgeons, psychologists, registered nurses, and social workers.)

Substance abuse and behavioral disorder counselors help people who have problems with alcohol, drugs, gambling, and eating disorders. They counsel individuals who are addicted to drugs, helping them identify behaviors and problems related to their addiction. These counselors hold sessions for one person, for families, or for groups of people.

Counselors must be able to inspire respect, trust, and confidence in order to assist people with their problems.

Marriage and family therapists apply principles, methods, and therapeutic techniques to individuals, family groups, couples, or organizations for the purpose of resolving emotional conflicts. In doing so, they modify people's perceptions and behaviors, enhance communication and understanding among all family members, and help to prevent family and individual crises. Marriage and family therapists also may engage in psychotherapy of a nonmedical nature, with appropriate referrals to psychiatric resources, and in research and teaching in the overall field of human development and interpersonal relationships.

Other counseling specialties include gerontological, multicultural, and genetic counseling. A gerontological counselor provides services to elderly persons who face changing lifestyles because of health problems; the counselor helps families cope with the changes. A multicultural counselor helps employers adjust to an increasingly diverse workforce. Genetic counselors provide information and support to families who have members with birth defects or genetic disorders and to families who may be at risk for a variety of inherited conditions. These counselors identify families at risk, investigate the problem that is present in the family, interpret information about the disorder, analyze inheritance patterns and risks of recurrence, and review available options with the family.

Working Conditions

Most school counselors work the traditional 9- to 10-month school year with a 2- to 3-month vacation, although increasing numbers are employed on 10½- or 11-month contracts. They usually work the same hours that teachers do. College career planning and placement counselors work long and irregular hours during student recruiting periods.

Rehabilitation counselors usually work a standard 40-hour week. Self-employed counselors and those working in mental health and community agencies, such as substance abuse and behavioral disorder counselors, frequently work evenings to counsel clients who work during the day. Both mental health counselors and marriage and family therapists also often work flexible hours, to accommodate families in crisis or working couples who must have evening or weekend appointments.

Counselors must possess high physical and emotional energy to handle the array of problems they address. Dealing daily with these problems can cause stress. Because privacy is essential for confidential and frank discussions with clients, counselors usually have private offices.

Employment

Counselors held about 526,000 jobs in 2002. Employment was distributed among the counseling specialties as follows:

Educational, vocational, and school counselors	228,000
Rehabilitation counselors	122,000
Mental health counselors	85,000
Substance abuse and behavioral disorder counselors	67,000
Marriage and family therapists	23,000

Educational, vocational, and school counselors work primarily in elementary and secondary schools and colleges and universities. Other types of counselors work in a wide variety of public and private establishments, including health care facilities; job training, career development, and vocational rehabilitation centers; social agencies; correctional institutions; and residential care facilities, such as halfway houses for criminal offenders and group homes for children, the elderly, and the disabled. Some substance abuse and behavioral disorder counselors work in therapeutic communities where addicts live while undergoing treatment. Counselors also work in organizations engaged in community improvement and social change and work as well in drug and alcohol rehabilitation programs and State and local government agencies. A growing number of counselors are self-employed and working in group practices or private practice. This growth has been helped by laws allowing counselors to receive payments from insurance companies and the growing recognition that counselors are well-trained professionals.

Training, Other Qualifications, and Advancement

All States require school counselors to hold State school counseling certification and to have completed at least some graduate course work; most require the completion of a master's degree. Some States require public school counselors to have both counseling and teaching certificates and to have had some teaching experience before receiving certification. For counselors based outside of schools, 47 States and the District of Columbia had some form of counselor credentialing, licensure, certification, or registration that governed their practice of counseling. Requirements typically include the completion of a master's degree in counseling, the accumulation of 2 years or 3,000 hours of supervised clinical experience beyond the master's degree level, the passage of a State-recognized exam, adherence to ethical codes and standards, and the satisfaction of annual continuing education requirements.

Counselors must be aware of educational and training requirements that are often very detailed and that vary by area and by counseling specialty. Prospective counselors should check with State and local governments, employers, and national voluntary certification organizations in order to determine which requirements apply.

As mentioned, a master's degree is typically required to be licensed or certified as a counselor. A bachelor's degree often qualifies a person to work as a counseling aide, rehabilitation aide, or social service worker. Some States require counselors in public employment to have a master's degree; others accept a bachelor's degree with appropriate counseling courses. Counselor education programs in colleges and universities usually are in departments of education or psychology. Fields of study include college student affairs, elementary or secondary school counseling, education, gerontological counseling, marriage and family counseling, substance abuse counseling, rehabilitation counseling, agency or community counseling, clinical mental health counseling, counseling psychology, career counseling, and related fields. Courses are grouped into eight core areas: Human growth and development, social and cultural diversity, relationships, group work, career development, assessment, research and program evaluation, and professional identity. In an accredited master's degree program, 48 to 60 semester hours of graduate study, including a period of supervised clinical experience in counseling, are required for a master's degree.

In 2003, 176 institutions offered programs in counselor education—including career, community, gerontological, mental health, school, student affairs, and marriage and family counseling—that were accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). CACREP also recognizes many counselor education programs, apart from those in the 176 accredited institutions, that use alternative instruction methods, such as distance learning. Programs that use such alternative instruction methods are evaluated on the basis of the same standards for accreditation that CACREP applies to programs that employ the more traditional

methods. Another organization, the Council on Rehabilitation Education (CORE), accredits graduate programs in rehabilitation counseling. Accredited master's degree programs include a minimum of 2 years of full-time study, including 600 hours of supervised clinical internship experience.

Many counselors elect to be nationally certified by the National Board for Certified Counselors, Inc. (NBCC), which grants the general practice credential "National Certified Counselor." To be certified, a counselor must hold a master's or higher degree, with a concentration in counseling, from a regionally accredited college or university; must have at least 2 years of supervised field experience in a counseling setting (graduates from counselor education programs accredited by CACREP are exempted); must provide two professional endorsements, one of which must be from a recent supervisor; and must have a passing score on the NBCC's National Counselor Examination for Licensure and Certification (NCE). This national certification is voluntary and is distinct from State certification. However, in some States, those who pass the national exam are exempted from taking a State certification exam. NBCC also offers specialty certification in school, clinical mental health, and addiction counseling. Beginning January 1, 2004, new candidates for NBCC's National Certified School counselor (NCSC) credential must pass a practical simulation examination in addition to fulfilling the current requirements. To maintain their certification, counselors retake and pass the NCE or complete 100 hours of acceptable continuing education credit every 5 years.

Another organization, the Commission on Rehabilitation Counselor Certification, offers voluntary national certification for rehabilitation counselors. Many employers require rehabilitation counselors to be nationally certified. To become certified, rehabilitation counselors usually must graduate from an accredited educational program, complete an internship, and pass a written examination. (Certification requirements vary according to an applicant's educational history. Employment experience, for example, is required for those with a counseling degree in a specialty other than rehabilitation.) After meeting these requirements, candidates are designated "Certified Rehabilitation Counselors." To maintain their certification, counselors must successfully retake the certification exam or complete 100 hours of acceptable continuing education credit every 5 years.

Other counseling organizations also offer certification in particular counseling specialties. Usually these are voluntary, but having one may enhance one's job prospects.

Some employers provide training for newly hired counselors. Others may offer time off or provide help with tuition if it is needed to complete a graduate degree. Counselors must participate in graduate studies, workshops, and personal studies to maintain their certificates and licenses.

Persons interested in counseling should have a strong interest in helping others and should possess the ability to inspire respect, trust, and confidence. They should be able to work independently or as part of a team. Counselors must follow the code of ethics associated with their respective certifications and licenses.

Prospects for advancement vary by counseling field. School counselors can move to a larger school; become directors or supervisors of counseling, guidance, or pupil personnel services; or, usually with further graduate education, become counselor educators, counseling psychologists, or school administrators. (See the statements on psychologists and education administrators elsewhere in the *Handbook*.) Some counselors choose to work for a State's department of education. For marriage and family therapists, doctoral education in family therapy emphasizes the training of supervisors, teachers, researchers, and clinicians in the discipline.

Counselors can become supervisors or administrators in their agencies. Some counselors move into research, consulting, or college teaching or go into private or group practice.

Job Outlook

Overall employment of counselors is expected to grow faster than the average for all occupations through 2012, and job opportunities should be very good because there are usually more job openings than graduates of counseling programs. In addition, numerous job openings will occur as many counselors retire or leave the profession.

Employment of educational, vocational, and school counselors is expected to grow as fast as the average for all occupations as a result of: increasing student enrollments, particularly in secondary and postsecondary schools; State legislation requiring counselors in elementary schools; and an expansion in the responsibilities of counselors. For example, counselors are becoming more involved in crisis and preventive counseling, helping students deal with issues ranging from drug and alcohol abuse to death and suicide. Although schools and governments realize the value of counselors in achieving academic success in their students, budget constraints at every school level will dampen job growth of school counselors. However, Federal grants and subsidies may fill in the gaps and allow the current ongoing reduction in student-to-counselor ratios to continue.

Demand for vocational or career counselors should grow as the notion of staying in one job over a lifetime continues to be rejected and replaced by the concept of managing one's own career and taking responsibility for it. In addition, changes in welfare laws that require beneficiaries to work will continue to create demand for counselors by State and local governments. Other opportunities for employment counselors will arise in private job-training centers that provide training and other services to laid-off workers, as well as to those seeking a new or second career or wanting to upgrade their skills.

Demand is expected to be strong for substance abuse and behavioral, mental health, and marriage and family therapists and for rehabilitation counselors, for a variety of reasons. For one, California and a few other States have recently passed laws requiring substance abuse treatment instead of jail for people caught possessing a drug. This shift will require more substance abuse counselors in those States. Second, the increasing availability of funds to build statewide networks to improve services for children and adolescents with serious emotional disturbances and for their family members should increase employment opportunities for counselors. Under managed care systems, insurance companies are increasingly providing for reimbursement of counselors as a less costly alternative to psychiatrists and psychologists. Also, legislation is pending that may provide counseling services to Medicare recipients.

The number of people who will need rehabilitation counseling is expected to grow as the population continues to age and as advances in medical technology continue to save lives that only a few years ago would have been lost. In addition, legislation requiring equal employment rights for people with disabilities will spur demand for counselors, who not only will help these people make a transition into the workforce, but also will help companies comply with the law.

Employment of mental health counselors and marriage and family therapists will grow as the Nation becomes more comfortable seeking professional help for a variety of health and

personal and family problems. Employers also are increasingly offering employee assistance programs that provide mental health and alcohol and drug abuse services. More people are expected to use these services as society focuses on ways of developing mental well-being, such as controlling stress associated with job and family responsibilities.

Earnings

Median annual earnings of educational, vocational, and school counselors in 2002 were $44,100. The middle 50 percent earned between $33,160 and $56,770. The lowest 10 percent earned less than $24,930, and the highest 10 percent earned more than $70,320. School counselors can earn additional income working summers in the school system or in other jobs. Median annual earnings in the industries employing the largest numbers of educational, vocational, and school counselors in 2002 were as follows:

Educational, vocational, and school counselors	228,000
Rehabilitation counselors	122,000
Mental health counselors	85,000
Substance abuse and behavioral disorder counselors	67,000
Marriage and family therapists	23,000

Median annual earnings of substance abuse and behavioral disorder counselors in 2002 were $30,180. The middle 50 percent earned between $24,350 and $37,520. The lowest 10 percent earned less than $19,540, and the highest 10 percent earned more than $45,570.

Median annual earnings of mental health counselors in 2002 were $29,940. The middle 50 percent earned between $23,950 and $39,160. The lowest 10 percent earned less than $19,760, and the highest 10 percent earned more than 50,170.

Median annual earnings of rehabilitation counselors in 2002 were $25,840. The middle 50 percent earned between $20,350 and $34,000. The lowest 10 percent earned less than $16,840, and the highest 10 percent earned more than $44,940.

For substance abuse, mental health, and rehabilitation counselors, government employers generally pay the highest wages, followed by hospitals and social service agencies. Residential care facilities often pay the lowest wages.

Median annual earnings of marriage and family therapists in 2002 were $35,580. The middle 50 percent earned between $26,790 and $44,620. The lowest 10 percent earned less than 20,960, and the highest 10 percent earned more than $59,030. Median annual earnings in 2002 were $29,160 in individual and family social services, the industry employing the largest numbers of marriage and family therapists.

Self-employed counselors who have well-established practices, as well as counselors employed in group practices, usually have the highest earnings.

Related Occupations

Counselors help people evaluate their interests, abilities, and disabilities and deal with personal, social, academic, and career problems. Others who help people in similar ways include teachers, social and human service assistants, social workers, psychologists, physicians and surgeons, registered nurses, members of the clergy, occupational therapists, and human resources, training, and labor relations managers and specialists.

Sources of Additional Information

For general information about counseling, as well as information on specialties such as school, college, mental health, rehabilitation, multicultural, career, marriage and family, and gerontological counseling, contact:

➤ American Counseling Association, 5999 Stevenson Ave., Alexandria, VA 22304-3300. Internet: **http://www.counseling.org**

For information on accredited counseling and related training programs, contact:

➤ Council for Accreditation of Counseling and Related Educational Programs, American Counseling Association, 5999 Stevenson Ave., 4th floor, Alexandria, VA 22304. Internet: **http://www.counseling.org/cacrep**

For information on national certification requirements for counselors, contact:

➤ National Board for Certified Counselors, Inc., 3 Terrace Way, Suite D, Greensboro, NC 27403-3660. Internet: **http://www.nbcc.org**

State departments of education can supply information on those colleges and universities which offer guidance and counseling training that meets State certification and licensure requirements.

State employment service offices have information about job opportunities and about entrance requirements for counselors.

Education Administrators

(0*NET 11-9031.00, 11-9032.00, 11-9033.00, 11-9039.99)

Significant Points

- Many jobs require a master's or doctoral degree and experience in a related occupation, such as a teacher or admissions counselor.
- Strong interpersonal and communication skills are essential because much of an administrator's job involves working and collaborating with others.
- Job outlook is expected to be excellent because a large proportion of education administrators are expected to retire over the next 10 years.

Nature of the Work

Smooth operation of an educational institution requires competent administrators. *Education administrators* provide instructional leadership as well as manage the day-to-day activities in schools, preschools, daycare centers, and colleges and universities. They also direct the educational programs of businesses, correctional institutions, museums, and job training and community service organizations. (College presidents and school superintendents are covered in the *Handbook* statement on general managers and top executives.) Education administrators set educational standards and goals and establish the policies and procedures to carry them out. They also supervise managers, support staff, teachers, counselors, librarians, coaches, and others. They develop academic programs; monitor students' educational progress; train and motivate teachers and other staff; manage guidance and other student services; administer recordkeeping; prepare budgets; handle relations with parents, prospective and current students, employers, and the community; and perform many other duties. In an organization such as a small daycare center, one administrator may handle all these functions. In universities or large school systems, responsibilities are divided among many administrators, each with a specific function.

Those who manage elementary, middle, and secondary schools are called *principals*. They set the academic tone and hire, evaluate, and help improve the skills of teachers and other staff. Principals confer with staff to advise, explain, or answer procedural questions. They visit classrooms, observe teaching methods, review instructional objectives, and examine learning materials. They actively work with teachers to develop and maintain high curriculum standards, develop mission statements, and set performance goals and objectives. Principals must use clear, objective guidelines for teacher appraisals, because pay often is based on performance ratings.

Principals also meet and interact with other administrators, students, parents, and representatives of community organizations. Decisionmaking authority has increasingly shifted from school district central offices to individual schools. Thus, parents, teachers, and other members of the community play an important role in setting school policies and goals. Principals must pay attention to the concerns of these groups when making administrative decisions.

Principals prepare budgets and reports on various subjects, including finances and attendance, and oversee the requisition and allocation of supplies. As school budgets become tighter, many principals have become more involved in public relations and fundraising to secure financial support for their schools from local businesses and the community.

Principals must take an active role to ensure that students meet national, State, and local academic standards. Many principals develop school/business partnerships and school-to-work transition programs for students. Increasingly, principals must be sensitive to the needs of the rising number of non-English speaking and culturally diverse students. Growing enrollments, which are leading to overcrowding at many existing schools, also are a cause for concern. When addressing problems of inadequate resources, administrators serve as advocates for the building of new schools or the repair of existing ones. During summer months, principals are responsible for planning for the upcoming year, overseeing summer school, participating in workshops for teachers and administrators, supervising building repairs and improvements, and working to be sure the school has adequate staff for the school year.

Schools continue to be involved with students' emotional welfare as well as their academic achievement. As a result, principals face responsibilities outside the academic realm. For example, in response to the growing numbers of dual-income and single-parent families and teenage parents, schools have established before- and after-school childcare programs or family resource centers, which also may offer parenting classes and social service referrals. With the help of community organizations, some principals have established programs to combat increases in crime, drug and alcohol abuse, and sexually transmitted diseases among students.

Assistant principals aid the principal in the overall administration of the school. Some assistant principals hold this position for several years to prepare for advancement to principal jobs; others are career assistant principals. They are primarily responsible for scheduling student classes, ordering textbooks and supplies, and coordinating transportation, custodial, cafeteria, and other support services. They usually handle student discipline and attendance problems, social and recreational programs, and health and safety matters. They also may counsel students on personal, educational, or vocational matters. With the advent of site-based management, assistant principals are playing a greater role in ensuring the academic success of students by helping to develop new curriculums, evaluating teachers, and dealing with school-community relations—responsibilities previously assumed solely by the principal. The number of assistant principals that a school employs may vary, depending on the number of students.

In preschools and childcare centers, education administrators are the director or supervisor of the school or center. Their job is similar to that of other school administrators in that they oversee daily

Strong interpersonal and communication skills are essential for education administrators.

activities and operation of the schools, hire and develop staff, and make sure that the school meets required regulations.

Administrators in school district central offices oversee public schools under their jurisdiction. This group includes those who direct subject-area programs such as English, music, vocational education, special education, and mathematics. They supervise instructional coordinators and curriculum specialists, and work with them to evaluate curriculums and teaching techniques and improve them. (Instructional coordinators are covered elsewhere in the *Handbook*.) Administrators also may oversee career counseling programs and testing that measures students' abilities and helps to place them in appropriate classes. Others may also direct programs such as school psychology, athletics, curriculum and instruction, and professional development. With site-based management, administrators have transferred primary responsibility for many of these programs to the principals, assistant principals, teachers, instructional coordinators, and other staff in the schools.

In colleges and universities, *academic deans, deans of faculty, provosts,* and *university deans* assist presidents, make faculty appointments, develop budgets, and establish academic policies and programs. They also direct and coordinate the activities of deans of individual colleges and chairpersons of academic departments. Fundraising also is becoming an essential part of their job.

College or university department heads or *chairpersons* are in charge of departments that specialize in particular fields of study, such as English, biological science, or mathematics. In addition to teaching, they coordinate schedules of classes and teaching assignments; propose budgets; recruit, interview, and hire applicants for teaching positions; evaluate faculty members; encourage faculty development; serve on committees; and perform other administrative duties. In overseeing their departments, chairpersons must consider and balance the concerns of faculty, administrators, and students.

Higher education administrators also direct and coordinate the provision of student services. *Vice presidents of student affairs or student life, deans of students, and directors of student services* may direct and coordinate admissions, foreign student services, health and counseling services, career services, financial aid, and housing and residential life, as well as social, recreational, and related programs. In small colleges, they may counsel students. In larger colleges and universities, separate administrators may handle each of these services. *Registrars* are custodians of students' records. They register students, record grades, prepare student transcripts, evaluate academic records, assess and collect tuition and fees, plan and implement commencement, oversee the preparation of college catalogs and schedules of classes, and analyze enrollment and demographic statistics. *Directors of admissions* manage the process of recruiting, evaluating, and admitting students, and work closely with *financial aid directors*, who oversee scholarship, fellowship, and loan programs. Registrars and admissions officers at most institutions need computer skills because they use electronic student information systems. For example, for those whose institutions present information—such as college catalogs and schedules—on the Internet, knowledge of online resources, imaging, and other computer skills is important. *Athletic directors* plan and direct intramural and intercollegiate athletic activities, seeing to publicity for athletic events, preparation of budgets, and supervision of coaches. Other increasingly important administrators direct fundraising, public relations, distance learning, and technology.

Working Conditions

Education administrators hold leadership positions with significant responsibility. Most find working with students extremely rewarding, but as the responsibilities of administrators have increased in recent years, so has the stress. Coordinating and interacting with faculty, parents, students, community members, business leaders, and State and local policymakers can be fast-paced and stimulating, but also stressful and demanding. Principals and assistant principals, whose varied duties include discipline, may find working with difficult students challenging. The pressures associated with education administrator jobs have multiplied in recent years, as workers in these positions are increasingly being held accountable for ensuring that their schools meet recently imposed State and Federal guidelines for student performance and teacher qualifications, and as they must cope with the additional challenges presented by current budget shortfalls,.

Many education administrators work more than 40 hours a week, often including school activities at night and on weekends. Most administrators work 11 or 12 months out of the year. Some jobs include travel.

Employment

Education administrators held about 427,000 jobs in 2002. About 2 in 10 worked for private education institutions, and 6 in 10 worked for State and local governments, mainly in schools, colleges and universities, and departments of education. Less than 5 percent were self-employed. The rest worked in child daycare centers, religious organizations, job training centers, and businesses and other organizations that provided training for their employees.

Training, Other Qualifications, and Advancement

Most education administrators begin their careers in related occupations, and prepare for a job in education administration by completing a master's or doctoral degree. Because of the diversity of duties and levels of responsibility, their educational backgrounds and experience vary considerably. Principals, assistant principals, central office administrators, academic deans, and preschool directors usually have held teaching positions before moving into administration. Some teachers move directly into principal positions; others first become assistant principals, or gain experience in other central office administrative jobs at either the school or district level in positions such as department head, curriculum specialist, or subject matter advisor. In some cases, administrators move up from related staff jobs such as recruiter, guidance counselor, librarian, residence hall director, or financial aid or admissions counselor.

To be considered for education administrator positions, workers must first prove themselves in their current jobs. In evaluating candidates, supervisors look for leadership, determination, confidence, innovativeness, and motivation. The ability to make sound decisions and to organize and coordinate work efficiently is essential. Because much of an administrator's job involves interacting with others—such as students, parents, teachers, and the community—a person in such a position must have strong interpersonal skills and be an effective communicator and motivator. Knowledge of leadership principles and practices, gained through work experience and formal education, is important. A familiarity with computer technology is a necessity for principals, who are required to gather information and coordinate technical resources for their students, teachers, and classrooms.

In most public schools, principals, assistant principals, and school administrators in central offices need a master's degree in education administration or educational supervision. Some principals and central office administrators have a doctorate or specialized degree in education administration. In private schools, which are not subject to State licensure requirements, some principals and assistant

principals hold only a bachelor's degree; however, the majority have a master's or doctoral degree. Most States require principals to be licensed as school administrators. License requirements vary by State. National standards for school leaders, including principals and supervisors, have been developed by the Interstate School Leaders Licensure Consortium. Many States use these national standards as guidelines to assess beginning principals for licensure. Increasingly, on-the-job training, often with a mentor, is required for new school leaders. Some States require administrators to take continuing education courses to keep their license, thus ensuring that administrators have the most up-to-date skills. The number and types of courses required to maintain licensure vary by State.

Educational requirements for administrators of preschools and childcare centers vary depending on the setting of the program and the State of employment. Administrators who oversee school-based preschool programs are often required to have at least a bachelor's degree. Child care directors are generally not required to have a degree; however, most States require a credential such as the Child Development Associate credential (CDA) sponsored by the Council for Professional Recognition or other credential specifically designed for administrators. The National Child Care Association, offers a National Administration Credential, which some recent college graduates voluntarily earn to better qualify for positions as childcare center directors.

Academic deans and chairpersons usually have a doctorate in their specialty. Most have held a professorship in their department before advancing. Admissions, student affairs, and financial aid directors and registrars sometimes start in related staff jobs with bachelor's degrees—any field usually is acceptable—and obtain advanced degrees in college student affairs, counseling, or higher education administration. A Ph.D. or Ed.D. usually is necessary for top student affairs positions. Computer literacy and a background in accounting or statistics may be assets in admissions, records, and financial work.

Advanced degrees in higher education administration, educational supervision, and college student affairs are offered in many colleges and universities. The National Council for Accreditation of Teacher Education and the Educational Leadership Constituent Council accredit these programs. Education administration degree programs include courses in school leadership, school law, school finance and budgeting, curriculum development and evaluation, research design and data analysis, community relations, politics in education, and counseling. Educational supervision degree programs include courses in supervision of instruction and curriculum, human relations, curriculum development, research, and advanced teaching courses.

Education administrators advance through promotion to more responsible administrative positions or by transferring to more responsible positions at larger schools or systems. They also may become superintendents of school systems or presidents of educational institutions.

Job Outlook

Employment of education administrators is projected to grow faster than the average for all occupations through 2012. As education and training take on greater importance in everyone's lives, the need for people to administer education programs will grow. Job opportunities for many of these positions should also be excellent because a large proportion of education administrators are expected to retire over the next 10 years.

A significant portion of growth will stem from growth in the private and for-profit segments of education. Many of these schools cater to working adults, many of whom might not ordinarily participate in postsecondary education. These schools allow students to earn a degree, receive job-specific training or update their skills, in a convenient manner, such as through part-time programs or distance learning. As the number of these schools continues to grow, more administrators will be needed to oversee them.

Enrollments of school-age children will also have an impact on the demand for education administrators. The U.S. Department of Education projects enrollment of elementary and secondary school students to grow between 5 and 7 percent over the next decade. Preschool and childcare center administrators are expected to experience substantially more growth as enrollments in formal child care programs continues to expand as fewer private households care for young children. Additionally, if mandatory preschool becomes more widespread more preschool directors will be needed. The number of postsecondary school students is projected to grow more rapidly than other student populations, creating significant demand for administrators at that level. In addition, enrollments are expected to increase the fastest in the West and South, where the population is growing, and to decline or remain stable in the Northeast and the Midwest. School administrators also are in greater demand in rural and urban areas, where pay is generally lower than in the suburbs.

Principals and assistant principals should have favorable job prospects. A sharp increase in responsibilities in recent years has made the job more stressful, and has discouraged teachers from taking positions in administration. Principals are now being held more accountable for the performance of students and teachers, while at the same time they are required to adhere to a growing number of government regulations. In addition, overcrowded classrooms, safety issues, budgetary concerns, and teacher shortages in some areas all are creating additional stress for administrators. The increase in pay is often not high enough to entice people into the field.

Job prospects also are expected to be favorable for college and university administrators, particularly those seeking nonacademic positions. Colleges and universities may be subject to funding shortfalls during economic downturns, but increasing enrollments over the projection period will require that institutions replace the large numbers of administrators who retire, and even hire additional administrators. While competition among faculty for prestigious positions as academic deans and department heads is likely to remain keen, fewer applicants are expected for nonacademic administrative jobs, such as director of admissions or student affairs. Furthermore, many people are discouraged from seeking administrator jobs by the requirement that they have a master's or doctoral degree in education administration—as well as by the opportunity to earn higher salaries in other occupations.

Earnings

In 2002, elementary and secondary school administrators had median annual earnings of $71,490; postsecondary school administrators had median annual earnings of $64,640, while preschool and childcare center administrators earned a median of $33,340 per year. Salaries of education administrators depend on several factors, including the location and enrollment level in the school or school district. According to a survey of public schools, conducted by the Educational Research Service, average salaries for principals and assistant principals in the 2002-03 school year were as follows:

Directors, managers, coordinators, and supervisors, finance and business	$81,451
Principals:	
Elementary school	75,291
Jr. high/middle school	80,708
Senior high school	86,452
Assistant principals:	
Elementary school	$62,230
Jr. high/middle school	67,288
Senior high school	70,874

According to the College and University Professional Association for Human Resources, median annual salaries for selected administrators in higher education in 2001-02 were as follows:

Academic deans:	
Business	$107,414
Graduate programs	100,391
Education	100,227
Arts and sciences	98,780
Health-related professions	89,234
Nursing	88,386
Continuing education	84,457
Occupational or vocational education	73,595
Other administrators:	
Dean of students	$70,012
Director, admissions and registrar	61,519
Director, student financial aid	57,036
Director, annual giving	49,121
Director, student activities	41,050

Benefits for education administrators are generally very good. Many get 4 or 5 weeks vacation every year and have generous health and pension packages. Many colleges and universities offer free tuition to employees and their families.

Related Occupations

Education administrators apply organizational and leadership skills to provide services to individuals. Workers in related occupations include administrative services managers; office and administrative support worker supervisors and managers; human resource, training, and labor relations managers and specialists; and archivists, curators, and museum technicians. Education administrators also work with students and have backgrounds similar to those of counselors; librarians; instructional coordinators; teachers—preschool, kindergarten, elementary, middle, and secondary; and teachers—postsecondary.

Sources of Additional Information

For information on principals and other management staff in public schools, contact:

➤ Educational Research Service, 2000 Clarendon Boulevard, Arlington, VA 22201-2908. Internet: **http://www.ers.org**

For information on principals, contact:

➤ The National Association of Elementary School Principals, 1615 Duke St., Alexandria, VA 22314-3483. Internet: **http://www.naesp.org**

➤ The National Association of Secondary School Principals, 1904 Association Drive, Reston, VA 20191-1537. Internet: **http://www.nassp.org**

For information on collegiate registrars and admissions officers, contact:

➤ American Association of Collegiate Registrars and Admissions Officers, One Dupont Circle NW., Suite 520, Washington, DC 20036-1171. Internet: **http://www.aacrao.org**

For information on professional development and graduate programs for college student affairs administrators, contact:

➤ NASPA, Student Affairs Administrators in Higher Education, 1875 Connecticut Ave. NW., Suite 418, Washington, DC 20009. Internet: **http://www.naspa.org**

Instructional Coordinators

(0*NET 25-9031.00)

Significant Points

- Many instructional coordinators are former teachers or principals.
- A bachelor's degree is the minimum educational requirement, but a graduate degree is preferred.
- The need to meet new educational standards will create more demand for instructional coordinators to train teachers and develop new materials.

Nature of the Work

Instructional coordinators, also known as curriculum specialists, staff development specialists, or directors of instructional material, play a large role in improving the quality of education in the classroom. They develop instructional materials, train teachers, and assess educational programs in terms of quality and adherence to regulations and standards. They also assist in implementing new technology in the classroom. Instructional coordinators often specialize in specific subjects, such as reading, language arts, mathematics, or social studies.

Instructional coordinators evaluate how well a school's curriculum, or plan of study, meets students' needs. They research teaching methods and techniques and develop procedures to determine whether program goals are being met. To aid in their evaluation, they may meet with members of educational committees and advisory groups to learn about subjects—English, history, or mathematics, for example—and to relate curriculum materials to these subjects, to students' needs, and to occupations for which these subjects are good preparation. They also may develop questionnaires and interview school staff about the curriculum. Based on their research and observations of instructional practice, they recommend instruction and curriculum improvements.

Another duty instructional coordinators have is to review textbooks, software, and other educational materials and make recommendations on purchases. They monitor materials ordered and the ways in which teachers use them in the classroom. They also supervise workers who catalogue, distribute, and maintain a school's educational materials and equipment.

Instructional coordinators develop effective ways to use technology to enhance student learning. They monitor the introduction of new technology, including the Internet, into a school's curriculum. In addition, instructional coordinators might recommend installing educational computer software, such as interactive books and exercises designed to enhance student literacy and develop math skills. Instructional coordinators may invite experts—such as computer hardware, software, and library or media specialists—into the classroom to help integrate technological materials into a school's curriculum.

Many instructional coordinators plan and provide onsite education for teachers and administrators. They may train teachers about the use of materials and equipment or help them to improve their skills. Instructional coordinators also mentor new teachers and train experienced ones in the latest instructional methods. This role becomes especially important when a school district introduces new content, program innovations, or a different organizational structure. For example, when a State or school district introduces standards or tests that must be met by students in order to pass to the next grade, instructional coordinators often must advise teachers on the content of the standards and provide instruction on implementing the standards in the classroom.

Working Conditions

Instructional coordinators, including those employed by school districts, often work year round, usually in offices or classrooms. Some spend much of their time traveling between schools meeting with teachers and administrators. The opportunity to shape and improve instructional curricula and work in an academic environment can be satisfying. However, some instructional coordinators find the work stressful because the occupation requires continual accountability to school administrators and it is not uncommon for people in this occupation to work long hours.

Employment

Instructional coordinators held about 98,000 jobs in 2002. More than 1 in 3 worked in local government education. About 1 in 5 worked in private education, and about 1 in 10 worked in State government education. The remainder worked mostly in the following industries: individual and family services; child daycare services; scientific research and development services; and management, scientific, and technical consulting services.

Training, Other Qualifications, and Advancement

The minimum educational requirement for instructional coordinators is a bachelor's degree, usually in education. Most employers, however, prefer candidates with a master's or higher degree. Many instructional coordinators have training in curriculum development and instruction, or in a specific academic field, such as mathematics or history. Instructional coordinators must have a good understanding of how to teach specific groups of students, in addition to expertise in developing educational materials. As a result, many persons transfer into instructional coordinator jobs after working for several years as teachers. Work experience in an education administrator position, such as principal or assistant principal, also is beneficial. Specific requirements for instructional coordinator jobs vary depending on the particular position or school district. They may also vary by State.

Instructional coordinators train teachers in the use of materials and equipment.

Helpful college courses may include those in curriculum development and evaluation, instructional approaches, or research design, which teaches how to create and implement research studies to determine the effectiveness of a given method of curriculum or instruction, or to measure and improve student performance. Moreover, instructional coordinators usually are required to take continuing education courses to keep their skills current. Topics for continuing education courses may include teacher evaluation techniques, curriculum training, new teacher induction, consulting and teacher support, and observation and analysis of teaching.

Instructional coordinators must be able to make sound decisions about curriculum options and to organize and coordinate work efficiently. They should have strong interpersonal and communication skills. Familiarity with computer technology also is important for instructional coordinators, who are increasingly involved in gathering and coordinating technical information for students and teachers.

Depending on experience and educational attainment, instructional coordinators may advance to higher positions in a school system, or to management or executive positions in private industry.

Job Outlook

Employment of instructional coordinators is expected to grow faster than the average for all occupations through the year 2012. Over the next decade, instructional coordinators will be instrumental in developing new curricula to meet the demands of a changing society and in training the teacher workforce. Although budget cuts, particularly in the near term, may negatively impact employment to some extent, a continuing emphasis on improving the quality of education is expected to result in a relatively steady and increasing demand for these workers. As increasing Federal, State and local standards impel more schools to focus on improving educational quality and student performance, growing numbers of coordinators will be needed to incorporate the standards into curriculums and make sure teachers and administrators are informed of the changes. Opportunities are expected to be best for those who specialize in subject areas that have been targeted for improvement by the No Child Left Behind Act—namely, reading, math, and science.

Instructional coordinators also will be needed to provide classes on using technology in the classroom, to keep teachers up-to-date on changes in their fields, and to demonstrate new teaching techniques. Additional job growth for instructional coordinators will stem from the increasing emphasis on lifelong learning and on programs for students with special needs, including those for whom English is a second language. These students often require more educational resources and consolidated planning and management within the educational system.

Earnings

Median annual earnings of instructional coordinators in 2002 were $47,350. The middle 50 percent earned between $34,450 and $62,460. The lowest 10 percent earned less than $25,880, and the highest 10 percent earned more than $76,820.

Related Occupations

Instructional coordinators are professionals involved in education and training and development, which requires organizational, administrative, teaching, research, and communication skills. Occupations with similar characteristics include preschool, kindergarten, elementary, middle, and secondary school teachers; postsecondary teachers; education administrators; counselors; and human resources, training, and labor relations managers and specialists.

Sources of Additional Information

Information on requirements and job opportunities for instructional coordinators is available from local school systems and State departments of education.

Librarians

(0*NET 25-4021.00)

Significant Points

- A master's degree in library science usually is required; special librarians often need an additional graduate or professional degree.
- A large number of retirements in the next decade is expected to result in many job openings for librarians to replace those who leave.
- Librarians increasingly use information technology to perform research, classify materials, and help students and library patrons seek information.

Nature of the Work

The traditional concept of a library is being redefined from a place to access paper records or books to one that also houses the most advanced media, including CD-ROM, the Internet, virtual libraries, and remote access to a wide range of resources. Consequently, librarians, or information professionals, increasingly are combining traditional duties with tasks involving quickly changing technology. Librarians assist people in finding information and using it effectively for personal and professional purposes. Librarians must have knowledge of a wide variety of scholarly and public information sources and must follow trends related to publishing, computers, and the media in order to oversee the selection and organization of library materials. Librarians manage staff and develop and direct information programs and systems for the public, to ensure that information is organized in a manner that meets users' needs.

Most librarian positions incorporate three aspects of library work: User services, technical services, and administrative services. Still, even librarians specializing in one of these areas have other responsibilities. Librarians in user services, such as reference and children's librarians, work with patrons to help them find the information they need. The job involves analyzing users' needs to determine what information is appropriate, as well as searching for, acquiring, and providing the information. The job also includes an instructional role, such as showing users how to access information. For example, librarians commonly help users navigate the Internet so they can search for relevant information efficiently. Librarians in technical services, such as acquisitions and cataloguing, acquire and prepare materials for use and often do not deal directly with the public. Librarians in administrative services oversee the management and planning of libraries: negotiate contracts for services, materials, and equipment; supervise library employees; perform public-relations and fundraising duties: prepare budgets; and direct activities to ensure that everything functions properly.

In small libraries or information centers, librarians usually handle all aspects of the work. They read book reviews, publishers' announcements, and catalogues to keep up with current literature and other available resources, and they select and purchase materials from publishers, wholesalers, and distributors. Librarians prepare new materials by classifying them by subject matter and describe books and other library materials to make them easy to find. Librarians supervise assistants, who prepare cards, computer records, or other access tools that direct users to resources. In large libraries, librarians often specialize in a single area, such as acquisitions, cataloguing, bibliography, reference, special collections, or administration. Teamwork is increasingly important to ensure quality service to the public.

Librarians also compile lists of books, periodicals, articles, and audiovisual materials on particular subjects; analyze collections; and recommend materials. They collect and organize books, pamphlets, manuscripts, and other materials in a specific field, such as rare books, genealogy, or music. In addition, they coordinate programs such as storytelling for children and literacy skills and book talks for adults; conduct classes; publicize services; provide reference help; write grants; and oversee other administrative matters.

Librarians are classified according to the type of library in which they work: A public library; school library media center; college, university, or other academic library; or special library. Some librarians work with specific groups, such as children, young adults, adults, or the disadvantaged. In school library media centers, librarians—often called school media specialists—help teachers develop curricula, acquire materials for classroom instruction, and sometimes team teach.

Librarians also work in information centers or libraries maintained by government agencies, corporations, law firms, advertising agencies, museums, professional associations, medical centers, hospitals, religious organizations, and research laboratories. They acquire and arrange an organization's information resources, which usually are limited to subjects of special interest to the organization. These special librarians can provide vital information services by preparing abstracts and indexes of current periodicals, organizing bibliographies, or analyzing background information and preparing reports on areas of particular interest. For example, a special librarian working for a corporation could provide the sales department with information on competitors or new developments affecting the field. A medical librarian may provide information about new medical treatments, clinical trials, and standard procedures to health professionals, patients, consumers, and corporations. Government document librarians, who work for government agencies and depository libraries in each of the States, preserve government publications, records, and other documents that make up a historical record of government actions and decisionmaking.

Librarians assist people in finding information and using it effectively.

Many libraries have access to remote databases and maintain their own computerized databases. The widespread use of automation in libraries makes database-searching skills important to librarians. Librarians develop and index databases and help train users to develop searching skills for the information they need. Some libraries are forming consortiums with other libraries through electronic mail. This practice allows patrons to submit information requests to several libraries simultaneously. The Internet also is expanding the amount of available reference information. Librarians must be aware of how to use these resources in order to locate information.

Librarians with computer and information systems skills can work as automated-systems librarians, planning and operating computer systems, and information architect librarians, designing information storage and retrieval systems and developing procedures for collecting, organizing, interpreting, and classifying information. These librarians analyze and plan for future information needs. (See the statements on computer support specialists and systems administrators; and systems analysts, computer scientists, and database administrators elsewhere in the *Handbook*.) The increasing use of automated information systems is enabling librarians to focus on administrative and budgeting responsibilities, grant writing, and specialized research requests, while delegating more technical and user services responsibilities to technicians. (See the statement on library technicians elsewhere in the *Handbook*.)

More and more, librarians are applying their information management and research skills to arenas outside of libraries—for example, database development, reference tool development, information systems, publishing, Internet coordination, marketing, web content management and design, and training of database users. Entrepreneurial librarians sometimes start their own consulting practices, acting as freelance librarians or information brokers and providing services to other libraries, businesses, or government agencies.

Working Conditions

Librarians spend a significant portion of time at their desks or in front of computer terminals; extended work at video display terminals can cause eyestrain and headaches. Assisting users in obtaining information or books for their jobs, homework, or recreational reading can be challenging and satisfying, but working with users under deadlines can be demanding and stressful. Some librarians lift and carry books, and some climb ladders to reach high stacks. Librarians in small organizations sometimes shelve books themselves.

More than 2 out of 10 librarians work part time. Public and college librarians often work weekends and evenings, as well as some holidays. School librarians usually have the same workday and vacation schedules as classroom teachers. Special librarians usually work normal business hours, but in fast-paced industries—such as advertising or legal services—they can work longer hours when needed.

Employment

Librarians held about 167,000 jobs in 2002. Most worked in school and academic libraries, but nearly a third worked in public libraries. The remainder worked in special libraries or as information professionals for companies and other organizations.

Training, Other Qualifications, and Advancement

A master's degree in library science (MLS) is necessary for librarian positions in most public, academic, and special libraries and in some school libraries. The Federal Government requires an MLS or the equivalent in education and experience. Many colleges and universities offer MLS programs, but employers often prefer graduates of the approximately 56 schools accredited by the American Library Association. Most MLS programs require a bachelor's degree; any liberal arts major is appropriate.

Most MLS programs take 1 year to complete; some take 2. A typical graduate program includes courses in the foundations of library and information science, including the history of books and printing, intellectual freedom and censorship, and the role of libraries and information in society. Other basic courses cover the selection and processing of materials, the organization of information, reference tools and strategies, and user services. Courses are adapted to educate librarians to use new resources brought about by advancing technology, such as online reference systems, Internet search methods, and automated circulation systems. Course options can include resources for children or young adults; classification, cataloguing, indexing, and abstracting; library administration; and library automation. Computer-related course work is an increasingly important part of an MLS degree. Some programs offer interdisciplinary degrees combining technical courses in information science with traditional training in library science.

The MLS degree provides general preparation for library work, but some individuals specialize in a particular area, such as reference, technical services, or children's services. A Ph.D. degree in library and information science is advantageous for a college teaching position or for a top administrative job in a college or university library or large library system.

Usually, an MLS also is required of librarians working in special libraries. In addition, most special librarians supplement their education with knowledge of the subject in which they are specializing, sometimes earning a master's, doctoral, or professional degree in the subject. Areas of specialization include medicine, law, business, engineering, and the natural and social sciences. For example, a librarian working for a law firm may also be a licensed attorney, holding both library science and law degrees. In some jobs, knowledge of a foreign language is needed.

State certification requirements for public school librarians vary widely. Most States require school librarians, often called library media specialists, to be certified as teachers and to have had courses in library science. An MLS is needed in some cases, perhaps with a library media specialization, or a master's in education with a specialty in school library media or educational media. Some States require certification of public librarians employed in municipal, county, or regional library systems.

Librarians participate in continuing education and training once they are on the job, in order to keep abreast of new information systems brought about by changing technology.

Experienced librarians can advance to administrative positions, such as department head, library director, or chief information officer.

Job Outlook

Employment of librarians is expected to grow about as fast as the average for all occupations over the 2002-12 period. However, job opportunities are expected to be very good because a large number of librarians are expected to retire in the coming decade, creating many job openings. Also, the number of people going into this profession has fallen in recent years, resulting in more jobs than applicants in some cases. Colleges and universities report the greatest difficulty in hiring librarians, because the pay is often less than the prospective employees can get elsewhere.

Offsetting the need for librarians are government budget cuts and the increasing use of computerized information storage and retrieval systems. Both will result in the hiring of fewer librarians and the replacement of librarians with less costly library technicians. Computerized systems make cataloguing easier, allowing library technicians to perform the work. In addition, many libraries are equipped for users to access library computers directly from their homes or offices. That way, users can bypass librarians altogether and conduct research on their own. However, librarians will still be needed to manage staff, help users develop database-searching techniques, address complicated reference requests, and define users' needs.

Jobs for librarians outside traditional settings will grow the fastest over the decade. Nontraditional librarian jobs include working as information brokers and working for private corporations, nonprofit organizations, and consulting firms. Many companies are turning to librarians because of their research and organizational skills and their knowledge of computer databases and library automation systems. Librarians can review vast amounts of information and analyze, evaluate, and organize it according to a company's specific needs. Librarians also are hired by organizations to set up information on the Internet. Librarians working in these settings may be classified as systems analysts, database specialists and trainers, webmasters or web developers, or local area network (LAN) coordinators.

Earnings

Salaries of librarians vary according to the individual's qualifications and the type, size, and location of the library. Librarians with primarily administrative duties often have greater earnings. Median annual earnings of librarians in 2002 were $43,090. The middle 50 percent earned between $33,560 and $54,250. The lowest 10 percent earned less than $24,510, and the highest 10 percent earned more than $66,590. Median annual earnings in the industries employing the largest numbers of librarians in 2002 were as follows:

Elementary and secondary schools	$45,660
Colleges, universities, and professional schools	45,600
Local government	37,970
Other information services	37,770

The average annual salary for all librarians in the Federal Government in nonsupervisory, supervisory, and managerial positions was $70,238 in 2003.

Nearly one in three librarians is a member of a union or is covered under a union contract.

Related Occupations

Librarians play an important role in the transfer of knowledge and ideas by providing people with access to the information they need and want. Jobs requiring similar analytical, organizational, and communicative skills include archivists, curators, and museum technicians; and computer and information scientists, research. School librarians have many duties similar to those of schoolteachers. Librarians are increasingly storing, cataloguing, and accessing information with computers. Other jobs that use similar computer skills include systems analysts, computer scientists, and database administrators.

Sources of Additional Information

For information on a career as a librarian and information on accredited library education programs and scholarships, contact

➤ American Library Association, Office for Human Resource Development and Recruitment, 50 East Huron St., Chicago, IL 60611. Internet: **http://www.ala.org**

For information on a career as a special librarian, write to

➤ Special Libraries Association, 1700 18th St. NW., Washington, DC 20009. Internet: **http://www.sla.org**

Information on graduate schools of library and information science can be obtained from

➤ Association for Library and Information Science Education, 1009 Commerce Park Dr., Suite 150, PO Box 4219, Oak Ridge, TN 37839. Internet: **http://www.alise.org**

For information on a career as a law librarian, scholarship information, and a list of ALA-accredited schools offering programs in law librarianship, contact

➤ American Association of Law Libraries, 53 West Jackson Blvd., Suite 940, Chicago, IL 60604. Internet: **http://www.aallnet.org**

For information on employment opportunities for health sciences librarians and for scholarship information, credentialing information, and a list of MLA-accredited schools offering programs in health sciences librarianship, contact

➤ Medical Library Association, 65 E Wacker Place , Suite 1900, Chicago, IL 60601. Internet: **http://www.mlanet.org**

Information on acquiring a job as a librarian with the Federal Government may be obtained from the Office of Personnel Management through a telephone-based system. Consult your telephone directory under "U.S. Government" for a local number, or call (703) 724-1850 (Federal Relay Service (800) 877-8339). The first number is not toll free, and charges may result. Information also is available on the Internet at **http://www.usajobs.opm.gov**.

Information concerning requirements and application procedures for positions in the Library of Congress can be obtained directly from

➤ Human Resources Office, Library of Congress, 101 Independence Ave. SE., Washington, DC 20540-2231.

State library agencies can furnish information on scholarships available through their offices, requirements for certification, and general information about career prospects in the particular State of interest. Several of these agencies maintain job hot lines reporting openings for librarians.

State departments of education can furnish information on certification requirements and job opportunities for school librarians.

Library Technicians

(0*NET 25-4031.00)

Significant Points

- Training requirements range from a high school diploma to an associate's or bachelor's degree, but computer skills are needed for many jobs.
- Increasing use of computerized circulation and information systems should continue to spur job growth, but many libraries' budget constraints should moderate growth.
- Employment should grow rapidly in special libraries because growing numbers of professionals and other workers use those libraries.

Nature of the Work

Library technicians both help librarians acquire, prepare, and organize material and assist users in finding information. Library technicians usually work under the supervision of a librarian, although they work independently in certain situations. Technicians in small libraries handle a range of duties; those in large libraries usually specialize. As libraries increasingly use new technologies—such as CD-ROM, the Internet, virtual libraries, and automated databases—the duties of library technicians will expand and evolve accordingly. Library technicians are assuming greater responsibilities, in some cases taking on tasks previously performed by librarians. (See the statement on librarians elsewhere in the *Handbook.*)

Depending on the employer, library technicians can have other titles, such as library technical assistant or media aide. Library technicians direct library users to standard references, organize and maintain periodicals, prepare volumes for binding, handle interlibrary loan requests, prepare invoices, perform routine cataloguing and coding of library materials, retrieve information from computer databases, and supervise support staff.

The widespread use of computerized information storage and retrieval systems has resulted in technicians handling technical services—such as entering catalogue information into the library's computer—that were once performed by librarians. Technicians assist with customizing databases. In addition, technicians instruct patrons in how to use computer systems to access data. The increased automation of recordkeeping has reduced the amount of clerical work performed by library technicians. Many libraries now offer self-service registration and circulation areas with computers, decreasing the time library technicians spend manually recording and inputting records.

Some library technicians operate and maintain audiovisual equipment, such as projectors, tape recorders, and videocassette recorders, and assist users with microfilm or microfiche readers. They also design posters, bulletin boards, or displays.

Library technicians in school libraries encourage and teach students to use the library and media center. They also help teachers obtain instructional materials, and they assist students with special assignments. Some work in special libraries maintained by government agencies, corporations, law firms, advertising agencies, museums, professional societies, medical centers, and research laboratories, where they conduct literature searches, compile bibliographies, and prepare abstracts, usually on subjects of particular interest to the organization.

To extend library services to more patrons, many libraries operate bookmobiles, often run by library technicians. The technicians take trucks stocked with books, or bookmobiles, to designated sites on a regular schedule, frequently stopping at shopping centers, apartment complexes, schools, and nursing homes. Bookmobiles also may be used to extend library service to patrons living in remote areas. Depending on local conditions, the technicians may operate a bookmobile alone or may be accompanied by another library employee.

Library technicians who drive bookmobiles, answer patrons' questions, receive and check out books, collect fines, maintain the book collection, shelve materials, and occasionally operate audiovisual equipment to show slides or films. They participate, and may assist, in planning programs sponsored by the library, such as reader advisory programs, used-book sales, or outreach programs. Technicians who drive the bookmobile keep track of their mileage, the materials lent out, and the amount of fines collected. In some areas, they are responsible for maintenance of the vehicle and any photocopiers or other equipment in it. They record statistics on circulation and the number of people visiting the bookmobile. Technicians also may record requests for special items from the main library and arrange for the materials to be mailed or delivered to a patron during the next scheduled visit. Many bookmobiles are equipped with personal computers and CD-ROM systems linked to the main library system, allowing technicians to reserve or locate books immediately. Some bookmobiles now offer Internet access to users.

Working Conditions

Technicians answer questions and provide assistance to library users. Those who prepare library materials sit at desks or computer terminals for long periods and can develop headaches or eyestrain from working with the terminals. Some duties, like calculating circulation statistics, can be repetitive and boring. Others, such as performing computer searches with the use of local and regional library networks and cooperatives, can be interesting and challenging. Library technicians may lift and

Library technicians direct library users to standard references, organize and maintain periodicals, and perform routine cataloguing and coding of library materials.

carry books climb ladders to reach high stacks, and bend low to shelve books on bottom shelves.

Library technicians in school libraries work regular school hours. Those in public libraries and college and university (academic) libraries also work weekends, evenings and some holidays. Library technicians in special libraries usually work normal business hours, although they often work overtime as well.

The schedules of library technicians who drive bookmobiles depend on the size of the area being served. Some bookmobiles operate every day, while others go only on certain days. Some bookmobiles operate in the evenings and weekends, to give patrons as much access to the library as possible. Because library technicians who operate bookmobiles may be the only link some people have to the library, much of their work consists of helping the public. They may assist handicapped or elderly patrons to the bookmobile or shovel snow to ensure their safety. They may enter hospitals or nursing homes to deliver books to patrons who are bedridden.

Employment

Library technicians held about 119,000 jobs in 2002. Most worked in school, academic, or public libraries. Some worked in hospitals and for religious organizations, mainly parochial schools. The Federal Government—primarily the U.S. Department of Defense and the U.S. Library of Congress—and State and local governments also employed library technicians.

Training, Other Qualifications, and Advancement

Training requirements for library technicians vary widely, ranging from a high school diploma to specialized postsecondary training. Some employers hire individuals with work experience or other training; others train inexperienced workers on the job. Still other employers require that technicians have an associate's or bachelor's degree. Given the rapid spread of automation in libraries, computer skills are needed for many jobs. Knowledge of databases, library automation systems, online library systems, online public access systems, and circulation systems is valuable. Many bookmobile drivers are required to have a commercial driver's license.

Some 2-year colleges offer an associate-of-arts degree in library technology. Programs include both liberal arts and library-related study. Students learn about library and media organization and operation, as well as how to order, process, catalogue, locate, and circulate library materials and work with library automation. Libraries and associations offer continuing education courses to keep technicians abreast of new developments in the field.

Library technicians usually advance by assuming added responsibilities. For example, technicians often start at the circulation desk, checking books in and out. After gaining experience, they may become responsible for storing and verifying information. As they advance, they may become involved in budget and personnel matters in their departments. Some library technicians advance to supervisory positions and are in charge of the day-to-day operation of their departments.

Job Outlook

Employment of library technicians is expected to grow about as fast as the average for all occupations through 2012. In addition to jobs opening up through employment growth, some job openings will result from the need to replace library technicians who transfer to other fields or leave the labor force.

The increasing use of library automation is expected to continue to spur job growth among library technicians. Computerized information systems have simplified certain tasks, such as descriptive cataloguing, which can now be handled by technicians instead of librarians. For example, nowadays technicians can easily retrieve information from a central database and store it in the library's computer. Although efforts to contain costs could dampen employment growth of library technicians in school, public, and college and university libraries, cost containment efforts could also result in more hiring of library technicians than librarians. Growth in the number of professionals and other workers who use special libraries should result in good job opportunities for library technicians in those settings.

Earnings

Median annual earnings of library technicians in 2002 were $24,090. The middle 50 percent earned between $18,150 and $31,140. The lowest 10 percent earned less than $14,410, and the highest 10 percent earned more than $38,000. Median annual earnings in the industries employing the largest numbers of library technicians in 2002 were as follows:

Colleges, universities, and professional schools	$27,280
Local government	23,310
Elementary and secondary schools	21,770
Other information services	20,950

Salaries of library technicians in the Federal Government averaged $36,788 in 2003.

Related Occupations

Library technicians perform organizational and administrative duties. Workers in other occupations with similar duties include library assistants, clerical; information and record clerks; and medical records and health information technicians.

Sources of Additional Information

For information on training programs for library/media technical assistants, write to

➤ American Library Association, Office for Human Resource Development and Recruitment, 50 East Huron St., Chicago, IL 60611. Internet: **http://www.ala.org**

Information on acquiring a job as a library technician with the Federal Government may be obtained from the Office of Personnel Management through a telephone-based system. Consult your telephone directory under "U.S. Government" for a local number, or call (703) 724-1850 (Federal Relay Service (800) 877-8339). The first number is not toll free, and charges may result. Information also is available on the Internet at **http://www.usajobs.opm.gov**.

Information concerning requirements and application procedures for positions in the Library of Congress can be obtained directly from

➤ Human Resources Office, Library of Congress, 101 Independence Ave. SE., Washington, DC 20540-2231.

State library agencies can furnish information on requirements for technicians and general information about career prospects in the State. Several of these agencies maintain job hot lines reporting openings for library technicians.

State departments of education can furnish information on requirements and job opportunities for school library technicians.

Probation Officers and Correctional Treatment Specialists

(0*NET 21-1092.00)

Significant Points

- State and local governments employ most workers.
- A bachelor's degree in social work, criminal justice, or a related field usually is required.
- Employment growth, which is projected to be about as fast as average, depends on government funding.

Nature of the Work

Many people who are convicted of crimes are placed on probation, instead of being sent to prison. During probation, offenders must stay out of trouble and meet various other requirements. *Probation officers*, who are called community supervision officers in some States, supervise people who have been placed on probation. *Correctional treatment specialists*, who may also be known as case managers, counsel prison inmates and help them plan for their release from incarceration.

Parole officers and *pretrial services officers* perform many of the same duties that probation officers perform. However, parole officers supervise offenders who have been released from prison on parole to ensure that they comply with the conditions of their parole. In some States, the job of parole and probation officer is combined. Pretrial services officers conduct pretrial investigations of criminal suspects when they are arrested by police. Their findings help to determine whether a suspect should be released before their trial. When suspects are released before their trial, pretrial services officers have the responsibility of supervising them to make sure they adhere to the terms of their release and that they show up for their trial. Occasionally, in the Federal courts system, probation officers perform the functions of pretrial services officers.

Probation officers supervise offenders on probation or parole through personal contact with the offenders and their families. Instead of requiring offenders to meet officers in their offices, many officers meet offenders in their homes and at their places of employment or therapy. Probation and parole agencies also seek the assistance of community organizations, such as religious institutions, neighborhood groups, and local residents, to monitor the behavior of many offenders. Some offenders are required to wear an electronic device so that probation officers can monitor their location and movements. Officers may arrange for offenders to get substance abuse rehabilitation or job training. Probation officers usually work with either adults or juveniles exclusively. Only in small, usually rural, jurisdictions do probation officers counsel both adults and juveniles.

Probation officers also spend much of their time working for the courts. They investigate the background of offenders brought before the court, write presentence reports, and make sentencing recommendations for each offender. Officers review sentencing recommendations with offenders and their families before submitting them to the court. Officers may be required to testify in court as to their findings and recommendations. They also attend court hearings to update the court on the offender's compliance with the terms of his or her sentence and on the offender's efforts at rehabilitation.

Correctional treatment specialists work in correctional institutions (jails and prisons) or in parole or probation agencies. In jails and prisons, they evaluate the progress of inmates. They also work with inmates, probation officers, and other agencies to develop parole and release plans. Their case reports are provided to the appropriate parole board when their clients are eligible for release. In addition, they plan education and training programs to improve offenders' job skills and provide them with coping, anger management, and drug or sexual abuse counseling either individually or in groups. They usually write treatment plans and summaries for each client. Correctional treatment specialists working in parole and probation agencies perform many of the same duties as their counterparts who work in correctional institutions.

The number of cases a probation officer or correctional treatment specialist handles at one time depends on the needs of offenders and the risks they pose. Higher risk offenders and those who need more counseling usually command more of the officer's time and resources. Caseload size also varies by agency jurisdiction. Consequently, officers may handle from 20 to more than 100 active cases at a time.

Computers, telephones, and fax machines enable the officers to handle the caseload. Probation officers may telecommute from their own homes. Other technological advancements, such as electronic monitoring devices and drug screening, also have assisted probation officers and correctional treatment specialists in supervising and counseling offenders.

Working Conditions

Probation officers and correctional treatment specialists work with criminal offenders, some of whom may be dangerous. In the course of supervising offenders, they usually interact with many other individuals, such as family members and friends of their clients, who may be angry, upset, or difficult to work with. Workers may be assigned to fieldwork in high crime areas or in institutions where there is a risk of violence or communicable disease. Probation officers and correctional treatment specialists are required to meet many deadlines, most of which are imposed by courts, which contributes to their heavy workloads.

In addition, extensive travel and fieldwork may be required to meet with offenders who are on probation or parole. Workers may be required to carry a firearm or other weapon for protection. They generally work a 40-hour workweek, but some may

Through personal contact with offenders and their families, probation officers supervise offenders who are on probation or parole.

work longer. They may be on call 24 hours a day to supervise and assist offenders at any time. They also may be required to collect and transport urine samples of offenders for drug testing. All of these factors make for a stressful work environment. Although the high stress levels can make these jobs very difficult at times, this work also can be very rewarding. Many workers obtain personal satisfaction from counseling members of their community and helping them become productive citizens.

Employment

Probation officers and correctional treatment specialists held about 84,000 jobs in 2002. Most jobs are found in State or local governments. In some States, the State government employs all probation officers and correctional treatment specialists; in other States, local governments are the only employers. In still other States, both levels of government employ these workers. Jobs are more plentiful in urban areas. Probation officers and correctional treatment specialists who work for the Federal Government are employed by the U.S. courts and the U.S. Department of Justice's Bureau of Prisons.

Training, Other Qualifications, and Advancement

Background qualifications for probation officers and correctional treatment specialists vary by State, but a bachelor's degree in social work, criminal justice, or a related field from a 4-year college or university is usually required. Some employers require previous experience or a master's degree in criminal justice, social work, psychology, or a related field.

Applicants usually are administered written, oral, psychological, and physical examinations. Most probation officers and some correctional treatment specialists are required to complete a training program sponsored by their State government or the Federal Government, after which a certification test may be required.

Prospective probation officers or correctional treatment specialists should be in good physical and emotional condition. Most agencies require applicants to be at least 21 years old and, for Federal employment, not older than 37. Those convicted of felonies may not be eligible for employment in this occupation. Familiarity with the use of computers often is required due to the increasing use of computer technology in probation and parole work. Candidates also should be knowledgeable about laws and regulations pertaining to corrections. Probation officers and correctional treatment specialists should possess strong writing skills due to the large numbers of reports they are required to prepare.

Most probation officers and correctional treatment specialists work as trainees or on a probationary period for up to a year. After successfully completing the training period, workers obtain a permanent position. A typical agency has several levels of probation and parole officers and correctional treatment specialists, as well as supervisors. A graduate degree, such as a master's degree in criminal justice, social work, or psychology, may be helpful for advancement.

Job Outlook

Employment of probation officers and correctional treatment specialists is projected to grow about as fast as the average for all occupations through 2012. In addition to openings due to growth, many openings will be created by replacement needs, especially openings due to the large number of these workers who are expected to retire over the 2002-12 projection period. This occupation is not attractive to some potential entrants due to relatively low earnings, heavy workloads, and high stress.

Vigorous law enforcement is expected to result in a continuing increase in the prison population. Overcrowding in prisons also has increased the probation population, as judges and prosecutors search for alternate forms of punishment, such as electronic monitoring and day reporting centers. The number of offenders released on parole also is expected to increase to create room in prison for other offenders. The increasing prison, parole, and probation populations should spur demand for probation and parole officers and correctional treatment specialists. However, the job outlook depends primarily on the amount of government funding that is allocated to corrections, and especially to probation systems. Although community supervision is far less expensive than keeping offenders in prison, a change in political trends toward more imprisonment and away from community supervision could result in reduced employment opportunities.

Earnings

Median annual earnings of probation officers and correctional treatment specialists in 2002 were $38,360. The middle 50 percent earned between $30,770 and $50,550. The lowest 10 percent earned less than $25,810, and the highest 10 percent earned more than $62,520. In 2002, median annual earnings for probation officers and correctional treatment specialists employed in State government were $38,720; those employed in local government earned $39,450. Higher wages tend to be found in urban areas.

Related Occupations

Probation officers and correctional treatment specialists counsel criminal offenders as they reenter society. Other occupations that involve similar responsibilities include social workers, social and human service assistants, and counselors.

Probation officers and correctional treatment also play a major role in maintaining public safety. Other occupations related to corrections and law enforcement include police and detectives, correctional officers, and firefighting occupations.

Sources of Additional Information

For information about criminal justice job opportunities in your area, contact your State's Department of Corrections, Criminal Justice, or Probation.

Further information about probation officers and correctional treatment specialists is available from:

➤ American Probation and Parole Association, P.O. Box 11910, Lexington, KY 40578. Internet: **http://www.appa-net.org**

➤ American Correctional Association, 4380 Forbes Blvd., Lanham, MD 20706. Internet: **http://www.aca.org**

Social and Human Service Assistants

(0*NET 21-1093.00)

Significant Points

- While a bachelor's degree usually is not required, employers increasingly seek individuals with relevant work experience or education beyond high school.
- Employment is projected to grow much faster than average.
- Job opportunities should be excellent, particularly for applicants with appropriate postsecondary education, but pay is low.

Nature of the Work

Social and human service assistant is a generic term for people with a wide array of job titles, including human service worker, case management aide, social work assistant, community support worker, mental health aide, community outreach worker, life skill counselor, or gerontology aide. They usually work under the direction of professionals from a variety of fields, such as nursing, psychiatry, psychology, rehabilitative or physical therapy, or social work. The amount of responsibility and supervision they are given varies a great deal. Some have little direct supervision; others work under close direction.

Social and human service assistants provide direct and indirect client services to ensure that individuals in their care reach their maximum level of functioning. They assess clients' needs, establish their eligibility for benefits and services such as food stamps, Medicaid, or welfare, and help to obtain them. They also arrange for transportation and escorts, if necessary, and provide emotional support. Social and human service assistants monitor and keep case records on clients and report progress to supervisors and case managers.

Social and human service assistants play a variety of roles in a community. They may organize and lead group activities, assist clients in need of counseling or crisis intervention, or administer a food bank or emergency fuel program. In halfway houses, group homes, and government-supported housing programs, they assist adults who need supervision with personal hygiene and daily living skills. They review clients' records, ensure that they take correct doses of medication, talk with family members, and confer with medical personnel and other caregivers to gain better insight into clients' backgrounds and needs. Social and human service assistants also provide emotional support and help clients become involved in their own well-being, in community recreation programs, and in other activities.

In psychiatric hospitals, rehabilitation programs, and outpatient clinics, social and human service assistants work with professional care providers, such as psychiatrists, psychologists, and social workers, to help clients master everyday living skills, communicate more effectively, and get along better with others. They support the client's participation in a treatment plan, such as individual or group counseling or occupational therapy.

Working Conditions

Working conditions of social and human service assistants vary. Some work in offices, clinics, and hospitals, while others work in group homes, shelters, sheltered workshops, and day programs. Many spend their time in the field visiting clients. Most work a 40-hour week, although some work in the evening and on weekends.

The work, while satisfying, can be emotionally draining. Understaffing and relatively low pay may add to the pressure. Turnover is reported to be high, especially among workers without academic preparation for this field.

Employment

Social and human service assistants held about 305,000 jobs in 2002. More than half worked in the health care and social assistance industries. Almost one third were employed by State and local governments, primarily in public welfare agencies and facilities for mentally disabled and developmentally challenged individuals.

Training, Other Qualifications, and Advancement

While a bachelor's degree usually is not required for entry into this occupation, employers increasingly seek individuals with relevant work experience or education beyond high school. Certificates or associate degrees in subjects such as social work, human services, gerontology, or one of the social or behavioral sciences meet most employers' requirements. Some jobs may require a bachelor's or master's degree in human services or a related field such as counseling, rehabilitation, or social work.

Human services degree programs have a core curriculum that trains students to observe patients and record information, conduct patient interviews, implement treatment plans, employ problem-solving techniques, handle crisis intervention matters, and use proper case management and referral procedures. General education courses in liberal arts, sciences, and the humanities also are part of the curriculum. Many degree programs require completion of a supervised internship.

Educational attainment often influences the kind of work employees may be assigned and the degree of responsibility that may be entrusted to them. For example, workers with no more than a high school education are likely to receive extensive on-the-job training to work in direct-care services, while employees with a college degree might be assigned to do supportive counseling, coordinate program activities, or manage a group home. Social and human service assistants with proven leadership ability, either from previous experience or as a volunteer in the field, often have greater autonomy in their work.

Social and human service assistants provide direct and indirect client services to ensure that individuals in their care reach their maximum level of functioning.

Regardless of the academic or work background of employees, most employers provide some form of inservice training, such as seminars and workshops, to their employees.

There may be additional hiring requirements in group homes. For example, employers may require employees to have a valid driver's license or to submit to a criminal background investigation.

Employers try to select applicants who have effective communication skills, a strong sense of responsibility, and the ability to manage time effectively. Many human services jobs involve direct contact with people who are vulnerable to exploitation or mistreatment; therefore, patience, understanding, and a strong desire to help others are highly valued characteristics.

Formal education almost always is necessary for advancement. In general, advancement requires a bachelor's or master's degree in human services, counseling, rehabilitation, social work, or a related field.

Job Outlook

Job opportunities for social and human service assistants are expected to be excellent, particularly for applicants with appropriate postsecondary education. The number of social and human service assistants is projected to grow much faster than the average for all occupations between 2002 and 2012—ranking the occupation among the most rapidly growing. Many additional job opportunities will arise from the need to replace workers who advance into new positions, retire, or leave the workforce for other reasons. There will be more competition for jobs in urban areas than in rural areas, but qualified applicants should have little difficulty finding employment. Faced with rapid growth in the demand for social and human services many employers increasingly rely on social and human service assistants to undertake greater responsibility for delivering services to clients.

Opportunities are expected to be good in private social service agencies, which provide such services as adult daycare and meal delivery programs. Employment in private agencies will grow as State and local governments continue to contract out services to the private sector in an effort to cut costs. Demand for social services will expand with the growing elderly population, who are more likely to need these services. In addition, more social and human service assistants will be needed to provide services to pregnant teenagers, the homeless, the mentally disabled and developmentally challenged, and substance abusers. Some private agencies have been employing more social and human service assistants in place of social workers, who are more educated and, thus, more highly paid.

Job training programs also are expected to require additional social and human service assistants. As social welfare policies shift focus from benefit-based programs to work-based initiatives, there will be more demand for people to teach job skills to the people who are new to, or returning to, the workforce.

Residential care establishments should face increased pressures to respond to the needs of the mentally and physically disabled. Many of these patients have been deinstitutionalized and lack the knowledge or the ability to care for themselves. Also, more community-based programs, supported independent-living sites, and group residences are expected to be established to house and assist the homeless and the mentally and physically disabled. As substance abusers are increasingly being sent to treatment programs instead of prison, employment of social and human service assistants in substance abuse treatment programs also will grow.

The number of jobs for social and human service assistants in State and local governments will grow but not as fast as employment for social and human service assistants in other industries. Employment in the public sector may fluctuate with the level of funding provided by State and local governments. Also, some State and local governments are contracting out selected social services to private agencies in order to save money.

Earnings

Median annual earnings of social and human service assistants were $23,370 in 2002. The middle 50 percent earned between $18,670 and $29,520. The top 10 percent earned more than $37,550, while the lowest 10 percent earned less than $15,420.

Median annual earnings in the industries employing the largest numbers of social and human service assistants in 2002 were:

State government	$31,280
Local government	26,570
Individual and family services	22,210
Community food and housing, and emergency and other relief services	21,840
Residential mental retardation, mental health and substance abuse facilities	20,010

Related Occupations

Workers in other occupations that require skills similar to those of social and human service assistants include social workers; clergy; counselors; childcare workers; occupational therapist assistants and aides; physical therapist assistants and aides; and nursing, psychiatric, and home health aides.

Sources of Additional Information

Information on academic programs in human services may be found in most directories of 2- and 4-year colleges, available at libraries or career counseling centers.

For information on programs and careers in human services, contact:

➤ National Organization for Human Service Education, 375 Myrtle Ave., Brooklyn, NY 11205. Internet: **http://www.nohse.org**

➤ Council for Standards in Human Services Education, Harrisburg Area Community College, Human Services Program, One HACC Dr., Harrisburg, PA 17110-2999. Internet: **http://www.cshse.org**

Information on job openings may be available from State employment service offices or directly from city, county, or State departments of health, mental health and mental retardation, and human resources.

Social Workers

(0*NET 21-1021.00, 21-1022.00, 21-1023.00)

Significant Points

- While a bachelor's degree is the minimum requirement, a master's degree in social work or a related field has become the standard for many positions.
- Employment is projected to grow faster than average.
- Competition for jobs is expected in cities, but opportunities should be good in rural areas.

Nature of the Work

Social work is a profession for those with a strong desire to help improve people's lives. Social workers help people function the best way they can in their environment, deal with their relationships, and solve personal and family problems. Social workers often see clients who face a life-threatening disease or a social problem. These problems may include inadequate housing, unemployment, serious illness, disability, or substance abuse. Social workers also assist families that have serious domestic conflicts, including those involving child or spousal abuse.

Social workers often provide social services in health-related settings that now are governed by managed care organizations. To contain costs, these organizations are emphasizing short-term intervention, ambulatory and community-based care, and greater decentralization of services.

Most social workers specialize. Although some conduct research or are involved in planning or policy development, most social workers prefer an area of practice in which they interact with clients.

Child, family, and school social workers provide social services and assistance to improve the social and psychological functioning of children and their families and to maximize the family well-being and academic functioning of children. Some social workers assist single parents; arrange adoptions; and help find foster homes for neglected, abandoned, or abused children. In schools, they address such problems as teenage pregnancy, misbehavior, and truancy. They also advise teachers on how to cope with problem students. Some social workers may specialize in services for senior citizens. They run support groups for family caregivers or for the adult children of aging parents. Some advise elderly people or family members about choices in areas such as housing, transportation, and long-term care; they also coordinate and monitor services. Through employee assistance programs, they may help workers cope with job-related pressures or with personal problems that affect the quality of their work. Child, family, and school social workers typically work in individual and family services agencies, schools, or State or local governments. These social workers may be known as child welfare social workers, family services social workers, child protective services social workers, occupational social workers, or gerontology social workers.

Medical and public health social workers provide persons, families, or vulnerable populations with the psychosocial support needed to cope with chronic, acute, or terminal illnesses, such as Alzheimer's disease, cancer, or AIDS. They also advise family caregivers, counsel patients, and help plan for patients' needs after discharge by arranging for at-home services—from meals-on-wheels to oxygen equipment. Some work on interdisciplinary teams that evaluate certain kinds of patients—geriatric or organ transplant patients, for example. Medical and public health social workers may work for hospitals, nursing and personal care facilities, individual and family services agencies, or local governments.

Mental health and substance abuse social workers assess and treat individuals with mental illness, or substance abuse problems, including abuse of alcohol, tobacco, or other drugs. Such services include individual and group therapy, outreach, crisis intervention, social rehabilitation, and training in skills of everyday living. They may also help plan for supportive services to ease patients' return to the community. Mental health and substance abuse social workers are likely to work in hospitals, substance abuse treatment centers, individual and family services agencies, or local governments. These social workers may be known as clinical social workers. (Counselors and psychologists, who may provide similar services, are discussed elsewhere in the *Handbook*.)

Other types of social workers include social work planners and policymakers, who develop programs to address such issues as child abuse, homelessness, substance abuse, poverty, and violence. These workers research and analyze policies, programs, and regulations. They identify social problems and suggest legislative and other solutions. They may help raise funds or write grants to support these programs.

Working Conditions

Full-time social workers usually work a standard 40-hour week; however, some occasionally work evenings and weekends to meet with clients, attend community meetings, and handle emergencies. Some, particularly in voluntary nonprofit agencies, work part time. Social workers usually spend most of their time in an office or residential facility, but also may travel locally to visit clients, meet with service providers, or attend meetings. Some may use one of several offices within a local area in which to meet with clients. The work, while satisfying, can be emotionally draining. Understaffing and large caseloads add to the pressure in some agencies. To tend to patient care or client needs, many hospitals and long-term care facilities are employing social workers on teams with a broad mix of occupations—including clinical specialists, registered nurses, and health aides.

Social workers often see clients who face inadequate housing, unemployment, serious illness, disability, or substance abuse.

Employment

Social workers held about 477,000 jobs in 2002. About 4 out of 10 jobs were in State or local government agencies, primarily in departments of health and human services. Most private sector jobs were in the health care and social assistance industry. Although most social workers are employed in cities or suburbs, some work in rural areas. The following tabulation shows 2002 employment by type of social worker.

Child, family, and school social workers	274,000
Medical and public health social workers	107,000
Mental health and substance abuse social workers	95,000

Training, Other Qualifications, and Advancement

A bachelor's degree in social work (BSW) degree is the most common minimum requirement to qualify for a job as a social worker; however, majors in psychology, sociology, and related fields may be adequate to qualify for some entry-level jobs, especially in small community agencies. Although a bachelor's degree is sufficient for entry into the field, an advanced degree has become the standard for many positions. A master's degree in social work (MSW) is typically required for positions in health settings and is required for clinical work. Some jobs in public and private agencies also may require an advanced degree, such as a master's degree in social services policy or administration. Supervisory, administrative, and staff training positions usually require an advanced degree. College and university teaching positions and most research appointments normally require a doctorate in social work (DSW or Ph.D.).

As of 2002, the Council on Social Work Education (CSWE) accredited 436 BSW programs and 149 MSW programs. The Group for the Advancement of Doctoral Education (GADE) listed 78 doctoral programs in social work (DSW or Ph.D.). BSW programs prepare graduates for direct service positions such as caseworker. They include courses in social work values and ethics, dealing with a culturally diverse clientele, at-risk-populations, promotion of social and economic justice, human behavior and the social environment, social welfare policy and services, social work practice, social research methods, and field education. Accredited BSW programs require a minimum of 400 hours of supervised field experience.

Master's degree programs prepare graduates for work in their chosen field of concentration and continue to develop the skills required to perform clinical assessments, manage large caseloads, and explore new ways of drawing upon social services to meet the needs of clients. Master's programs last 2 years and include a minimum of 900 hours of supervised field instruction, or internship. A part-time program may take 4 years. Entry into a master's program does not require a bachelor's in social work, but courses in psychology, biology, sociology, economics, political science, and social work are recommended. In addition, a second language can be very helpful. Most master's programs offer advanced standing for those with a bachelor's degree from an accredited social work program.

All States and the District of Columbia have licensing, certification, or registration requirements regarding social work practice and the use of professional titles. Although standards for licensing vary by State, a growing number of States are placing greater emphasis on communications skills, professional ethics, and sensitivity to cultural diversity issues. Additionally, the National Association of Social Workers (NASW) offers voluntary credentials. Social workers with an MSW may be eligible for the Academy of Certified Social Workers (ACSW), the Qualified Clinical Social Worker (QCSW), or the Diplomate in Clinical Social Work (DCSW) credential based on their professional experience. Credentials are particularly important for those in private practice; some health insurance providers require social workers to have them in order to be reimbursed for services.

Social workers should be emotionally mature, objective, and sensitive to people and their problems. They must be able to handle responsibility, work independently, and maintain good working relationships with clients and coworkers. Volunteer or paid jobs as a social work aide offer ways of testing one's interest in this field.

Advancement to supervisor, program manager, assistant director, or executive director of a social service agency or department is possible, but usually requires an advanced degree and related work experience. Other career options for social workers include teaching, research, and consulting. Some of these workers also help formulate government policies by analyzing and advocating policy positions in government agencies, in research institutions, and on legislators' staffs.

Some social workers go into private practice. Most private practitioners are clinical social workers who provide psychotherapy, usually paid for through health insurance or by the client themselves. Private practitioners must have at least a master's degree and a period of supervised work experience. A network of contacts for referrals also is essential. Many private practitioners work part time while they work full time elsewhere.

Job Outlook

Competition for social worker jobs is stronger in cities, where demand for services often is highest and training programs for social workers are prevalent. However, opportunities should be good in rural areas, which often find it difficult to attract and retain qualified staff. By specialty, job prospects may be best for those social workers with a background in gerontology and substance abuse treatment.

Employment of social workers is expected to increase faster than the average for all occupations through 2012. The rapidly growing elderly population and the aging baby boom generation will create greater demand for health and social services, resulting in particularly rapid job growth among gerontology social workers. Many job openings also will stem from the need to replace social workers who leave the occupation.

As hospitals continue to limit the length of patient stays, the demand for social workers in hospitals will grow more slowly than in other areas. Because hospitals are releasing patients earlier than in the past, social worker employment in home healthcare services is growing. However, the expanding senior population is an even larger factor. Employment opportunities for social workers with backgrounds in gerontology should be good in the growing numbers of assisted-living and senior-living communities. The expanding senior population will also spur demand for social workers in nursing homes, long-term care facilities, and hospices.

Employment of substance abuse social workers will grow rapidly over the 2002-12 projection period. Substance abusers are increasingly being placed into treatment programs instead of being sentenced to prison. As this trend grows, demand will increase for treatment programs and social workers to assist abusers on the road to recovery.

Employment of social workers in private social service agencies will increase. However, agencies increasingly will restructure services and hire more lower-paid social and human service

assistants instead of social workers. Employment in State and local government agencies may grow somewhat in response to increasing needs for public welfare, family services, and child protection services; however, many of these services will be contracted out to private agencies. Employment levels in public and private social services agencies may fluctuate, depending on need and government funding levels.

Employment of school social workers also is expected to steadily grow. Expanded efforts to respond to rising student enrollments and continued emphasis on integrating disabled children into the general school population may lead to more jobs. Availability of State and local funding will be a major factor in determining the actual job growth in schools.

Opportunities for social workers in private practice will expand but growth may be somewhat hindered by restrictions that managed care organizations put on mental health services. The growing popularity of employee assistance programs is expected to spur some demand for private practitioners, some of whom provide social work services to corporations on a contractual basis. However, the popularity of employee assistance programs will fluctuate with the business cycle, as businesses are not likely to offer these services during recessions.

Earnings

Median annual earnings of child, family, and school social workers were $33,150 in 2002. The middle 50 percent earned between $26,310 and $42,940. The lowest 10 percent earned less than $21,270, and the top 10 percent earned more than $54,250. Median annual earnings in the industries employing the largest numbers of child, family, and school social workers in 2002 were:

Elementary and secondary schools	$44,100
Local government	38,140
State government	34,000
Individual and family services	29,150
Other residential care facilities	28,470

Median annual earnings of medical and public health social workers were $37,380 in 2002. The middle 50 percent earned between $29,700 and $46,540. The lowest 10 percent earned less than $23,840, and the top 10 percent earned more than $56,320. Median annual earnings in the industries employing the largest numbers of medical and public health social workers in 2002 were:

General medical and surgical hospitals	$42,730
Local government	37,620
State government	35,250
Nursing care facilities	33,330
Individual and family services	31,000

Median annual earnings of mental health and substance abuse social workers were $32,850 in 2002. The middle 50 percent earned between $25,940 and $42,160. The lowest 10 percent earned less than $21,050, and the top 10 percent earned more than $52,240. Median annual earnings in the industries employing the largest numbers of mental health and substance abuse social workers in 2002 were:

State government	$38,430
Local government	35,700
Psychiatric and substance abuse hospitals	34,610
Outpatient care centers	31,370
Individual and family services	31,300

Related Occupations

Through direct counseling or referral to other services, social workers help people solve a range of personal problems. Workers in occupations with similar duties include the clergy, counselors, probation officers and correctional treatment specialists, psychologists, and social and human services assistants.

Sources of Additional Information

For information about career opportunities in social work and voluntary credentials for social workers, contact:

➤ National Association of Social Workers, 750 First St. NE., Suite 700, Washington, DC 20002-4241. Internet: **http://www.socialworkers.org**

For a listing of accredited social work programs, contact:

➤ Council on Social Work Education, 1725 Duke St., Suite 500, Alexandria, VA 22314-3457. Internet: **http://www.cswe.org**

Information on licensing requirements and testing procedures for each State may be obtained from State licensing authorities, or from:

➤ Association of Social Work Boards, 400 South Ridge Pkwy., Suite B, Culpeper, VA 22701. Internet: **http://www.aswb.org**

Teacher Assistants

(0*NET 25-9041.00)

Significant Points

- About 4 in 10 teacher assistants work part time.
- Educational requirements range from a high school diploma to some college training.
- Workers with experience in special education, or who can speak a foreign language, will be especially in demand.

Nature of the Work

Teacher assistants provide instructional and clerical support for classroom teachers, allowing teachers more time for lesson planning and teaching. Teacher assistants tutor and assist children in learning class material using the teacher's lesson plans, providing students with individualized attention. Teacher assistants also supervise students in the cafeteria, schoolyard, and hallways, or on field trips. They record grades, set up equipment, and help prepare materials for instruction. Teacher assistants also are called teacher aides or instructional aides. Some assistants refer to themselves as paraeducators or paraprofessionals.

Some teacher assistants perform exclusively noninstructional or clerical tasks, such as monitoring nonacademic settings. Playground and lunchroom attendants are examples of such assistants. Most teacher assistants, however, perform a combination of instructional and clerical duties. They generally provide instructional reinforcement to children, under the direction and guidance of teachers. They work with students individually or in small groups—listening while students read, reviewing or reinforcing class lessons, or helping them find information for reports. At the secondary school level, teacher assistants often specialize in a certain subject, such as math or science. Teacher assistants often take charge of special projects and prepare equipment or exhibits, such as for a science demonstration. Some assistants work in computer laboratories, helping students using computers and educational software programs.

In addition to instructing, assisting, and supervising students, teacher assistants grade tests and papers, check homework, keep health and attendance records, do typing and filing, and duplicate materials. They also stock supplies, operate audiovisual equipment, and keep classroom equipment in order.

Many teacher assistants work extensively with special education students. As schools become more inclusive, integrating special education students into general education classrooms, teacher assistants in general education and special education classrooms increasingly assist students with disabilities. Teacher assistants attend to a disabled student's physical needs, including feeding, teaching good grooming habits, or assisting students riding the schoolbus. They also provide personal attention to students with other special needs, such as those from disadvantaged families, those who speak English as a second language, or those who need remedial education. Teacher assistants help assess a student's progress by observing performance and recording relevant data.

Teacher assistants also work with infants and toddlers who have developmental delays or other disabilities. Under the guidance of a teacher or therapist, teacher assistants perform exercises or play games to help the child develop physically and behaviorally. Some teacher assistants work with young adults to help them obtain a job or to apply for community services for the disabled.

Working Conditions

Approximately 4 in 10 teacher assistants work part time. However, even among full-time workers, nearly 40 percent work less than 8 hours per day. Most assistants who provide educational instruction work the traditional 9- to 10-month school year. Teacher assistants work in a variety of settings—including private homes and preschools, and local government offices, where they would deal with young adults—but most work in classrooms in elementary, middle, and secondary schools. They also work outdoors supervising recess when weather allows, and they spend much of their time standing, walking, or kneeling.

Seeing students develop and gain appreciation of the joy of learning can be very rewarding. However, working closely with students can be both physically and emotionally tiring. Teacher assistants who work with special education students often perform more strenuous tasks, including lifting, as they help students with their daily routine. Those who perform clerical work may tire of administrative duties, such as copying materials or typing.

Employment

Teacher assistants held almost 1.3 million jobs in 2002. Nearly 3 in 4 work for State and local government education institutions; mostly at the preschool and elementary school level. Private schools, daycare centers, and religious organizations hire most of the rest.

Training, Other Qualifications, and Advancement

Educational requirements for teacher assistants vary by State or school district and range from a high school diploma to some college training, although employers increasingly prefer applicants with some college training. Teacher assistants with instructional responsibilities usually require more training than do those who do not perform teaching tasks. In addition, as a

Teacher assistants provide students with individual attention.

result of the No Child Left Behind Act of 2001, teacher assistants in Title 1 schools—those with a large proportion of students from low-income households—will be required to meet one of three requirements: have a minimum of 2 years of college, hold a 2-year or higher degree, or pass a rigorous state and local assessment. Many schools also require previous experience in working with children and a valid driver's license. Some schools may require the applicant to pass a background check.

A number of 2-year and community colleges offer associate degree programs that prepare graduates to work as teacher assistants. However, most teacher assistants receive on-the-job training. Those who tutor and review lessons with students must have a thorough understanding of class materials and instructional methods, and should be familiar with the organization and operation of a school. Teacher assistants also must know how to operate audiovisual equipment, keep records, and prepare instructional materials, as well as have adequate computer skills.

Teacher assistants should enjoy working with children from a wide range of cultural backgrounds, and be able to handle classroom situations with fairness and patience. Teacher assistants also must demonstrate initiative and a willingness to follow a teacher's directions. They must have good writing skills and be able to communicate effectively with students and teachers. Teacher assistants who speak a second language, especially Spanish, are in great demand for communicating with growing numbers of students and parents whose primary language is not English.

Advancement for teacher assistants—usually in the form of higher earnings or increased responsibility—comes primarily with experience or additional education. Some school districts provide time away from the job or tuition reimbursement so that teacher assistants can earn their bachelor's degrees and pursue licensed teaching positions. In return for tuition reimbursement, assistants are often required to teach a certain length of time for the school district.

Job Outlook

Employment of teacher assistants is expected to grow somewhat faster than the average for all occupations through 2012. Although school enrollments are projected to increase only slowly over the next decade, the student population for which teacher assistants are most needed—special education students and students for whom English is not their first language—is expected to increase more rapidly than the general school-age population. Legislation that requires students with disabilities and non-native English speakers to receive an education "equal" to that of other students, will generate jobs for teacher assistants to accommodate these students' special needs. Children with special needs require much personal attention, and special education teachers, as well as general education teachers with special education students, rely heavily on teacher assistants.

Additionally, a greater focus on educational quality and accountability, as required by the No Child Left Behind Act, is likely to lead to an increased demand for teacher assistants. Growing numbers of teacher assistants will be needed to help teachers prepare students for standardized testing and to provide extra assistance to students who perform poorly on standardized tests. An increasing number of afterschool programs and summer programs also will create new opportunities for teacher assistants. In addition to those stemming from employment growth, numerous job openings will arise as assistants transfer to other occupations or leave the labor force to assume family responsibilities, to return to school, or for other reasons characteristic of occupations that require limited formal education and offer relatively low pay.

Opportunities for teacher assistant jobs are expected to be best for persons with at least 2 years of formal education after high school. Persons who can speak a foreign language should be in particular demand in school systems with large numbers of students whose families do not speak English at home. Demand is expected to vary by region of the country. Areas in which the population and school enrollments are expanding rapidly, such as many communities in the South and West, should have rapid growth in the demand for teacher assistants.

Earnings

Median annual earnings of teacher assistants in 2002 were $18,660. The middle 50 percent earned between $14,880 and $23,600. The lowest 10 percent earned less than $12,900, and the highest 10 percent earned more than $29,050.

Teacher assistants who work part time ordinarily do not receive benefits. Full-time workers usually receive health coverage and other benefits.

In 2002, about 3 out of 10 teacher assistants belonged to unions—mainly the American Federation of Teachers and the National Education Association—which bargain with school systems over wages, hours, and the terms and conditions of employment.

Related Occupations

Teacher assistants who instruct children have duties similar to those of preschool, kindergarten, elementary, middle, and secondary school teachers, special education teachers, and school librarians. However, teacher assistants do not have the same level of responsibility or training. The support activities of teacher assistants and their educational backgrounds are similar to those of childcare workers, library technicians, and library assistants. Teacher assistants who work with children with disabilities perform many of the same functions as occupational therapy assistants and aides.

Sources of Additional Information

For information on teacher assistants, including training and certification, contact:

➤ American Federation of Teachers, Paraprofessional and School Related Personnel Division, 555 New Jersey Ave. NW., Washington, DC 20001.

➤ National Education Association, Educational Support Personnel division, 1201 16th Street, NW | Washington, DC 20036.

For information on a career as a teacher assistant, contact:

➤ National Resource Center for Paraprofessionals, 6526 Old Main Hill, Utah State University, Logan, UT 84322. Internet: **http://www.nrcpara.org**

Human resource departments of school systems, school administrators, and State departments of education also can provide details about employment opportunities and required qualifications for teacher assistant jobs.

Teachers—Adult Literacy and Remedial and Self-Enrichment Education

(0*NET 25-3011.00, 25-3021.00)

Significant Points

- Many adult literacy and remedial and self-enrichment teachers work part time and receive no benefits; unpaid volunteers also teach these subjects.
- Opportunities for teachers of English as a second language are expected to be very good, due to the expected increase in the number of residents with limited English skills who seek classes.
- Demand for self-enrichment courses is expected to rise with growing numbers of people who embrace lifelong learning and of retirees who have more free time to take classes.

Nature of the Work

Self-enrichment teachers teach courses that students take for pleasure or personal enrichment; these classes are not usually intended to lead to a particular degree or vocation. Self-enrichment teachers may instruct children or adults in a wide variety of areas, such as cooking, dancing, creative writing, photography, or personal finance. In contrast, *adult literacy and remedial education teachers* provide adults and out-of-school youths with the education they need to read, write, and speak English and to perform elementary mathematical calculations—basic skills that equip them to solve problems well enough to become active participants in our society, to hold a job, and to further their education. The instruction provided by these teachers can be divided into three principle categories: *remedial or adult basic education (ABE)*, which is geared toward adults whose skills are either at or below an eighth-grade level; *adult secondary education (ASE)*, which is geared towards students who wish to obtain their General Educational Development (GED) certificate or other high school equivalency credential; and *English literacy*, which provides instruction for adults with limited proficiency in English. Traditionally, the students in adult literacy and remedial (basic) education classes were made up primarily of those who did not graduate high school or who passed through school without the knowledge needed to meet their educational goals or to participate fully in today's high-skill society. Increasingly, however, students in these classes are immigrants or other people whose native language is not English. Educators who work with adult English-language learners are usually called *teachers of English as a second language* (*ESL*) or *teachers of English to speakers of other languages* (*ESOL*).

Self-enrichment teachers, due to the wide range of classes and subjects they teach, may have styles and methods of instruction that differ greatly. The majority of self-enrichment classes are relatively informal and nonintensive in terms of instructional demands. Some classes, such as pottery or sewing, may be largely hands-on, requiring students to practice doing things themselves in order to learn. In that case, teachers may demonstrate methods or techniques for their class and subsequently supervise students' progress as they attempt to carry out the same or similar tasks or actions. Other classes, such as those involving financial planning or religion and spirituality, may be somewhat more academic in nature. Teachers of these classes are likely to rely more heavily on lectures and group discussions as methods of instruction. Classes offered through religious institutions, such as marriage preparation or classes in religion for children, may also be taught by self-enrichment teachers.

Many of the classes that self-enrichment educators teach are shorter in duration than classes taken for academic credit; some finish in 1 or 2 days to several weeks. These brief classes tend to be introductory in nature and generally focus on only one topic—for example, a cooking class that teaches students how to make bread. Some self-enrichment classes introduce children and youths to activities such as piano or drama, and may be designed to last anywhere from 1 week to several months. These and other self-enrichment classes may be scheduled to occur after school or during school vacations.

Remedial education teachers, more commonly called adult basic education teachers, teach basic academic courses in mathematics, languages, history, reading, writing, science, and other areas, using instructional methods geared toward adult learning. They teach these subjects to students 16 years of age and older who demonstrate the need to increase their skills in one or more of the subject areas mentioned. Classes are taught to appeal to a variety of learning styles and usually include large-group, small-group, and one-on-one instruction. Because the students often are at different proficiency levels for different

English literacy teachers often use real-life situations to promote learning.

subjects, adult basic education teachers must make individual assessments of each student's abilities beforehand. In many programs, the assessment is used to develop an individualized education plan for each student. Teachers are required to evaluate students periodically to determine their progress and potential for advancement to the next level.

Teachers in remedial or adult basic education may have to assist students in acquiring effective study skills and the self-confidence they need to reenter an academic environment. Teachers also may encounter students with a learning or physical disability that requires additional expertise. Teachers should possess an understanding of how to help these students achieve their goals, but they also may need to have the knowledge to detect challenges their students may have and provide them with access to a broader system of additional services that are required to address their challenges.

For students who wish to get a GED credential in order to get a job or qualify for postsecondary education, adult secondary education or GED teachers provide help in acquiring the necessary knowledge and skills to pass the test. The GED tests students in subject areas such as reading, writing, mathematics, science, and social studies, while at the same time measuring students' communication, information-processing, problem-solving, and critical-thinking skills. The emphasis in class is on acquiring the knowledge needed to pass the GED test, as well as preparing students for success in further educational endeavors.

ESOL teachers help adults to speak, listen, read, and write in English, often in the context of real-life situations to promote learning. More advanced students may concentrate on writing and conversational skills or focus on learning more academic or job-related communication skills. ESOL teachers teach adults who possess a wide range of cultures and abilities and who speak a variety of languages. Some of their students have a college degree and many advance quickly through the program owing to a variety of factors, such as their age, previous language experience, educational background, and native language. Others may need additional time due to these same factors. Because the teacher and students often do not share a common language, creativity is an important part of fostering communication in the classroom and achieving learning goals.

All adult literacy, remedial, and self-enrichment teachers must prepare lessons beforehand, do any related paperwork, and stay current in their fields. Attendance for students is mostly voluntary and course work is rarely graded. Many teachers also must learn the latest uses for computers in the classroom, as computers are increasingly being used to supplement instruction in basic skills and in teaching ESOL.

Working Conditions

A large number of adult literacy and remedial and self-enrichment education teachers work part time. Some have several part-time teaching assignments or work full time in addition to their part-time teaching job. Classes for adults are held on days and at times that best accommodate students who may have a job or family responsibilities. Similarly, self-enrichment classes for children are usually held after school or during school vacation periods.

Because many of these teachers work with adult students, they do not encounter some of the behavioral or social problems sometimes found with younger students. Adults attend by choice, are highly motivated, and bring years of experience to the classroom—attributes that can make teaching these students rewarding and satisfying. Self-enrichment teachers must have a great deal of patience, particularly when working with young children.

Employment

Teachers of adult literacy, remedial, and self-enrichment education held about 280,000 jobs in 2002. About 1 in 5 was self-employed. Many additional teachers worked as unpaid volunteers.

Nearly three-quarters, or 200,000, of the jobs were held by self-enrichment teachers. The largest numbers of these workers were employed by public and private educational institutions, religious organizations, and providers of social assistance and amusement and recreation services.

Adult literacy, basic education, and GED teachers and instructors held about 80,000 jobs. Many of the jobs are federally funded, with additional funds coming from State and local governments. The education industry employs the majority of these teachers, who work in adult learning centers, libraries, or community colleges. Others work for social service organizations such as job-training or residential care facilities. Still others work for State and local governments, providing basic education at juvenile detention and corrections institutions, among other places.

Training, Other Qualifications, and Advancement

The main qualification for self-enrichment teachers is expertise in their subject area; however, requirements may vary greatly with both the type of class taught and the place of employment. In some cases, a portfolio of one's work may be required. For example, to secure a job teaching a photography course, an applicant would need to show examples of previous work. Special certification may be required to teach some subjects, such as a Red Cross water safety instructor certificate to teach swimming. Some self-enrichment teachers are trained educators or other professionals who teach enrichment classes in their spare time. In some disciplines, such as art or music, specific teacher training programs are available. Prospective dance teachers, for example, may complete programs that prepare them to instruct any number of types of dance—from ballroom dancing to ballet. Self-enrichment teachers also should have good speaking skills and a talent for making the subject interesting. Patience and the ability to explain and instruct students at a basic level are important as well, particularly when one is working with children.

Requirements for teaching adult literacy and basic and secondary education vary by State and by program. Federally funded programs run by State and local governments require high accountability and student achievement standards. Those programs run by religious, community, or volunteer organizations, rather than State-run, federally funded programs, generally develop standards based on their own needs and organizational goals. Most State and local governments and educational institutions require that adult teachers have at least a bachelor's degree and, preferably, a master's degree. Some—especially school districts that hire adult education teachers—require an elementary or secondary school teaching certificate. A few have begun requiring a special certificate in ESOL or adult education. Teaching experience, especially with adults, also is preferred or required. Volunteers usually do not need a bachelor's degree, but often must attend a training program before they are allowed to work with students.

Most programs recommend that adult literacy and basic and secondary education teachers take classes or workshops on teach-

ing adults, using technology to teach, working with learners from a variety of cultures, and teaching adults with learning disabilities. ESOL teachers also should have courses or training in second-language acquisition theory and linguistics. In addition, knowledge of the citizenship and naturalization process may be useful. Knowledge of a second language is not necessary to teach ESOL students, but can be helpful in understanding the students' perspectives. GED teachers should know what is required to pass the GED and be able to instruct students in the subject matter. Training for literacy volunteers usually consists of instruction on effective teaching practices, needs assessment, lesson planning, the selection of appropriate instructional materials, characteristics of adult learners, and cross-cultural awareness.

Adult education and literacy teachers must have the ability to work with a variety of cultures, languages, and educational and economic backgrounds. They must be understanding and respectful of their students' circumstances and be familiar with their concerns. All teachers, both paid and volunteer, should be able to communicate well and motivate their students.

Professional development among adult education and literacy teachers varies widely. Both part-time and full-time teachers are expected to participate in ongoing professional development activities in order to keep current on new developments in the field and to enhance skills already acquired. Each State's professional development system reflects the unique needs and organizational structure of that State. Attendance by teachers at professional development workshops and other activities is often outlined in State or local policy. Some teachers are able to access professional development activities through alternative delivery systems such as the Internet or distance learning.

Opportunities for advancement in these professions, particularly for adult education and literacy teachers, again vary from State to State and program to program. Some part-time teachers are able to move into full-time teaching positions or program administrator positions, such as coordinator or director, when such vacancies occur. Others may decide to use their classroom experience to move into policy work at a nonprofit organization or with the local, State, or Federal government or to perform research. Self-enrichment teachers also may advance to administrative positions or may even go on to start their own school or program. Experienced self-enrichment teachers may mentor new instructors and volunteers.

Job Outlook

Opportunities for jobs as adult literacy, remedial, and self-enrichment education teachers are expected to be favorable. Employment is expected to grow faster than the average for all occupations through 2012, and a large number of job openings is expected, due to the need to replace people who leave the occupation or retire.

Self-enrichment education teachers account for the largest proportion of jobs in these occupations. The need for self-enrichment teachers is expected to grow as more people embrace lifelong learning and as the baby boomers begin to retire and have more time to take classes. Subjects that are not easily researched on the Internet and those that provide hands-on experiences, such as cooking, crafts, and the arts, will be in greater demand. Also, classes on spirituality and self-improvement are expected to be popular.

As employers increasingly require a more literate workforce, workers' demand for adult literacy, basic education, and secondary education classes is expected to grow. Significant employment growth is anticipated especially for ESOL teachers, who will be needed by the increasing number of immigrants and other residents living in this country who need to learn, or enhance their skills in, English. In addition, a greater proportion of these groups is expected to take ESOL classes. Demand for ESOL teachers will be greatest in States such as California, Florida, Texas, and New York, due to their large populations of residents who have limited English skills. However, parts of the Midwest and Plains States have begun to attract large numbers of immigrants, making for especially good opportunities in those areas as well.

The demand for adult literacy and basic and secondary education often fluctuates with the economy. When the economy is good and workers are hard to find, employers relax their standards and hire workers without a degree or GED or those with limited proficiency in English. As the economy softens, more students find that they need additional education to get a job. However, adult education classes often are subject to changes in funding levels, which can cause the number of teaching jobs to fluctuate from year to year. In addition, factors such as immigration policies and the relative prosperity of the United States compared with other countries may have an impact on the number of immigrants entering this country and, consequently, on the demand for ESOL teachers.

Earnings

Median hourly earnings of self-enrichment teachers were $14.09 in 2002. The middle 50 percent earned between $9.86 and $19.69. The lowest 10 percent earned less than $7.37, and the highest 10 percent earned more than $26.49. Self-enrichment teachers are generally paid by the hour or for each class that they teach.

Median hourly earnings of adult literacy, remedial education, and GED teachers and instructors were $17.50 in 2002. The middle 50 percent earned between $13.21 and $24.00. The lowest 10 percent earned less than $10.08, and the highest 10 percent earned more than $34.30. Part-time adult literacy and remedial education and GED instructors are usually paid by the hour or for each class that they teach, and receive few benefits or none at all. Full-time teachers are generally paid a salary and receive health insurance and other benefits if they work for a school system or government.

Related Occupations

The work of adult literacy, remedial, and self-enrichment teachers is closely related to that of other types of teachers, especially preschool, kindergarten, elementary school, middle school, and secondary school teachers. In addition, adult literacy and basic and secondary education teachers require a wide variety of skills and aptitudes. Not only must they be able to teach and motivate students (including, at times, those with learning disabilities), but they also must often take on roles as advisers and mentors. Workers in other occupations that require these aptitudes include special-education teachers, counselors, and social workers. Self-enrichment teachers teach a wide variety of subjects that may be related to the work done by those in many other occupations, such as dancers and choreographers; artists and related workers; musicians, singers, and related workers; recreation and fitness workers; and athletes, coaches, umpires, and related workers.

Sources of Additional Information

Information on adult literacy, basic and secondary education programs, and teacher certification requirements is available from State departments of education, local school districts, and literacy resource centers. Information also may be obtained through local religious and charitable organizations.

For information on adult education and family literacy programs, contact

➤ The U.S. Department of Education, Office of Vocational and Adult Education, 4090 MES, 400 Maryland Ave. SW., Washington, DC 20202. Internet: **http://www.ed.gov/offices/OVAE**

For information on teaching English as a second language, contact

➤ The National Center for ESL Literacy Education, 4646 40th St. NW., Washington, DC 20016. Internet: **http://www.cal.org/ncle**

Teachers—Postsecondary

(0*NET 25-1011.00, 25-1021.00, 25-1022.00, 25-1031.00, 25-1032.00, 25-1041.00, 25-1042.00, 25-1043.00, 25-1051.00, 25-1052.00, 25-1053.00, 25-1054.00, 25-1061.00, 25-1062.00, 25-1063.00, 25-1064.00, 25-1065.00, 25-1066.00, 25-1067.00, 25-1069.99, 25-1071.00, 25-1072.00, 25-1081.00, 25-1082.00, 25-1111.00, 25-1112.00, 25-1113.00, 25-1121.00, 25-1122.00, 25-1123.00, 25-1124.00, 25-1125.00, 25-1126.00, 25-1191.00, 25-1192.00, 25-1193.00, 25-1194.00, 25-1199.99)

Significant Points

- Opportunities for college and university teaching jobs are expected to improve, but many new openings will be for part-time or non-tenure-track positions.
- Prospects for teaching jobs will continue to be better in academic fields that offer attractive alternative nonacademic job opportunities—health specialties, business, and computer science, for example—which attract fewer applicants for academic positions.
- Educational qualifications for postsecondary teacher jobs range from expertise in a particular field to a Ph.D, depending on the subject being taught and the type of educational institution.
- One out of eight postsecondary teachers is a graduate teaching assistant—and one out of ten is a vocational or career and technical education teacher.

Nature of the Work

Postsecondary teachers instruct students in a wide variety of academic and vocational subjects beyond the high school level that may lead to a degree or simply to improvement in one's knowledge or skills. These teachers include college and university faculty, postsecondary career and technical education teachers, and graduate teaching assistants.

College and university faculty make up the majority of postsecondary teachers. They teach and advise more than 15 million full- and part-time college students and perform a significant part of our Nation's research. Faculty also keep up with new developments in their field and may consult with government, business, nonprofit, and community organizations.

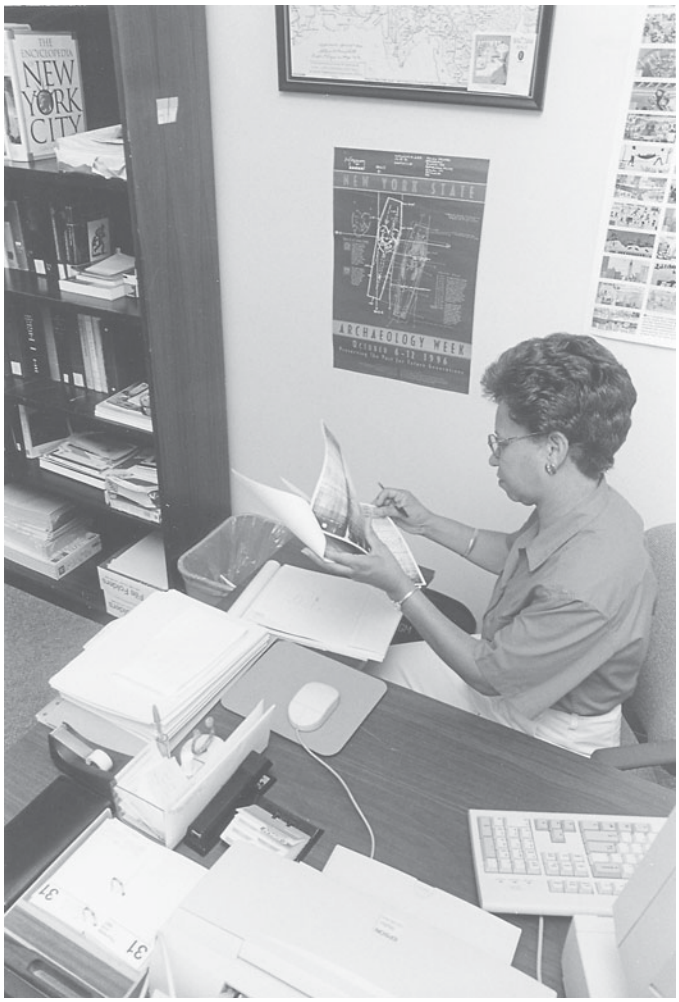
Faculty usually are organized into departments or divisions, based on academic subject or field. They usually teach several different related courses in their subject—algebra, calculus, and statistics, for example. They may instruct undergraduate or graduate students, or both. College and university faculty may give lectures to several hundred students in large halls, lead small seminars, or supervise students in laboratories. They prepare lectures, exercises, and laboratory experiments; grade exams and papers; and advise and work with students individually. In universities, they also supervise graduate students' teaching and research. College faculty work with an increasingly varied student population made up of growing shares of part-time, older, and culturally and racially diverse students.

Faculty keep abreast of developments in their field by reading current literature, talking with colleagues, and participating in professional conferences. They may also do their own research to expand knowledge in their field. They may perform experiments; collect and analyze data; and examine original documents, literature, and other source material. From this process, they arrive at conclusions, and publish their findings in scholarly journals, books, and electronic media.

Most college and university faculty extensively use computer technology, including the Internet; electronic mail; software programs, such as statistical packages; and CD-ROMs. They may use computers in the classroom as teaching aids and may post course content, class notes, class schedules, and other information on the Internet. Some faculty are increasingly using sophisticated telecommunications and videoconferencing equipment and the Internet to teach courses to students at remote sites. The use of e-mail, chat rooms, and other techniques has greatly improved communications between students and teachers and among students.

Most faculty members serve on academic or administrative committees that deal with the policies of their institution, departmental matters, academic issues, curricula, budgets, equipment purchases, and hiring. Some work with student and community organizations. Department chairpersons are faculty members who usually teach some courses but have heavier administrative responsibilities.

The proportion of time spent on research, teaching, administrative, and other duties varies by individual circumstance and type of institution. Faculty members at universities normally spend a significant part of their time doing research; those in 4-year colleges, somewhat less; and those in 2-year colleges, rela-



Postsecondary teachers review current research to keep abreast of developments in their field.

tively little. The teaching load, however, often is heavier in 2-year colleges and somewhat lighter at 4-year institutions. Full professors at all types of institutions usually spend a larger portion of their time conducting research than do assistant professors, instructors, and lecturers.

Postsecondary vocational education teachers, also known as *postsecondary career and technical education teachers,* provide instruction for occupations that require specialized training, but may not require a 4-year degree, such as welder, dental hygienist, x-ray technician, auto mechanic, and cosmetologist. Classes often are taught in an industrial or laboratory setting where students are provided hands-on experience. For example, welding instructors show students various welding techniques and essential safety practices, watch them use tools and equipment, and have them repeat procedures until they meet the specific standards required by the trade. Increasingly, career and technical education teachers are integrating academic and vocational curriculums so that students obtain a variety of skills that can be applied to the "real world."

Career and technical education teachers have many of the same responsibilities that other college and university faculty have. They must prepare lessons, grade papers, attend faculty meetings, and keep abreast of developments in their field. Career and technical education teachers at community colleges and career and technical schools also often play a key role in students' transition from school to work by helping to establish internship programs for students and by providing information about prospective employers.

Graduate teaching assistants, often referred to as *graduate TAs*, assist faculty, department chairs, or other professional staff at colleges and universities by performing teaching or teaching-related duties. In addition to their work responsibilities, assistants have their own school commitments, as they are also students who are working towards earning a graduate degree, such as a Ph.D. Some teaching assistants have full responsibility for teaching a course—usually one that is introductory in nature—which can include preparation of lectures and exams, and assigning final grades to students. Others provide assistance to faculty members, which may consist of a variety of tasks such as grading papers, monitoring exams, holding office hours or help-sessions for students, conducting laboratory sessions, or administering quizzes to the class. Teaching assistants generally meet initially with the faculty member whom they are going to assist in order to determine exactly what is expected of them, as each faculty member may have his or her own needs. For example, some faculty members prefer assistants to sit in on classes, while others assign them other tasks to do during class time. Graduate teaching assistants may work one-on-one with a faculty member or, for large classes, they may be one of several assistants.

Working Conditions

Postsecondary teachers usually have flexible schedules. They must be present for classes, usually 12 to 16 hours per week, and for faculty and committee meetings. Most establish regular office hours for student consultations, usually 3 to 6 hours per week. Otherwise, teachers are free to decide when and where they will work, and how much time to devote to course preparation, grading, study, research, graduate student supervision, and other activities.

Some teach night and weekend classes. This is particularly true for teachers at 2-year community colleges or institutions with large enrollments of older students who have full-time jobs or family responsibilities. Most colleges and universities require teachers to work 9 months of the year, which allows them the time to teach additional courses, do research, travel, or pursue nonacademic interests during the summer and school holidays. Colleges and universities usually have funds to support research or other professional development needs, including travel to conferences and research sites.

About 3 out of 10 college and university faculty worked part time in 2002. Some part-timers, known as "adjunct faculty," have primary jobs outside of academia—in government, private industry, or nonprofit research—and teach "on the side." Others prefer to work part-time hours or seek full-time jobs but are unable to obtain them due to intense competition for available openings. Some work part time in more than one institution. Many adjunct faculty are not qualified for tenure-track positions because they lack a doctoral degree.

University faculty may experience a conflict between their responsibilities to teach students and the pressure to do research and publish their findings. This may be a particular problem for young faculty seeking advancement in 4-year research universities. Also, recent cutbacks and the hiring of more part-time faculty have put a greater administrative burden on full-time faculty. Requirements to teach online classes also have added greatly to the workloads of postsecondary teachers. Many find that developing the courses to put online, plus learning how to operate the technology and answering large amounts of e-mail, is very time-consuming.

Like college and university faculty, there is usually a great deal of flexibility in graduate TAs' work schedules, which allows them the time to pursue their own academic coursework and studies. The number of hours that TAs work varies depending on their assignments. Work may be stressful, particularly when assistants are given full responsibility for teaching a class; however, these types of positions allow graduate students the opportunity to gain valuable teaching experience. This experience is especially helpful for those graduate teaching assistants who seek to become faculty members at colleges and universities after completing their degree.

Employment

Postsecondary teachers held nearly 1.6 million jobs in 2002. Most were employed in public and private 4-year colleges and universities and in 2-year community colleges. Postsecondary career and technical education teachers also are employed by schools and institutes that specialize in training people in a specific field, such as technology centers or culinary schools. Some career and technical education teachers work for State and local governments and job training facilities. The following tabulation shows postsecondary teaching jobs in specialties having 20,000 or more jobs in 2002:

Graduate teaching assistants	128,000
Vocational education teachers	119,000
Health specialties teachers	86,000
Business teachers	67,000
Art, drama, and music teachers	58,000
English language and literature teachers	55,000
Education teachers	42,000
Biological science teachers	47,000
Mathematical science teachers	41,000
Nursing instructors and teachers	37,000
Computer science teachers	33,000
Engineering teachers	29,000
Psychology teachers	26,000

Training, Other Qualifications, and Advancement

The education and training required of postsecondary teachers varies widely, depending on the subject taught and educational institution employing them. Educational requirements for teachers are generally the highest at 4-year research universities but, at career and technical institutes, experience and expertise in a related occupation is the most valuable qualification.

Postsecondary teachers should communicate and relate well with students, enjoy working with them, and be able to motivate them. They should have inquiring and analytical minds, and a strong desire to pursue and disseminate knowledge. Additionally, they must be self-motivated and able to work in an environment in which they receive little direct supervision.

Training requirements for postsecondary career and technical education teachers vary by State and by subject. In general, teachers need a bachelor's or higher degree, plus work or other experience in their field. In some fields, a license or certificate that demonstrates one's qualifications may be all that is required. Teachers update their skills through continuing education, in order to maintain certification. They must also maintain ongoing dialogue with businesses to determine the most current skills needed in the workplace.

Four-year colleges and universities usually consider doctoral degree holders for full-time, tenure-track positions, but may hire master's degree holders or doctoral candidates for certain disciplines, such as the arts, or for part-time and temporary jobs. Most college and university faculty are in four academic ranks—professor, associate professor, assistant professor, and instructor. These positions usually are considered to be tenure-track positions. Most faculty members are hired as instructors or assistant professors. A smaller number of additional faculty members, called lecturers, are usually employed on contracts for a single academic term and are not on the tenure track.

In 2-year colleges, master's degree holders fill most full-time positions. However, with increasing competition for available jobs, institutions can be more selective in their hiring practices. Many 2-year institutions increasingly prefer job applicants to have some teaching experience or experience with distance learning. Preference also may be given to those holding dual master's degrees, because they can teach more subjects. In addition, with greater competition for jobs, master's degree holders may find it increasingly difficult to obtain employment as they are passed over in favor of candidates holding a Ph.D.

Doctoral programs take an average of 6 to 8 years of full-time study beyond the bachelor's degree, including time spent completing a master's degree and a dissertation. Some programs, such as those in the humanities, take longer to complete; others, such as those in engineering, usually are shorter. Candidates specialize in a subfield of a discipline—for example, organic chemistry, counseling psychology, or European history—but also take courses covering the entire discipline. Programs include 20 or more increasingly specialized courses and seminars plus comprehensive examinations on all major areas of the field. Candidates also must complete a dissertation—a written report on original research in the candidate's major field of study. The dissertation sets forth an original hypothesis or proposes a model and tests it. Students in the natural sciences and engineering usually do laboratory work; in the humanities, they study original documents and other published material. The dissertation is done under the guidance of one or more faculty advisors and usually takes 1 or 2 years of full-time work.

In some fields, particularly the natural sciences, some students spend an additional 2 years on postdoctoral research and study before taking a faculty position. Some Ph.D.s extend postdoctoral appointments, or take new ones, if they are unable to find a faculty job. Most of these appointments offer a nominal salary.

Obtaining a position as a graduate teaching assistant is a good way to gain college teaching experience. To qualify, candidates must be enrolled in a graduate school program. In addition, some colleges and universities require teaching assistants to attend classes or take some training prior to being given responsibility for a course.

Although graduate teaching assistants usually work at the institution and in the department where they are earning their degree, teaching or internship positions for graduate students at institutions that do not grant a graduate degree have become more common in recent years. For example, a program called Preparing Future Faculty, administered by the Association of American Colleges and Universities and the Council of Graduate Schools, has led to the creation of many now-independent programs that offer graduate students at research universities the opportunity to work as teaching assistants at other types of institutions, such as liberal arts or community colleges. Working with a mentor, the graduate students teach classes and learn how to improve their teaching techniques. They may attend faculty and committee meetings, develop a curriculum, and learn how to balance the teaching, research, and administrative roles that faculty play. These programs provide valuable learning opportunities for graduate students interested in teaching at the postsecondary level, and also help to make these students aware of the differences among the various types of institutions at which they may someday work.

For faculty, a major step in the traditional academic career is attaining tenure. New tenure-track faculty usually are hired as instructors or assistant professors, and must serve a period—usually 7 years—under term contracts. At the end of the period, their record of teaching, research, and overall contribution to the institution is reviewed; tenure is granted if the review is favorable. Those denied tenure usually must leave the institution. Tenured professors cannot be fired without just cause and due process. Tenure protects the faculty's academic freedom—the ability to teach and conduct research without fear of being fired for advocating unpopular ideas. It also gives both faculty and institutions the stability needed for effective research and teaching, and provides financial security for faculty. Some institutions have adopted post-tenure review policies to encourage ongoing evaluation of tenured faculty.

The number of tenure-track positions is expected to decline as institutions seek flexibility in dealing with financial matters and changing student interests. Institutions will rely more heavily on limited term contracts and part-time, or adjunct, faculty, thus shrinking the total pool of tenured faculty. In a trend that is expected to continue, some institutions now offer limited-term contracts to prospective faculty—typically 2-, 3-, or 5-year, full-time contracts. These contracts may be terminated or extended when they expire. Institutions are not obligated to grant tenure to the contract holders. In addition, some institutions have limited the percentage of faculty who can be tenured.

For most postsecondary teachers, advancement involves a move into administrative and managerial positions, such as departmental chairperson, dean, and president. At 4-year institutions, such advancement requires a doctoral degree. At 2-year colleges, a doctorate is helpful but not usually required, except for advancement to some top administrative positions. (Deans and departmental chairpersons are covered in the *Handbook* statement on education administrators, while college presidents are included in the *Handbook* statement on top executives.)

Job Outlook

Overall, employment of postsecondary teachers is expected to grow much faster than the average for all occupations through 2012. A significant proportion of these new jobs will be part-time positions. Good job opportunities are expected as retirements of current postsecondary teachers and continued increases in student enrollments create numerous openings for teachers at all types of postsecondary institutions.

Projected growth in college and university enrollment over the next decade stems largely from the expected increase in the population of 18- to 24-year-olds. Adults returning to college and an increase in foreign-born students also will add to the number of students, particularly in the fastest growing States of California, Texas, Florida, New York, and Arizona. In addition, workers' growing need to regularly update their skills will continue to create new opportunities for postsecondary teachers, particularly at community colleges and for-profit institutions that cater to working adults. However, many postsecondary educational institutions receive a significant portion of their funding from State and local governments, and, over the early years of the projection period, tight State and local budgets will limit the ability of many schools to expand. Nevertheless, a significant number of openings also is expected to arise due to the need to replace the large numbers of postsecondary teachers who are likely to retire over the next decade. Many postsecondary teachers were hired in the late 1960s and 1970s to teach the baby boomers, and they are expected to retire in growing numbers in the years ahead.

Postsecondary institutions are a major employer of workers holding doctoral degrees, and opportunities for Ph.D. recipients seeking jobs as postsecondary teachers are expected to be somewhat better than in previous decades. The number of earned doctorate degrees is projected to rise by only 4 percent over the 2002-12 period, sharply lower than the 10-percent increase over the previous decade. In spite of this positive trend, competition will remain tight for those seeking tenure-track positions at 4-year colleges and universities, as many of the job openings are expected to be either part-time or renewable, term appointments.

Opportunities for graduate teaching assistants are expected to be very good. Graduate enrollments over the 2002-12 period are projected to increase at a rate that is somewhat slower than that of the previous decade, while total undergraduate enrollments in degree-granting institutions are expected to increase at nearly twice the rate of the preceding decade, creating many teaching opportunities. Constituting more than 12 percent of all postsecondary teachers, graduate teaching assistants play an integral role in the postsecondary education system, and they are expected to continue to do so in the future.

Because one of the main reasons why students attend postsecondary institutions is to obtain a job, the best job prospects for postsecondary teachers are likely to be in fields where job growth is expected to be strong over the next decade. These will include fields such as business, health specialties, nursing, and computer and biological sciences. Community colleges and other institutions offering career and technical education have been among the most rapidly growing, and these institutions are expected to offer some of the best opportunities for postsecondary teachers.

Earnings

Median annual earnings of all postsecondary teachers in 2002 were $49,040. The middle 50 percent earned between $34,310 and $69,580. The lowest 10 percent earned less than $23,080, and the highest 10 percent earned more than $92,430.

Earnings for college faculty vary according to rank and type of institution, geographic area, and field. According to a 2002-03 survey by the American Association of University Professors, salaries for full-time faculty averaged $64,455. By rank, the average was $86,437 for professors, $61,732 for associate professors, $51,545 for assistant professors, $37,737 for instructors, and $43,914 for lecturers. Faculty in 4-year institutions earn higher salaries, on average, than do those in 2-year schools. In 2002-03, average faculty salaries in public institutions—$63,974—were lower than those in private independent institutions—$74,359—but higher than those in religiously affiliated private colleges and universities—$57,564. In fields with high-paying nonacademic alternatives-medicine, law, engineering, and business, among others—earnings exceed these averages. In others—such as the humanities and education—they are lower.

Many faculty members have significant earnings, in addition to their base salary, from consulting, teaching additional courses, research, writing for publication, or other employment. In addition, many college and university faculty enjoy some unique benefits, including access to campus facilities, tuition waivers for dependents, housing and travel allowances, and paid sabbatical leaves. Part-time faculty usually have fewer benefits than do full-time faculty.

Earnings for postsecondary career and technical education teachers vary widely by subject, academic credentials, experience, and region of the country. Part-time instructors usually receive few benefits.

Related Occupations

Postsecondary teaching requires the ability to communicate ideas well, motivate students, and be creative. Workers in other occupations that require these skills are teachers—preschool, kindergarten, elementary, middle, and secondary; education administrators; librarians; counselors; writers and editors; public relations specialists; and management analysts. Faculty research activities often are similar to those of scientists, as well as to those of managers and administrators in industry, government, and nonprofit research organizations.

Sources of Additional Information

Professional societies related to a field of study often provide information on academic and nonacademic employment opportunities. Names and addresses of many of these societies appear in statements elsewhere in the *Handbook*.

Special publications on higher education, such as *The Chronicle of Higher Education*, list specific employment opportunities for faculty. These publications are available in libraries.

For information on the Preparing Future Faculty program, contact:

➤ Association of American Colleges and Universities, 1818 R St. NW., Washington, DC 20009. Internet: **http://www.aacu-edu.org**

For information on postsecondary career and technical education teaching positions, contact State departments of career and technical education.

General information on adult and career and technical education is available from:

➤ Association for Career and Technical Education, 1410 King St., Alexandria, VA 22314. Internet: **http://www.acteonline.org**

Teachers—Preschool, Kindergarten, Elementary, Middle, and Secondary

(0*NET 25-2011.00, 25-2012.00, 25-2021.00, 25-2022.00, 25-2023.00, 25-2031.00, 25-2032.00)

Significant Points

- Public school teachers must have at least a bachelor's degree, complete an approved teacher education program, and be licensed.
- Many States offer alternative licensing programs to attract people into teaching, especially for hard-to-fill positions.
- Excellent job opportunities are expected as a large number of teachers retire over the next 10 years, particularly at the secondary school level; opportunities will vary somewhat by geographic area and subject taught.

Nature of the Work

Teachers act as facilitators or coaches, using interactive discussions and "hands-on" approaches to help students learn and apply concepts in subjects such as science, mathematics, or English. They utilize "props" or "manipulatives" to help children understand abstract concepts, solve problems, and develop critical thought processes. For example, they teach the concepts of numbers or of addition and subtraction by playing board games. As the children get older, the teachers use more sophisticated materials, such as science apparatus, cameras, or computers.

To encourage collaboration in solving problems, students are increasingly working in groups to discuss and solve problems together. Preparing students for the future workforce is the major stimulus generating the changes in education. To be prepared, students must be able to interact with others, adapt to new technology, and think through problems logically. Teachers provide the tools and the environment for their students to develop these skills.

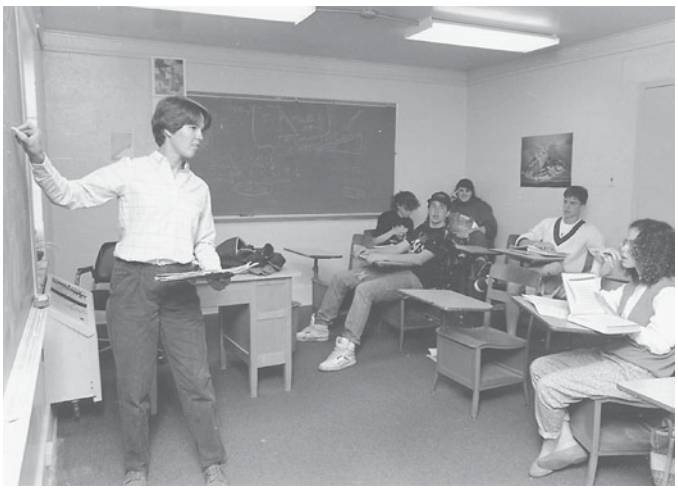
Preschool, kindergarten, and elementary school teachers play a vital role in the development of children. What children learn and experience during their early years can shape their views of themselves and the world and can affect their later success or failure in school, work, and their personal lives. Preschool, kindergarten, and elementary school teachers introduce children to mathematics, language, science, and social studies. They use games, music, artwork, films, books, computers, and other tools to teach basic skills.

Preschool children learn mainly through play and interactive activities. *Preschool teachers* capitalize on children's play to further language and vocabulary development (using storytelling, rhyming games, and acting games), improve social skills (having the children work together to build a neighborhood in a sandbox), and introduce scientific and mathematical concepts (showing the children how to balance and count blocks when building a bridge or how to mix colors when painting). Thus, a less structured approach, including small-group lessons, one-on-one instruction, and learning through creative activities such as art, dance, and music, is adopted to teach preschool children. Play and hands-on teaching also are used in kindergarten classrooms, but there academics begin to take priority. Letter recognition, phonics, numbers, and awareness of nature and science, introduced at the preschool level, are taught primarily by *kindergarten teachers*.

Most *elementary school teachers* instruct one class of children in several subjects. In some schools, two or more teachers work as a team and are jointly responsible for a group of students in at least one subject. In other schools, a teacher may teach one special subject—usually music, art, reading, science, arithmetic, or physical education—to a number of classes. A small but growing number of teachers instruct multilevel classrooms, with students at several different learning levels.

Middle school teachers and *secondary school teachers* help students delve more deeply into subjects introduced in elementary school and expose them to more information about the world. Middle and secondary school teachers specialize in a specific subject, such as English, Spanish, mathematics, history, or biology. They also can teach subjects that are career oriented. *Vocational education teachers*, also referred to as career and technical or career-technology teachers, instruct and train students to work in a wide variety of fields, such as healthcare, business, auto repair, communications, and, increasingly, technology. They often teach courses that are in high demand by area employers, who may provide input into the curriculum and offer internships to students. Many vocational teachers play an active role in building and overseeing these partnerships. Additional responsibilities of middle and secondary school teachers may include career guidance and job placement, as well as followups with students after graduation. (Special education teachers—who instruct elementary and secondary school students who have a variety of disabilities—are discussed separately in this section of the *Handbook*.)

Teachers may use films, slides, overhead projectors, and the latest technology in teaching, including computers, telecommunication systems, and video discs. The use of computer resources, such as educational software and the Internet, exposes students to a vast range of experiences and promotes interactive learning. Through the Internet, students can communicate with students in other countries. Students also use the Internet for individual research projects and to gather information. Computers are used in other classroom activities as well, from solving math problems to learning English as a second language. Teachers also may use computers to record grades and perform other administrative and clerical duties. They must continually update their skills so that they can instruct and use the latest technology in the classroom.



Teachers find that helping students to gain an appreciation of knowledge and learning can be very rewarding.

Teachers often work with students from varied ethnic, racial, and religious backgrounds. With growing minority populations in most parts of the country, it is important for teachers to work effectively with a diverse student population. Accordingly, some schools offer training to help teachers enhance their awareness and understanding of different cultures. Teachers may also include multicultural programming in their lesson plans, to address the needs of all students, regardless of their cultural background.

Teachers design classroom presentations to meet students' needs and abilities. They also work with students individually. Teachers plan, evaluate, and assign lessons; prepare, administer, and grade tests; listen to oral presentations; and maintain classroom discipline. They observe and evaluate a student's performance and potential and increasingly are asked to use new assessment methods. For example, teachers may examine a portfolio of a student's artwork or writing in order to judge the student's overall progress. They then can provide additional assistance in areas in which a student needs help. Teachers also grade papers, prepare report cards, and meet with parents and school staff to discuss a student's academic progress or personal problems.

In addition to conducting classroom activities, teachers oversee study halls and homerooms, supervise extracurricular activities, and accompany students on field trips. They may identify students with physical or mental problems and refer the students to the proper authorities. Secondary school teachers occasionally assist students in choosing courses, colleges, and careers. Teachers also participate in education conferences and workshops.

In recent years, site-based management, which allows teachers and parents to participate actively in management decisions regarding school operations, has gained popularity. In many schools, teachers are increasingly involved in making decisions regarding the budget, personnel, textbooks, curriculum design, and teaching methods.

Working Conditions

Seeing students develop new skills and gain an appreciation of knowledge and learning can be very rewarding. However, teaching may be frustrating when one is dealing with unmotivated or disrespectful students. Occasionally, teachers must cope with unruly behavior and violence in the schools. Teachers may experience stress in dealing with large classes, students from disadvantaged or multicultural backgrounds, or heavy workloads. Inner-city schools in particular, may be run down and lack the amenities of schools in wealthier communities. Accountability standards also may increase stress levels, with teachers expected to produce students who are able to exhibit satisfactory performance on standardized tests in core subjects.

Teachers are sometimes isolated from their colleagues because they work alone in a classroom of students. However, some schools allow teachers to work in teams and with mentors to enhance their professional development.

Including school duties performed outside the classroom, many teachers work more than 40 hours a week. Part-time schedules are more common among preschool and kindergarten teachers. Although some school districts have gone to all-day kindergartens, most kindergarten teachers still teach two kindergarten classes a day. Most teachers work the traditional 10-month school year with a 2-month vacation during the summer. During the vacation break, those on the 10-month schedule may teach in summer sessions, take other jobs, travel, or pursue personal interests. Many enroll in college courses or workshops to continue their education. Teachers in districts with a year-round schedule typically work 8 weeks, are on vacation for 1 week, and have a 5-week midwinter break. Preschool teachers working in daycare settings often work year round.

Most States have tenure laws that prevent teachers from being fired without just cause and due process. Teachers may obtain tenure after they have satisfactorily completed a probationary period of teaching, normally 3 years. Tenure does not absolutely guarantee a job, but it does provide some security.

Employment

Preschool, kindergarten, elementary school, middle school, and secondary school teachers, except special education, held about 3.8 million jobs in 2002. Of the teachers in those jobs, about 1.5 million were elementary school teachers, 1.1 million were secondary school teachers, 602,000 were middle school teachers, 424,000 were preschool teachers, and 168,000 were kindergarten teachers. The majority of kindergarten, elementary school, middle school, and secondary school teachers, except special education worked in local government educational services. About 10 percent worked for private schools. Preschool teachers, except special education were most often employed in child daycare services (63 percent), religious organizations (9 percent), local government educational services (9 percent), and private educational services (7 percent). Employment of teachers is geographically distributed much the same as the population is.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require public school teachers to be licensed. Licensure is not required for teachers in private schools. Usually licensure is granted by the State Board of Education or a licensure advisory committee. Teachers may be licensed to teach the early childhood grades (usually preschool through grade 3); the elementary grades (grades 1 through 6 or 8); the middle grades (grades 5 through 8); a secondary-education subject area (usually grades 7 through 12); or a special subject, such as reading or music (usually grades kindergarten through 12).

Requirements for regular licenses to teach kindergarten through grade 12 vary by State. However, all States require general education teachers to have a bachelor's degree and to have completed an approved teacher training program with a prescribed number of subject and education credits, as well as supervised practice teaching. Some States also require technology training and the attainment of a minimum grade point average. A number of States require that teachers obtain a master's degree in education within a specified period after they begin teaching.

Almost all States require applicants for a teacher's license to be tested for competency in basic skills, such as reading and writing, and in teaching. Almost all also require the teacher to exhibit proficiency in his or her subject. Nowadays, school systems are moving toward implementing performance-based systems for licensure, which usually require the teacher to demonstrate satisfactory teaching performance over an extended period in order to obtain a provisional license, in addition to passing an examination in one's subject. Most States require continuing education for renewal of the teacher's license. Many States have reciprocity agreements that make it easier for teachers licensed in one State to become licensed in another.

Many States offer alternative licensure programs for teachers who have bachelor's degrees in the subject they will teach, but

who lack the necessary education courses required for a regular license. Alternative licensure programs originally were designed to ease shortages of teachers of certain subjects, such as mathematics and science. The programs have expanded to attract other people into teaching, including recent college graduates and those changing from another career to teaching. In some programs, individuals begin teaching quickly under provisional licensure. After working under the close supervision of experienced educators for 1 or 2 years while taking education courses outside school hours, they receive regular licensure if they have progressed satisfactorily. In other programs, college graduates who do not meet licensure requirements take only those courses that they lack and then become licensed. This approach may take 1 or 2 semesters of full-time study. States may issue emergency licenses to individuals who do not meet the requirements for a regular license when schools cannot attract enough qualified teachers to fill positions. Teachers who need to be licensed may enter programs that grant a master's degree in education, as well as a license.

In many States, vocational teachers have many of the same requirements for teaching as their academic counterparts. However, because knowledge and experience in a particular field are important criteria for the job, some States will license vocational education teachers without a bachelor's degree, provided they can demonstrate expertise in their field. A minimum number of hours in education courses may also be required.

Licensing requirements for preschool teachers also vary by State. Requirements for public preschool teachers are generally higher than those for private preschool teachers. Some States require a bachelor's degree in early childhood education, others require an associate's degree, and still others require certification by a nationally recognized authority. The Child Development Associate (CDA) credential, the most common type of certification, requires a mix of classroom training and experience working with children, along with an independent assessment of an individual's competence.

In some cases, teachers of kindergarten through high school may attain professional certification in order to demonstrate competency beyond that required for a license. The National Board for Professional Teaching Standards offers a voluntary national certification. To become nationally accredited, experienced teachers must prove their aptitude by compiling a portfolio showing their work in the classroom and by passing a written assessment and evaluation of their teaching knowledge. Currently, teachers may become certified in a variety of areas, on the basis of the age of the students and, in some cases, the subject taught. For example, teachers may obtain a certificate for teaching English language arts to early adolescents (aged 11 to 15), or they may become certified as early childhood generalists. All States recognize national certification, and many States and school districts provide special benefits to teachers holding such certification. Benefits typically include higher salaries and reimbursement for continuing education and certification fees. In addition, many States allow nationally certified teachers to carry a license from one State to another.

The National Council for Accreditation of Teacher Education currently accredits more than 550 teacher education programs across the United States. Generally, 4-year colleges require students to wait until their sophomore year before applying for admission to teacher education programs. Traditional education programs for kindergarten and elementary school teachers include courses—designed specifically for those preparing to teach—in mathematics, physical science, social science, music, art, and literature, as well as prescribed professional education courses, such as philosophy of education, psychology of learning, and teaching methods. Aspiring secondary school teachers most often major in the subject they plan to teach while also taking a program of study in teacher preparation. Teacher education programs are now required to include classes in the use of computers and other technologies in order to maintain their accreditation. Most programs require students to perform a student-teaching internship.

Many States now offer professional development schools—partnerships between universities and elementary or secondary schools. Students enter these 1-year programs after completion of their bachelor's degree. Professional development schools merge theory with practice and allow the student to experience a year of teaching firsthand, under professional guidance.

In addition to being knowledgeable in their subject, teachers must have the ability to communicate, inspire trust and confidence, and motivate students, as well as understand the students' educational and emotional needs. Teachers must be able to recognize and respond to individual and cultural differences in students and employ different teaching methods that will result in higher student achievement. They should be organized, dependable, patient, and creative. Teachers also must be able to work cooperatively and communicate effectively with other teachers, support staff, parents, and members of the community.

With additional preparation, teachers may move into positions as school librarians, reading specialists, curriculum specialists, or guidance counselors. Teachers may become administrators or supervisors, although the number of these positions is limited and competition can be intense. In some systems, highly qualified, experienced teachers can become senior or mentor teachers, with higher pay and additional responsibilities. They guide and assist less experienced teachers while keeping most of their own teaching responsibilities. Preschool teachers usually work their way up from assistant teacher, to teacher, to lead teacher—who may be responsible for the instruction of several classes—and, finally, to director of the center. Preschool teachers with a bachelor's degree frequently are qualified to teach kindergarten through grade 3 as well. Teaching at these higher grades often results in higher pay.

Job Outlook

Job opportunities for teachers over the next 10 years will vary from good to excellent, depending on the locality, grade level, and subject taught. Most job openings will be attributable to the expected retirement of a large number of teachers. In addition, relatively high rates of turnover, especially among beginning teachers employed in poor, urban schools, also will lead to numerous job openings for teachers. Competition for qualified teachers among some localities will likely continue, with schools luring teachers from other States and districts with bonuses and higher pay.

Through 2012, overall student enrollments, a key factor in the demand for teachers, are expected to rise more slowly than in the past. As the children of the baby-boom generation get older, smaller numbers of young children will enter school behind them, resulting in average employment growth for all teachers, from preschool through secondary grades. Projected enrollments will vary by region. Fast-growing States in the South and West—particularly California, Texas, Georgia, Idaho, Hawaii, Alaska, and New Mexico—will experience the largest enrollment increases. Enrollments in the Northeast and Midwest are

expected to hold relatively steady or decline. The job market for teachers also continues to vary by school location and by subject taught. Many inner cities—often characterized by overcrowded, ill-equipped schools and higher-than-average poverty rates—and rural areas—characterized by their remote location and relatively low salaries—have difficulty attracting and retaining enough teachers, so job prospects should be better in these areas than in suburban districts. Currently, many school districts have difficulty hiring qualified teachers in some subject areas—mathematics, science (especially chemistry and physics), bilingual education, and foreign languages. Qualified vocational teachers, at both the middle school and secondary school levels, also are currently in demand in a variety of fields. Specialties that have an adequate number of qualified teachers include general elementary education, physical education, and social studies. Teachers who are geographically mobile and who obtain licensure in more than one subject should have a distinct advantage in finding a job. Increasing enrollments of minorities, coupled with a shortage of minority teachers, should cause efforts to recruit minority teachers to intensify. Also, the number of non-English-speaking students has grown dramatically, creating demand for bilingual teachers and for those who teach English as a second language. The number of teachers employed is dependent as well on State and local expenditures for education and on the enactment of legislation to increase the quality of education. A number of initiatives, such as reduced class size (primarily in the early elementary grades), mandatory preschool for 4-year-olds, and all-day kindergarten, have been implemented in a few States, but not nationwide. Additional teachers—particularly preschool and early elementary school teachers—will be needed if States or localities implement any of these measures. At the Federal level, legislation that is likely to affect teachers recently was put into place with the enactment of the No Child Left Behind Act. Although the full impact of this act is not yet known, its emphasis on ensuring that all schools hire and retain only qualified teachers, may lead to an increase in funding for schools that currently lack such teachers.

The supply of teachers is expected to increase in response to reports of improved job prospects, better pay, more teacher involvement in school policy, and greater public interest in education. In recent years, the total number of bachelor's and master's degrees granted in education has increased steadily. Because of a shortage of teachers in certain locations, and in anticipation of the loss of a number of teachers to retirement, many States have implemented policies that will encourage more students to become teachers. In addition, more teachers may be drawn from a reserve pool of career changers, substitute teachers, and teachers completing alternative certification programs.

Earnings

Median annual earnings of kindergarten, elementary, middle, and secondary school teachers ranged from $39,810 to $44,340 in 2002; the lowest 10 percent earned $24,960 to $29,850; the top 10 percent earned $62,890 to $68,530. Median earnings for preschool teachers were $19,270.

According to the American Federation of Teachers, beginning teachers with a bachelor's degree earned an average of $30,719 in the 2001-02 school year. The estimated average salary of all public elementary and secondary school teachers in the 2001-02 school year was $44,367. Private school teachers generally earn less than public school teachers.

In 2002, more than half of all elementary, middle, and secondary school teachers belonged to unions—mainly the American Federation of Teachers and the National Education Association—that bargain with school systems over wages, hours, and other terms and conditions of employment. Fewer preschool and kindergarten teachers were union members—about 15 percent in 2002.

Teachers can boost their salary in a number of ways. In some schools, teachers receive extra pay for coaching sports and working with students in extracurricular activities. Getting a master's degree or national certification often results in a raise in pay, as does acting as a mentor. Some teachers earn extra income during the summer by teaching summer school or performing other jobs in the school system.

Related Occupations

Preschool, kindergarten, elementary school, middle school, and secondary school teaching requires a variety of skills and aptitudes, including a talent for working with children; organizational, administrative, and recordkeeping abilities; research and communication skills; the power to influence, motivate, and train others; patience; and creativity. Workers in other occupations requiring some of these aptitudes include teachers—postsecondary; counselors; teacher assistants; education administrators; librarians; child care workers; public relations specialists; social workers; and athletes, coaches, umpires, and related workers.

Sources of Additional Information

Information on licensure or certification requirements and approved teacher training institutions is available from local school systems and State departments of education.

Information on the teaching profession and on how to become a teacher can be obtained from

➤ Recruiting New Teachers, Inc., 385 Concord Ave., Suite 103, Belmont, MA 02478. Internet: **http://www.rnt.org**

This organization also sponsors another Internet site that provides helpful information on becoming a teacher: Internet: **http://www.recruitingteachers.org**

Information on teachers' unions and education-related issues may be obtained from any of the following sources:

➤ American Federation of Teachers, 555 New Jersey Ave. NW., Washington, DC 20001.

➤ National Education Association, 1201 16th St. NW., Washington, DC 20036.

A list of institutions with accredited teacher education programs can be obtained from:

➤ National Council for Accreditation of Teacher Education, 2010 Massachusetts Ave. NW., Suite 500, Washington, DC 20036-1023. Internet: **http://www.ncate.org**

For information on vocational education and vocational education teachers, contact

➤ Association for Career and Technical Education, 1410 King St., Alexandria, VA 22314. Internet: **http://www.acteonline.org**

For information on careers in educating children and issues affecting preschool teachers, contact either of the following organizations:

➤ National Association for the Education of Young Children, 1509 16th St. NW., Washington, DC 20036. Internet: **http://www.naeyc.org**

➤ Council for Professional Recognition, 2460 16th St. NW., Washington, DC 20009-3575. Internet: **http://www.cdacouncil.org**

For information on teachers and the No Child Left Behind Act, contact

➤ U.S. Department of Education, 400 Maryland Avenue, SW., Washington, DC, 20202. Internet: **http://www.ed.gov**

Teachers—Special Education

(0*NET 25-2041.00, 25-2042.00, 25-2043.00)

Significant Points

- Excellent job prospects are expected due to rising enrollments of special education students and reported shortages of qualified teachers.
- A bachelor's degree, completion of an approved teacher preparation program, and a license are required to qualify; many States require a master's degree.
- Many States offer alternative licensure programs to attract people into these jobs.

Nature of the Work

Special education teachers work with children and youths who have a variety of disabilities. A small number of special education teachers work with students with mental retardation or autism, primarily teaching them life skills and basic literacy. However, the majority of special education teachers work with children with mild to moderate disabilities, using the general education curriculum, or modifying it, to meet the child's individual needs. Most special education teachers instruct students at the elementary, middle, and secondary school level, although some teachers work with infants and toddlers.

The various types of disabilities that qualify individuals for special education programs include specific learning disabilities, speech or language impairments, mental retardation, emotional disturbance, multiple disabilities, hearing impairments, orthopedic impairments, visual impairments, autism, combined deafness and blindness, traumatic brain injury, and other health impairments. Students are classified under one of the categories, and special education teachers are prepared to work with specific groups. Early identification of a child with special needs is an important part of a special education teacher's job. Early intervention is essential in educating children with disabilities.

Special education teachers use various techniques to promote learning. Depending on the disability, teaching methods can include individualized instruction, problem-solving assignments, and small-group work. When students need special accommodations in order to take a test, special education teachers see that appropriate ones are provided, such as having the questions read orally or lengthening the time allowed to take the test.

Special education teachers help to develop an Individualized Education Program (IEP) for each special education student. The IEP sets personalized goals for each student and is tailored to the student's individual learning style and ability. The program includes a transition plan outlining specific steps to prepare special education students for middle school or high school or, in the case of older students, a job or postsecondary study. Teachers review the IEP with the student's parents, school administrators, and, often, the student's general education teacher. Teachers work closely with parents to inform them of their child's progress and suggest techniques to promote learning at home.

Special education teachers design and teach appropriate curricula, assign work geared toward each student's ability, and grade papers and homework assignments. They are involved in the students' behavioral and academic development, helping the students develop emotionally, feel comfortable in social situations, and be aware of socially acceptable behavior. Preparing special education students for daily life after graduation also is an important aspect of the job. Teachers provide students with career counseling or help them learn routine skills, such as balancing a checkbook.

As schools become more inclusive, special education teachers and general education teachers are increasingly working together in general education classrooms. Special education teachers help general educators adapt curriculum materials and teaching techniques to meet the needs of students with disabilities. They coordinate the work of teachers, teacher assistants, and related personnel, such as therapists and social workers, to meet the requirements of inclusive special education programs. A large part of a special education teacher's job involves interacting with others. Special education teachers communicate frequently with parents, social workers, school psychologists, occupational and physical therapists, school administrators, and other teachers.

Special education teachers work in a variety of settings. Some have their own classrooms and teach only special education students; others work as special education resource teachers and offer individualized help to students in general education classrooms; still others teach together with general education teachers in classes composed of both general and special education students. Some teachers work with special education students for several hours a day in a resource room, separate from

Special education teachers usually modify the general education curriculum to meet an individual student's needs.

their general education classroom. Considerably fewer special education teachers work in residential facilities or tutor students in homebound or hospital environments.

Special education teachers who work with infants usually travel to the child's home to work with the child and his or her parents. Many of these infants have medical problems that slow or preclude normal development. Special education teachers show parents techniques and activities designed to stimulate the infant and encourage the growth of the child's skills. Toddlers usually receive their services at a preschool where special education teachers help them develop social, self-help, motor, language, and cognitive skills, often through the use of play.

Technology is playing an increasingly important role in special education. Teachers use specialized equipment such as computers with synthesized speech, interactive educational software programs, and audiotapes to assist children.

Working Conditions

Special education teachers enjoy the challenge of working with students with disabilities and the opportunity to establish meaningful relationships with them. Although helping these students can be highly rewarding, the work also can be emotionally and physically draining. Many special education teachers are under considerable stress due to heavy workloads and administrative tasks. They must produce a substantial amount of paperwork documenting each student's progress, and they work under the threat of litigation by students' parents if correct procedures are not followed or if the parents feel that their child is not receiving an adequate education. The physical and emotional demands of the job cause some special education teachers to leave the occupation.

Some schools offer year-round education for special education students, but most special education teachers work only the traditional 10-month school year.

Employment

Special education teachers held a total of about 433,000 jobs in 2002. A great majority, almost 90 percent, work in public schools. Another 7 percent work at private schools. About half work in elementary schools. A few worked for individual and social assistance agencies or residential facilities, or in homebound or hospital environments.

Training, Other Qualifications, and Advancement

All 50 States and the District of Columbia require special education teachers to be licensed. The State board of education or a licensure advisory committee usually grants licenses, and licensure varies by State. In many States, special education teachers receive a general education credential to teach kindergarten through grade 12. These teachers then train in a specialty, such as learning disabilities or behavioral disorders. Some States offer general special education licenses, while others license several different specialties within special education, and still others require teachers to obtain a general education license first and an additional license in special education afterwards.

All States require a bachelor's degree and the completion of an approved teacher preparation program with a prescribed number of subject and education credits and supervised practice teaching. Many States require a master's degree in special education, involving at least 1 year of additional course work, including a specialization, beyond the bachelor's degree.

Some States have reciprocity agreements allowing special education teachers to transfer their licenses from one State to another, but many still require that the teacher pass licensing requirements for the State in which they work. In the future, employers may recognize certification or standards offered by a national organization.

Many colleges and universities across the United States offer programs in special education, at the undergraduate, master's, and doctoral degree levels. Special education teachers usually undergo longer periods of training than do general education teachers. Most bachelor's degree programs are 4-year programs that include general and specialized courses in special education. However, an increasing number of institutions are requiring a 5th year or other postbaccalaureate preparation. Among the courses offered are educational psychology, legal issues of special education, and child growth and development; courses imparting knowledge and skills needed for teaching students with disabilities also are given. Some programs require specialization, while others offer generalized special education degrees or a course of study in several specialized areas. The last year of the program usually is spent student teaching in a classroom supervised by a certified teacher.

Alternative and emergency licenses are available in many States, due to the need to fill special education teaching positions. Alternative licenses are designed to bring college graduates and those changing careers into teaching more quickly. Requirements for an alternative license may be less stringent than for a regular license. Requirements vary by State. In some programs, individuals begin teaching quickly under a provisional license and can obtain a regular license by teaching under the supervision of licensed teachers for a period of 1 to 2 years while taking education courses. Emergency licenses are granted when States have difficulty finding licensed special education teachers to fill positions.

Special education teachers must be patient, able to motivate students, understanding of their students' special needs, and accepting of differences in others. Teachers must be creative and apply different types of teaching methods to reach students who are having difficulty learning. Communication and cooperation are essential traits, because special education teachers spend a great deal of time interacting with others, including students, parents, and school faculty and administrators.

Special education teachers can advance to become supervisors or administrators. They may also earn advanced degrees and become instructors in colleges that prepare others to teach special education. In some school systems, highly experienced teachers can become mentors to less experienced ones, providing guidance to those teachers while maintaining a light teaching load.

Job Outlook

Employment of special education teachers is expected to increase faster than the average for all occupations through 2012. Although slowdowns in student enrollments may constrain employment growth somewhat, additional positions for these workers will be created by continued increases in the number of special education students needing services, by legislation emphasizing training and employment for individuals with disabilities, and by educational reforms requiring higher standards for graduation. The need to replace special education teachers who switch to general education, change careers altogether, or retire will lead to additional job openings. At the same time, many school districts report shortages of qualified teachers. As

a result, special education teachers should have excellent job prospects.

The job outlook varies by geographic area and specialty. Although many areas of the country report difficulty finding qualified applicants, positions in inner cities and rural areas usually are more plentiful than job openings in suburban or wealthy urban areas. Student populations, in general, also are expected to increase significantly in several States in the West and South, resulting in increased demand for special education teachers in those regions. In addition, job opportunities may be better in certain specialties—such as speech or language impairments and learning disabilities—because of large increases in the enrollment of special education students classified under those categories. Legislation encouraging early intervention and special education for infants, toddlers, and preschoolers has created a need for early childhood special education teachers. Bilingual special education teachers and those with multicultural experience also are needed to work with an increasingly diverse student population.

The number of students requiring special education services has grown steadily in recent years, a trend that is expected to continue. Learning disabilities will continue to be identified and diagnosed at earlier ages. In addition, medical advances have resulted in more children surviving serious accidents or illnesses, but with impairments that require special accommodations. The percentage of foreign-born special education students also is expected to grow, as teachers begin to recognize learning disabilities in that population. Finally, more parents are expected to seek special services for those of their children who have difficulty meeting the new, higher standards required of students.

Earnings

Median annual earnings in 2002 of special education teachers who worked primarily in preschools, kindergartens, and elementary schools were $42,690. The middle 50 percent earned between $34,160 and $54,340. The lowest 10 percent earned less than $28,680, and the highest 10 percent earned more than $67,810.

Median annual earnings in 2002 of middle school special education teachers were $41,350. The middle 50 percent earned between $33,460 and $52,370. The lowest 10 percent earned less than $28,560, and the highest 10 percent earned more than $65,070.

Median annual earnings in 2002 of special education teachers who worked primarily in secondary schools were $44,130. The middle 50 percent earned between $35,320 and $56,850. The lowest 10 percent earned less than $29,630, and the highest 10 percent earned more than $71,020.

In 2002, about 62 percent of special education teachers belonged to unions—mainly the American Federation of Teachers and the National Education Association—that bargain with school systems over wages, hours, and the terms and conditions of employment.

In most schools, teachers receive extra pay for coaching sports and working with students in extracurricular activities. Some teachers earn extra income during the summer, working in the school system or in other jobs.

Related Occupations

Special education teachers work with students who have disabilities and special needs. Other occupations involved with the identification, evaluation, and development of students with disabilities include psychologists, social workers, speech-language pathologists and audiologists, counselors, teacher assistants, occupational therapists, recreational therapists, and teachers—preschool, kindergarten, elementary, middle, and secondary.

Sources of Additional Information

For information on professions related to early intervention and education for children with disabilities, a list of accredited schools, information on teacher certification and financial aid, and general information on related personnel issues—including recruitment, retention, and the supply of, and demand for, special education professionals—contact

➤ National Clearinghouse for Professions in Special Education, Council for Exceptional Children, 1110 N. Glebe Rd., Suite 300, Arlington, VA 22201. Internet: **http://www.special-ed-careers.org**

To learn more about the special education teacher certification and licensing requirements in your State, contact your State's department of education.

Drywall Installers, Ceiling Tile Installers, and Tapers

(0*NET 47-2081.01, 47-2081.02, 47-2082.00)

Significant Points

- Most workers learn the trade on the job, either by working as helpers or through a formal apprenticeship.
- Job prospects are expected to be good.
- Inclement weather seldom interrupts work, but workers may be idled when downturns in the economy slow new construction activity.

Nature of the Work

Drywall consists of a thin layer of gypsum between two layers of heavy paper. It is used for walls and ceilings in most buildings today because it is both faster and cheaper to install than plaster.

There are two kinds of drywall workers—installers and tapers—although many workers do both types of work. Installers, also called *applicators* or *hangers*, fasten drywall panels to the inside framework of residential houses and other buildings. *Tapers*, or *finishers*, prepare these panels for painting by taping and finishing joints and imperfections.

Because drywall panels are manufactured in standard sizes—usually 4 feet by 8 or 12 feet—drywall installers must measure, cut, and fit some pieces around doors and windows. They also saw or cut holes in panels for electrical outlets, air-conditioning units, and plumbing. After making these alterations, installers may glue, nail, or screw the wallboard panels to the wood or metal framework. Because drywall is heavy and cumbersome, a helper generally assists the installer in positioning and securing the panel. Workers often use a lift when placing ceiling panels.

After the drywall is installed, tapers fill joints between panels with a joint compound. Using the wide, flat tip of a special trowel, they spread the compound into and along each side of the joint with brush-like strokes. They immediately use the trowel to press a paper tape—used to reinforce the drywall and to hide imperfections—into the wet compound and to smooth away excess material. Nail and screw depressions also are covered with this compound, as are imperfections caused by the installation of air-conditioning vents and other fixtures. On large projects, finishers may use automatic taping tools that apply the joint compound and tape in one step. Tapers apply second and third coats of the compound, sanding the treated areas where needed after each coat to make them as smooth as the rest of the wall surface. This results in a very smooth and almost perfect surface. Some tapers apply textured surfaces to walls and ceilings with trowels, brushes, or spray guns.

Ceiling tile installers, or *acoustical carpenters*, apply or mount acoustical tiles or blocks, strips, or sheets of shock-absorbing materials to ceilings and walls of buildings to reduce reflection of sound or to decorate rooms. First, they measure and mark the surface according to blueprints and drawings. Then, they nail or screw moldings to the wall to support and seal the joint between the ceiling tile and the wall. Finally, they mount the tile, either by applying a cement adhesive to the back of the tile and then pressing the tile into place, or by nailing, screwing, stapling, or wire-tying the lath directly to the structural framework.

Lathers also are included in this occupation. Lathers fasten metal or rockboard lath to walls, ceilings, and partitions of buildings. Lath forms the support base for plaster, fireproofing, or acoustical materials. At one time, lath was made of wooden strips. Now, lathers work mostly with wire, metal mesh, or rockboard lath. Metal lath is used where the plaster application will be exposed to weather or water or for curved or irregular surfaces for which drywall is not a practical material. Using handtools and portable power tools, lathers nail, screw, staple, or wire-tie the lath directly to the structural framework.

Working Conditions

As in many other construction trades, the work sometimes is strenuous. Drywall installers, ceiling tile installers, and tapers spend most of the day on their feet, either standing, bending, or kneeling. Some tapers use stilts to tape and finish ceiling and angle joints. Installers have to lift and maneuver heavy panels. Hazards include falls from ladders and scaffolds and injuries from power tools and from working with sharp materials. Because sanding a joint compound to a smooth finish creates a great deal of dust, some finishers wear masks for protection.

Employment

Drywall installers, ceiling tile installers, and tapers held about 176,000 jobs in 2002. Most worked for contractors specializing in drywall and ceiling tile installation; others worked for contractors doing many kinds of construction. About 33,000 were self-employed independent contractors.

Most installers and tapers are employed in populous areas. In other areas, where there may not be enough work to keep a drywall or ceiling tile installer employed full time, carpenters and painters usually do the work.

Training, Other Qualifications, and Advancement

Most drywall installers, ceiling tile installers, and tapers start as helpers and learn their skills on the job. Installer helpers start by carrying materials, lifting and holding panels, and cleaning up debris. Within a few weeks, they learn to measure, cut, and install materials. Eventually, they become fully experienced workers. Taper apprentices begin by taping joints and touching up nail holes, scrapes, and other imperfections. They soon learn to install corner guards and to conceal openings around pipes. At the end of their training, drywall installers, ceiling tile installers, and tapers learn to estimate the cost of installing and finishing drywall.

Some drywall installers, ceiling tile installers, and tapers learn their trade in an apprenticeship program. The United Brotherhood

Because drywall is heavy and cumbersome, a helper generally assists the installer in positioning and securing the panel.

of Carpenters and Joiners of America, in cooperation with local contractors, administers an apprenticeship program both in drywall installation and finishing and in acoustical carpentry. Apprenticeship programs consist of at least 3 years, or 6,000 hours, of on-the-job training and 144 hours a year of related classroom instruction. In addition, local affiliates of the Associated Builders and Contractors and the National Association of Home Builders conduct training programs for nonunion workers. The International Union of Painters and Allied Trades conducts an apprenticeship program in drywall finishing that lasts 2 to 3 years.

Employers prefer high school graduates who are in good physical condition, but they frequently hire applicants with less education. High school or vocational school courses in carpentry provide a helpful background for drywall work. Regardless of educational background, installers must be good at simple arithmetic. Other useful high school courses include English, wood shop, metal shop, blueprint reading, and mechanical drawing.

Drywall installers, ceiling tile installers, and tapers with a few years of experience and with leadership ability may become supervisors. Some workers start their own contracting businesses.

Job Outlook

Job opportunities for drywall installers, ceiling tile installers, and tapers are expected to be good. Many potential workers are not attracted to this occupation because they prefer work that is less strenuous and has more comfortable working conditions. Experienced workers will have especially favorable opportunities.

Employment is expected to increase faster than average for all occupations over the 2002-12 period, reflecting increases in the numbers of new construction and remodeling projects. In addition to jobs involving traditional interior work, drywall workers will find employment opportunities in the installation of insulated exterior wall systems, which are becoming increasingly popular.

Besides those resulting from job growth, many jobs will open up each year because of the need to replace workers who transfer to other occupations or leave the labor force. Some drywall installers, ceiling tile installers, and tapers with limited skills leave the occupation when they find that they dislike the work or fail to find steady employment.

Despite the growing use of exterior panels, most drywall installation and finishing is done indoors. Therefore, drywall workers lose less worktime because of inclement weather than do some other construction workers. Nevertheless, they may be unemployed between construction projects and during downturns in construction activity.

Earnings

In 2002, the median hourly earnings of drywall and ceiling tile installers were $16.21. The middle 50 percent earned between $12.43 and $21.50. The lowest 10 percent earned less than $9.76, and the highest 10 percent earned more than $28.03. The median hourly earnings in the industries employing the largest numbers of drywall and ceiling tile installers in 2002 were:

Building finishing contractors	$16.50
Nonresidential building construction	14.66

In 2002, the median hourly earnings of tapers were $18.75. The middle 50 percent earned between $14.57 and $24.68. The lowest 10 percent earned less than $11.07, and the highest 10 percent earned more than $29.32.

Trainees usually started at about half the rate paid to experienced workers and received wage increases as they became more highly skilled.

Some contractors pay these workers according to the number of panels they install or finish per day; others pay an hourly rate. A 40-hour week is standard, but the workweek may sometimes be longer. Workers who are paid hourly rates receive premium pay for overtime.

Related Occupations

Drywall installers, ceiling tile installers, and tapers combine strength and dexterity with precision and accuracy to make materials fit according to a plan. Other occupations that require similar abilities include carpenters; carpet, floor, and tile installers and finishers; insulation workers; and plasterers and stucco masons.

Sources of Additional Information

For information about work opportunities in drywall application and finishing and ceiling tile installation, contact local drywall installation and ceiling tile installation contractors, a local of the unions previously mentioned, a local joint union-management apprenticeship committee, a State or local chapter of the Associated Builders and Contractors, or the nearest office of the State employment service or apprenticeship agency.

For details about job qualifications and training programs in drywall application and finishing and ceiling tile installation, contact:

➤ Associated Builders and Contractors, 1300 N. 17th St., Arlington, VA 22209**.**

➤ National Association of Home Builders, 1201 15th St. NW. Suite 800, Washington, DC 20005. Internet: **http://www.nahb.org**

➤ Home Builders Institute, 1201 15th St. NW., Washington, DC 20005. Internet: **http://www.hbi.org**

➤ International Union of Painters and Allied Trades, 1750 New York Ave. NW., Washington, DC 20006. Internet: **http://www.iupat.org**

➤ United Brotherhood of Carpenters and Joiners of America, 50 F St. NW., Washington, DC 20001. Internet: **http://www.carpenters.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their Web site: **http://www.doleta.gov**.

Electricians

(0*NET 47-2111.00)

Significant Points

- Job opportunities are expected to be good.
- Most electricians acquire their skills by completing an apprenticeship program lasting 3 to 5 years.
- More than one-quarter of wage and salary electricians work in industries other than construction.

Nature of the Work

Electricity is essential for light, power, air-conditioning, and refrigeration. Electricians install, connect, test, and maintain electrical systems for a variety of purposes, including climate control, security, and communications. They also may install and maintain the electronic controls for machines in business and industry. Although most electricians specialize in construction or maintenance, a growing number do both.

Electricians work with blueprints when they install electrical systems in factories, office buildings, homes, and other structures. Blueprints indicate the locations of circuits, outlets, load centers, panel boards, and other equipment. Electricians must follow the National Electric Code and comply with State and local building codes when they install these systems. In factories and offices, they first place conduit (pipe or tubing) inside designated partitions, walls, or other concealed areas. They also fasten to the walls small metal or plastic boxes that will house electrical switches and outlets. They then pull insulated wires or cables through the conduit to complete circuits between these boxes. In lighter construction, such as residential, plastic-covered wire usually is used instead of conduit.

Regardless of the type of wire used, electricians connect it to circuit breakers, transformers, or other components. They join the wires in boxes with various specially designed connectors. After they finish the wiring, they use testing equipment, such as ohmmeters, voltmeters, and oscilloscopes, to check the circuits for proper connections, ensuring electrical compatibility and safety of components.

Electricians also may install low voltage wiring systems in addition to wiring a building's electrical system. Low voltage wiring involves voice, data, and video wiring systems, such as those for telephones, computers and related equipment, intercoms, and fire alarm and security systems. Electricians also may install coaxial or fiber optic cable for computers and other telecommunications equipment and electronic controls for industrial equipment.

Maintenance work varies greatly, depending on where the electrician is employed. Electricians who specialize in residential work may rewire a home and replace an old fuse box with a new circuit breaker box to accommodate additional appliances. Those who work in large factories may repair motors, transformers, generators, and electronic controllers on machine tools and industrial robots. Those in office buildings and small plants may repair all types of electrical equipment.

Maintenance electricians spend much of their time doing preventive maintenance. They periodically inspect equipment, and locate and correct problems before breakdowns occur. Electricians may also advise management whether continued operation of equipment could be hazardous. When needed, they install new electrical equipment. When breakdowns occur, they must make the necessary repairs as quickly as possible in order to minimize inconvenience. Electricians may replace items such as circuit breakers, fuses, switches, electrical and electronic components, or wire. When working with complex electronic devices, they may work with engineers, engineering technicians, or industrial machinery installation, repair, and maintenance workers. (Statements on these occupations appear elsewhere in the *Handbook*.)

Electricians use handtools such as screwdrivers, pliers, knives, hacksaws, and wire strippers. They also use a variety of power tools as well as testing equipment such as oscilloscopes, ammeters, and test lamps.

Working Conditions

Electricians' work is sometimes strenuous. They bend conduit, stand for long periods, and frequently work on ladders and scaffolds. Their working environment varies, depending on the type of job. Some may work in dusty, dirty, hot, or wet conditions, or in confined areas, ditches, or other uncomfortable places. Electricians risk injury from electrical shock, falls, and cuts; to avoid injuries, they must follow strict safety procedures. Some electricians may have to travel great distances to jobsites.

Most electricians work a standard 40-hour week, although overtime may be required. Those in maintenance work may work nights or weekends, and be on call. Maintenance electricians may also have periodic extended overtime during scheduled maintenance or retooling periods. Companies that operate 24 hours a day may employ three shifts of electricians.

Employment

Electricians held about 659,000 jobs in 2002. More than one-quarter of wage and salary workers were employed in the construction industry; while the remainder worked as maintenance electricians employed outside the construction industry. In addition, about one in ten electricians were self-employed.

Because of the widespread need for electrical services, jobs for electricians are found in all parts of the country.

Training, Other Qualifications, and Advancement

Most people learn the electrical trade by completing an apprenticeship program lasting 3 to 5 years. Apprenticeship gives trainees a thorough knowledge of all aspects of the trade and generally improves their ability to find a job. Although electricians are more likely to be trained through apprenticeship than are workers in other construction trades, some still learn their skills informally on the job. Others train to be residential electricians in a 3-year program.

Electricians join the wires in boxes with specially designed connectors.

Apprenticeship programs may be sponsored by joint training committees made up of local unions of the International Brotherhood of Electrical Workers and local chapters of the National Electrical Contractors Association; company management committees of individual electrical contracting companies; or local chapters of the Associated Builders and Contractors and the Independent Electrical Contractors Association. Because of the comprehensive training received, those who complete apprenticeship programs qualify to do both maintenance and construction work.

The typical large apprenticeship program provides at least 144 hours of classroom instruction and 2,000 hours of on-the-job training each year. In the classroom, apprentices learn blueprint reading, electrical theory, electronics, mathematics, electrical code requirements, and safety and first aid practices. They also may receive specialized training in welding, communications, fire alarm systems, and cranes and elevators. On the job, under the supervision of experienced electricians, apprentices must demonstrate mastery of the electrician's work. At first, they drill holes, set anchors, and set up conduit. Later, they measure, fabricate, and install conduit, as well as install, connect, and test wiring, outlets, and switches. They also learn to set up and draw diagrams for entire electrical systems.

After finishing an apprenticeship, journeymen often continue to learn about related electrical systems, such as low voltage voice, data, and video systems. Many builders and owners want to work with only one contractor who can install or repair both regular electrical systems and low voltage systems.

Those who do not enter a formal apprenticeship program can begin to learn the trade informally by working as helpers for experienced electricians. While learning to install conduit, connect wires, and test circuits, helpers also learn safety practices. Many helpers supplement this training with trade school or correspondence courses.

Regardless of how one learns the trade, previous training is very helpful. High school courses in mathematics, electricity, electronics, mechanical drawing, science, and shop provide a good background. Special training offered in the U.S. Armed Forces and by postsecondary technical schools also is beneficial. All applicants should be in good health and have at least average physical strength. Agility and dexterity also are important. Good color vision is needed because workers frequently must identify electrical wires by color.

Most apprenticeship sponsors require applicants for apprentice positions to be at least 18 years old, have a high school diploma or its equivalent, and be able to pass a skills test. For those interested in becoming maintenance electricians, a background in electronics is increasingly important because of the growing use of complex electronic controls on manufacturing equipment.

Most localities require electricians to be licensed. Although licensing requirements vary from area to area, electricians usually must pass an examination that tests their knowledge of electrical theory, the National Electrical Code, and local electric and building codes. Electricians periodically take courses offered by their employer or union to keep abreast of changes in the National Electrical Code, materials, or methods of installation.

Experienced electricians can become supervisors and then superintendents. Those with sufficient capital and management skills may start their own contracting business, although this may require an electrical contractor's license. Many electricians become electrical inspectors.

Job Outlook

Job opportunities for electricians are expected to be good. Numerous openings will arise each year as experienced electricians leave the occupation. In addition, many potential workers may choose not to enter training programs because they prefer work that is less strenuous and has more comfortable working conditions.

Employment of electricians is expected to increase faster than the average for all occupations through the year 2012. As the population and economy grow, more electricians will be needed to install and maintain electrical devices and wiring in homes, factories, offices, and other structures. New technologies also are expected to continue to stimulate the demand for these workers. For example, buildings will be prewired during construction to accommodate use of computers and telecommunications equipment. More factories will be using robots and automated manufacturing systems. Additional jobs will be created by rehabilitation and retrofitting of existing structures.

In addition to jobs created by increased demand for electrical work, many openings will occur each year as electricians transfer to other occupations, retire, or leave the labor force for other reasons. Because the training for this occupation is long and difficult and the earnings are relatively high, a smaller proportion of electricians than of other craftworkers leave the occupation each year. The number of retirements is expected to rise, however, as more electricians reach retirement age.

Employment of construction electricians, like that of many other construction workers, is sensitive to changes in the economy. This results from the limited duration of construction projects and the cyclical nature of the construction industry. During economic downturns, job openings for electricians are reduced as the level of construction activity declines. Apprenticeship opportunities also are less plentiful during these periods.

Although employment of maintenance electricians is steadier than that of construction electricians, those working in the automotive and other manufacturing industries that are sensitive to cyclical swings in the economy may be laid off during recessions. Also, efforts to reduce operating costs and increase productivity through the increased use of contracting out for electrical services may limit opportunities for maintenance electricians in many industries. However, this should be partially offset by increased job opportunities for electricians in electrical contracting firms.

Job opportunities for electricians also vary by area. Employment opportunities follow the movement of people and businesses among States and local areas, and reflect differences in local economic conditions. The number of job opportunities in a given year may fluctuate widely from area to area.

Earnings

In 2002, median hourly earnings of electricians were $19.90. The middle 50 percent earned between $14.95 and $26.50. The lowest 10 percent earned less than $11.81, and the highest 10 percent earned more than $33.21. Median hourly earnings in the industries employing the largest numbers of electricians in 2002 are shown below:

Motor vehicle parts manufacturing	$28.72
Local government	21.15
Building equipment contractors	19.54
Nonresidential building construction	19.36
Employment services	15.46

Depending on experience, apprentices usually start at between 40 and 50 percent of the rate paid to fully trained electricians. As apprentices become more skilled, they receive periodic increases throughout the course of their training. Many employers also provide training opportunities for experienced electricians to improve their skills.

Many construction electricians are members of the International Brotherhood of Electrical Workers. Among unions organizing main-

tenance electricians are the International Brotherhood of Electrical Workers; the International Union of Electronic, Electrical, Salaried, Machine, and Furniture Workers; the International Association of Machinists and Aerospace Workers; the International Union, United Automobile, Aircraft and Agricultural Implement Workers of America; and the United Steelworkers of America.

Related Occupations

To install and maintain electrical systems, electricians combine manual skill and knowledge of electrical materials and concepts. Workers in other occupations involving similar skills include heating, air-conditioning, and refrigeration mechanics and installers; line installers and repairers; electrical and electronics installers and repairers; electronic home entertainment equipment installers and repairers; and elevator installers and repairers.

Sources of Additional Information

For details about apprenticeships or other work opportunities in this trade, contact the offices of the State employment service, the State apprenticeship agency, local electrical contractors or firms that employ maintenance electricians, or local union-management electrician apprenticeship committees. This information also may be available from local chapters of the Independent Electrical Contractors, Inc.; the National Electrical Contractors Association; the Home Builders Institute; the Associated Builders and Contractors; and the International Brotherhood of Electrical Workers.

For information about union apprenticeship programs, contact:

➤ National Joint Apprenticeship Training Committee (NJATC), 301 Prince George's Blvd., Upper Marlboro, MD 20774. Internet: **http://www.njatc.org**

➤ National Electrical Contractors Association (NECA), 3 Metro Center, Suite 1100, Bethesda, MD 20814. Internet: **http://www.necanet.org**

➤ International Brotherhood of Electrical Workers (IBEW), 1125 15th St. NW., Washington, DC 20005. Internet: **http://www.ibew.org**

For information about independent apprenticeship programs, contact:

➤ Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.

➤ Independent Electrical Contractors, Inc., 4401 Ford Ave., Suite 1100, Alexandria, VA 22302. Internet: **http://www.ieci.org**

➤ National Association of Home Builders, 1201 15th St. NW., Washington, DC 20005. Internet: **http://www.nahb.org**

➤ Home Builders Institute, 1201 15th St. NW., Washington, DC 20005. Internet: **http://www.hbi.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their Web site: **http://www.doleta.gov**.

Elevator Installers and Repairers

(0*NET 47-4021.00)

Significant Points

- Workers learn the trade through 4 years of on-the-job training and classroom instruction.
- Job opportunities are expected to be limited in this small occupation; prospects should be best for those with postsecondary education in electronics.
- Elevator installers and repairers lose less worktime due to inclement weather than do other construction trades workers.

Nature of the Work

Elevator installers and repairers—also called *elevator constructors* or *elevator mechanics*—assemble, install, and replace elevators, escalators, dumbwaiters, moving walkways, and similar equipment in new and old buildings. Once the equipment is in service, they maintain and repair it as well. They also are responsible for modernizing older equipment.

To install, repair, and maintain modern elevators, which are almost all electronically controlled, elevator installers and repairers must have a thorough knowledge of electronics, electricity, and hydraulics. Many elevators are controlled with microprocessors, which are programmed to analyze traffic conditions in order to dispatch elevators in the most efficient manner. With these computer controls, it is possible to get the greatest amount of service with the least number of cars.

When installing a new elevator, installers and repairers begin by studying blueprints to determine the equipment needed to install rails, machinery, car enclosures, motors, pumps, cylinders, and plunger foundations. Once this has been done, they begin equipment installation. Working on scaffolding or platforms, installers bolt or weld steel rails to the walls of the shaft to guide the elevator.

Elevator installers put in electrical wires and controls by running tubing, called conduit, along a shaft's walls from floor to floor. Once the conduit is in place, mechanics pull plastic-covered electrical wires through it. They then install electrical components and related devices required at each floor and at the main control panel in the machine room.

Installers bolt or weld together the steel frame of an elevator car at the bottom of the shaft; install the car's platform, walls, and doors; and attach guide shoes and rollers to minimize the lateral motion of the car as it travels through the shaft. They also install the outer doors and door frames at the elevator entrances on each floor.

For cabled elevators, these workers install geared or gearless machines with a traction drive wheel that guides and moves heavy steel cables connected to the elevator car and counterweight. (The counterweight moves in the opposite direction from the car and balances most of the weight of the car to reduce the weight that the elevator's motor must lift.) Elevator installers also install elevators in which a car sits on a hydraulic plunger that is driven by a pump. The plunger pushes the elevator car up from underneath, similar to a lift in an auto service station.

Installers and repairers also install escalators. They put in place the steel framework, the electrically powered stairs, and the tracks, and install associated motors and electrical wiring. In addition to elevators and escalators, installers and repairers also may install devices such as dumbwaiters and material lifts—which are similar to elevators in design—as well as moving walkways, stair lifts, and wheelchair lifts.

The most highly skilled elevator installers and repairers, called "adjusters," specialize in fine-tuning all the equipment after installation. Adjusters make sure that an elevator is working according to specifications and is stopping correctly at each floor within a specified time. Once an elevator is operating properly, it must be maintained and serviced regularly to keep it in safe working condition. Elevator installers and repairers generally do preventive maintenance—such as oiling and greasing moving parts, replacing worn parts, testing equipment with meters and gauges, and adjusting equipment for optimal performance. They also troubleshoot and may be called to do emergency repairs.

A service crew usually handles major repairs—for example, replacing cables, elevator doors, or machine bearings. This may require the use of cutting torches or rigging equipment—tools that an elevator repairer normally would not carry. Service crews also do major modernization and alteration work, such as moving and replacing electrical motors, hydraulic pumps, and control panels.

Elevator installers and repairers usually specialize in installation, maintenance, or repair work. Maintenance and repair workers generally need greater knowledge of electricity and electronics than do installers, because a large part of maintenance and repair work is troubleshooting. Similarly, adjusters need a thorough knowledge of electricity, electronics, and computers to ensure that newly installed elevators operate properly.

Working Conditions

Most elevator installers and repairers work a 40-hour week. However, overtime is required when essential elevator equipment must be repaired, and some workers are on 24-hour call. Unlike most elevator installers, workers who specialize in elevator maintenance are on their own most of the day and typically service the same elevators periodically.

Elevator installers lift and carry heavy equipment and parts, and may work in cramped spaces or awkward positions. Potential hazards include falls, electrical shock, muscle strains, and other injuries related to handling heavy equipment. Because most of their work is performed indoors in buildings under construction or in existing buildings, elevator installers and repairers lose less worktime due to inclement weather than do other construction trades workers.

Once an elevator is operating properly, it must be maintained and serviced regularly to keep it in safe working condition.

Employment
Elevator installers and repairers held about 21,000 jobs in 2002. Most were employed by special trade contractors. Others were employed by field offices of elevator manufacturers, wholesale distributors, small-elevator maintenance and repair contractors, government agencies, or businesses that do their own elevator maintenance and repair.

Training, Other Qualifications, and Advancement
Most elevator installers and repairers apply for their jobs through a local of the International Union of Elevator Constructors. Applicants for apprenticeship positions must be at least 18 years old, have a high school diploma or equivalent, and pass an aptitude test. Good physical condition and mechanical aptitude also are important.

Elevator installers and repairers learn their trade in a program administered by local joint educational committees representing the employers and the union. These programs, through which the apprentice learns everything from installation to repair, combine on-the-job training with classroom instruction in blueprint reading, electrical and electronic theory, mathematics, applications of physics, and safety. In nonunion shops, workers may complete training programs sponsored by independent contractors.

Generally, apprentices must complete a 6-month probationary period. After successful completion, they work toward becoming fully qualified within 4 years. To be classified as a fully qualified elevator installer or repairer, union trainees must pass a standard examination administered by the National Elevator Industry Educational Program. Most States and cities also require elevator installers and repairers to pass a licensing examination. Both union and nonunion technicians may take the Certified Elevator Technician (CET) course offered by the National Association of Elevator Contractors.

Most apprentices assist experienced elevator installers and repairers. Beginners carry materials and tools, bolt rails to walls, and assemble elevator cars. Eventually, apprentices learn more difficult tasks such as wiring, which requires knowledge of local and national electrical codes.

High school courses in electricity, mathematics, and physics provide a useful background. As elevators become increasingly sophisticated, workers may find it necessary to acquire more advanced formal education—for example, in postsecondary technical school or junior college—with an emphasis on electronics. Workers with more formal education, such as an associate degree, usually advance more quickly than do their counterparts.

Many elevator installers and repairers also receive training from their employers or through manufacturers to become familiar with a particular company's equipment. Retraining is very important if a worker is to keep abreast of technological developments in elevator repair. In fact, union elevator installers and repairers typically receive continual training throughout their careers, through correspondence courses, seminars, or formal classes. Although voluntary, this training greatly improves one's chances for promotion.

Some installers may receive further training in specialized areas and advance to the position of mechanic-in-charge, adjuster, supervisor, or elevator inspector. Adjusters, for example, may be picked for their position because they possess particular skills or are electronically inclined. Other workers may move into management, sales, or product design jobs.

Job Outlook
Job opportunities are expected to be limited in this small occupation. A large proportion of elevator installer and repairer jobs are unionized and involve a significant investment in training. As a result, workers tend to stay in this occupation for a long time. This investment in training, as well as good benefits and relatively high wages, results in fewer openings due to turnover, thus reducing job opportunities. Job prospects should be best for those with postsecondary education in electronics.

Employment of elevator installers and repairers is expected to increase about as fast as the average for all occupations through the year 2012. Job growth is related to the growth of nonresidential construction, such as commercial office buildings and stores that have elevators and escalators. The need to continually update and modernize old equipment, expand and access, improve appearance, and install increasingly sophisticated equipment and computerized controls also should add to the demand for elevator installers and repairers.

Because it is desirable that equipment always be kept in good working condition, economic downturns will have less of an effect on employment of elevator installers and repairers than on other construction trades.

Earnings
Median hourly earnings of elevator installers and repairers were $25.99 in 2002. The middle 50 percent earned between $20.08 and $31.72. The lowest 10 percent earned less than $14.60, and the top 10 percent earned more than $36.81. In 2002, median hourly earnings in the miscellaneous special trade contractors industry were $26.62. In addition to free continuing education, elevator installers and repairers receive basic benefits enjoyed by most other workers.

Related Occupations
Elevator installers and repairers combine electrical and mechanical skills with construction skills, such as welding, rigging, measuring, and blueprint reading. Other occupations that require many of these skills are boilermakers; electricians; electrical and electronics installers and repairers; industrial machinery installation, repair, and maintenance workers; sheet metal workers; and structural and reinforcing iron and metal workers.

Sources of Additional Information
For further information on opportunities as an elevator installer and repairer, contact:

➤ International Union of Elevator Constructors, 7154 Columbia Gateway Dr., Columbia, MD 21046. Internet: **http://www.iuec.org**

For additional information about the Certified Elevator Technician (CET) program, contact:

➤ National Association of Elevator Contractors,1298 Wellbrook Circle, Suite A, Conyers, GA 30012. Internet: **http://www.naec.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their Web site: **http://www.doleta.gov**.

Glaziers

(0*NET 47-2121.00)

Significant Points

- Many glaziers learn the trade by working as helpers to experienced glaziers; however, employers recommend a 3- to 4-year apprenticeship program.
- Job opportunities are expected to be excellent.

Nature of the Work

Glass serves many uses in modern life. Insulated and specially treated glass keeps in warmed or cooled air and provides good condensation and sound control qualities; tempered and laminated glass makes doors and windows more secure. In large commercial buildings, glass panels give office buildings a distinctive look while reducing the need for artificial lighting. The creative use of large windows, glass doors, skylights, and sunroom additions makes homes bright, airy, and inviting.

Glaziers are responsible for selecting, cutting, installing, replacing, and removing all types of glass. They generally work on one of several types of projects. Residential glazing involves work such as replacing glass in home windows; installing glass mirrors, shower doors, and bathtub enclosures; and fitting glass for tabletops and display cases. On commercial interior projects, glaziers install items such as heavy, often etched, decorative room dividers or security windows. Glazing projects also may involve replacement of storefront windows for establishments such as supermarkets, auto dealerships, or banks. In the construction of large commercial buildings, glaziers build metal framework extrusions and install glass panels or curtain walls.

Besides working with glass, glaziers also may work with plastics, granite, marble, similar materials used as glass substitutes, and films or laminates that improve the durability or safety of the glass. They may mount steel and aluminum sashes or frames and attach locks and hinges to glass doors. For most jobs, the glass is precut and mounted in frames at a factory or a contractor's shop. It arrives at the jobsite ready for glaziers to position and secure it in place. They may use a crane or hoist with suction cups to lift large, heavy pieces of glass. They then gently guide the glass into position by hand.

Once glaziers have the glass in place, they secure it with mastic, putty, or other pastelike cement, or with bolts, rubber gaskets, glazing compound, metal clips, or metal or wood moldings. When they secure glass using a rubber gasket—a thick, molded rubber half-tube with a split running its length—they first secure the gasket around the perimeter within the opening, then set the glass into the split side of the gasket, causing it to clamp to the edges and hold the glass firmly in place.

When they use metal clips and wood moldings, glaziers first secure the molding to the opening, place the glass in the molding, and then force springlike metal clips between the glass and the molding. The clips exert pressure and keep the glass firmly in place.

When a glazing compound is used, glaziers first spread it neatly against and around the edges of the molding on the inside of the opening. Next, they install the glass. Pressing it against the compound on the inside molding, workers screw or nail outside molding that loosely holds the glass in place. To hold it firmly, they pack the space between the molding and the glass with glazing compound and then trim any excess material with a glazing knife.

For some jobs, the glazier must cut the glass manually at the jobsite. To prepare the glass for cutting, glaziers rest it either on edge on a rack, or "A-frame," or flat against a cutting table. They then measure and mark the glass for the cut.

Glaziers cut glass with a special tool that has a small, very hard metal wheel. Using a straightedge as a guide, the glazier presses the cutter's wheel firmly on the glass, guiding and rolling it carefully to make a score just below the surface. To help the cutting tool move smoothly across the glass, workers brush a thin layer of oil along the line of the intended cut or dip the cutting tool in oil. Immediately after cutting, the glazier presses on the shorter end of the glass to break it cleanly along the cut.

In addition to handtools such as glasscutters, suction cups, and glazing knives, glaziers use power tools such as saws, drills, cutters, and grinders. An increasing number of glaziers use computers in the shop or at the jobsite to improve their layout work and reduce the amount of glass that is wasted.

Working Conditions

Glaziers often work outdoors, sometimes in inclement weather. At times, they work on scaffolds at great heights. They do a considerable amount of bending, kneeling, lifting, and standing. Glaziers may be injured by broken glass or cutting tools, by falls from scaffolds, or by improperly lifting heavy glass panels.

Employment

Glaziers held 49,000 jobs in 2002. Almost two-thirds of glaziers worked for glazing contractors engaged in new construction, alteration, and repair. About 1 in 5 glaziers worked in retail glass shops

For some jobs, the glazier must cut the glass manually at the jobsite.

that install or replace glass and for wholesale distributors of products containing glass.

Training, Other Qualifications, and Advancement

Many glaziers learn the trade informally on the job. They usually start as helpers, carrying glass and cleaning up debris in glass shops. They often practice cutting on discarded glass. After a while, they are given an opportunity to cut glass for a job. Eventually, helpers assist experienced workers on simple installation jobs. By working with experienced glaziers, they eventually acquire the skills of a fully qualified glazier.

Employers recommend that glaziers learn the trade through a formal apprenticeship program that lasts 3 to 4 years. Apprenticeship programs, which are administered by the National Glass Association and local union-management committees or local contractors' associations, consist of on-the-job training and a minimum of 144 hours of classroom instruction or home study each year. On the job, apprentices learn to use the tools and equipment of the trade; handle, measure, cut, and install glass and metal framing; cut and fit moldings; and install and balance glass doors. In the classroom, they are taught basic mathematics, blueprint reading and sketching, general construction techniques, safety practices, and first aid. Learning the trade through an apprenticeship program usually takes less time and provides more complete training than acquiring skills informally on the job, but opportunities to obtain apprenticeships are declining.

Local apprenticeship administrators determine the physical, age, and educational requirements needed by applicants for apprenticeships and for helper positions. In general, applicants must be in good physical condition and be at least 18 years old. High school or vocational school graduates are preferred. In some areas, applicants must take mechanical-aptitude tests. Courses in general mathematics, blueprint reading or mechanical drawing, general construction, and shop provide a good background.

Standards for acceptance into apprenticeship programs are rising to reflect changing skill requirements associated with the use of new products and equipment. In addition, the growing use of computers in glass layout requires that glaziers be familiar with personal computers.

Because many glaziers do not learn the trade through a formal apprenticeship program, some associations offer a series of written examinations that certify an individual's competency to perform glazier work at three progressively more difficult levels of proficiency. These levels include Level I, Glazier; Level II, Commercial Interior/Residential Glazier or Storefront/Curtainwall Glazier; and Level III, Master Glazier. There also is a certification program for auto-glass repair.

Advancement generally consists of increases in pay for most glaziers; some advance to supervisory jobs or become contractors or estimators.

Job Outlook

Job opportunities are expected to be excellent for glaziers, largely due to the numerous openings arising each year as experienced glaziers leave the occupation. In addition, many potential workers may choose not to enter this occupation because they prefer work that is less strenuous and has more comfortable working conditions.

Employment of glaziers is expected to increase about as fast as the average for all occupations through the year 2012, as a result of growth in residential and nonresidential construction. Demand for glaziers will be spurred by the continuing need to modernize and repair existing structures and the popularity of glass in bathroom and kitchen design. Improved glass performance related to insulation, privacy, safety, condensation control, and noise reduction also are expected to contribute to the demand for glaziers in both residential and nonresidential remodeling. A continuing emphasis on energy management, which encourages people to replace their old windows and doors with high-efficiency products, also should result in more jobs for glaziers. The increased level of security consciousness should spur demand for specialized safety glass in many commercial and government buildings.

Like other construction trades workers, glaziers employed in the construction industry should expect to experience periods of unemployment resulting from the limited duration of construction projects and the cyclical nature of the construction industry. During bad economic times, job openings for glaziers are reduced as the level of construction declines. Because construction activity varies from area to area, job openings and apprenticeship opportunities fluctuate with local economic conditions. Employment and apprenticeship opportunities should be greatest in metropolitan areas, where most glazing contractors and glass shops are located.

Earnings

In 2002, median hourly earnings of glaziers were $15.20. The middle 50 percent earned between $11.56 and $20.53. The lowest 10 percent earned less than $9.14, and the highest 10 percent earned more than $28.18. Median hourly earnings in the industries employing the largest numbers of glaziers in 2002 are shown below:

Foundation, structure, and building exterior contractors	$16.36
Building material and supplies dealers	13.13

Glaziers covered by union contracts generally earn more than their nonunion counterparts. Apprentice wage rates usually start at 40 to 50 percent of the rate paid to experienced glaziers and increase as they gain experience in the field. Because glaziers can lose time due to weather conditions and fluctuations in construction activity, their overall earnings may be lower than their hourly wages suggest.

Many glaziers employed in construction are members of the International Union of Painters and Allied Trades.

Related Occupations

Glaziers use their knowledge of construction materials and techniques to install glass. Other construction workers whose jobs also involve skilled, custom work are brickmasons, blockmasons, and stonemasons; carpenters; carpet, floor, and tile installers and finishers; cement masons, concrete finishers, segmental pavers, and terrazzo workers; and painters and paperhangers. Other related occupations include automotive body and related repairers who install broken or damaged glass on vehicles that they repair.

Sources of Additional Information

For more information about glazier apprenticeships or work opportunities, contact local glazing or general contractors, a local of the International Union of Painters and Allied Trades, a local joint union-management apprenticeship agency, or the nearest office of the State employment service or State apprenticeship agency.

For general information about the work of glaziers, contact:

➤ International Union of Painters and Allied Trades, 1750 New York Ave. NW., Washington, DC 20006. Internet: **http://www.iupat.org**

For information concerning training for glaziers, contact:

➤ National Glass Association, Education and Training Department, 8200 Greensboro Dr., Suite 302, McLean, VA 22102-3881. Internet: **http://www.glass.org**

➤ Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.

Hazardous Materials Removal Workers

(0*NET 47-4041.00)

Significant Points

- Working conditions can be hazardous, and the use of protective clothing often is required.
- Formal education beyond high school is not required, but a training program leading to a Federal license is mandatory.
- Good job opportunities are expected.

Nature of the Work

Increased public awareness and Federal and State regulations are resulting in the removal of hazardous materials from buildings, facilities, and the environment to prevent further contamination of natural resources and to promote public health and safety. Hazardous materials removal workers identify, remove, package, transport, and dispose of various hazardous materials, including asbestos, lead, and radioactive and nuclear materials. The removal of hazardous materials, or "hazmats," from public places and the environment also is called abatement, remediation, and decontamination.

Hazardous materials removal workers use a variety of tools and equipment, depending on the work at hand. Equipment ranges from brooms to personal protective suits that completely isolate workers from the hazardous material. The equipment required varies with the threat of contamination and can include disposable or reusable coveralls, gloves, hardhats, shoe covers, safety glasses or goggles, chemical-resistant clothing, face shields, and devices to protect one's hearing. Most workers also are required to wear respirators while working, to protect them from airborne particles. The respirators range from simple versions that cover only the mouth and nose to self-contained suits with their own air supply.

In the past, asbestos was used to fireproof roofing and flooring, for heat insulation, and for a variety of other purposes. Today, asbestos is rarely used in buildings, but there still are structures that contain the material. Embedded in materials, asbestos is fairly harmless; airborne, however, it can cause several lung diseases, including lung cancer and asbestosis. Similarly, lead was a common building component found in paint and plumbing fixtures and pipes until the late 1970s. Because lead is easily absorbed into the bloodstream, often from breathing lead dust or from eating chips of paint containing lead, it can cause serious health risks, especially in children. Due to these risks, it has become necessary to remove lead-based products and asbestos from buildings and structures.

Asbestos abatement workers and *lead abatement workers* remove asbestos, lead, and other materials from buildings scheduled to be renovated or demolished. Using a variety of hand and power tools, such as vacuums and scrapers, these workers remove the asbestos and lead from surfaces. A typical residential lead abatement project involves the use of a chemical to strip the lead-based paint from the walls of the home. Lead abatement workers apply the compound with a putty knife and allow it to dry. Then they scrape the hazardous material into an impregnable container for transport and storage. They also use sandblasters and high-pressure water sprayers to remove lead from large structures. The vacuums utilized by asbestos abatement workers have special, highly efficient filters designed to trap the asbestos, which later is disposed of or stored. During the abatement, special monitors measure the amount of asbestos and lead in the air, to protect the workers; in addition, lead abatement workers wear a personal air monitor that indicates the amount of lead to which a worker has been exposed. Workers also use monitoring devices to identify the asbestos, lead, and other materials that need to be removed from the surfaces of walls and structures.

Transportation of hazardous materials is safer today than it was in the past, but accidents still occur. *Emergency and disaster response workers* clean up hazardous materials after train derailments and trucking accidents. These workers also are needed when an immediate cleanup is required, as would be the case after an attack by biological or chemical weapons.

Radioactive materials are classified as either high- or low-level wastes. High-level wastes are primarily nuclear-reactor fuels used to produce electricity. Low-level wastes include any radioactively contaminated protective clothing, tools, filters, medical equipment, and other items. *Decontamination technicians* perform duties similar to those of janitors and cleaners. They use brooms, mops, and other tools to clean exposed areas and remove exposed items for decontamination or disposal. With experience, these workers can advance to *radiation-protection technician* jobs and use radiation survey meters to locate and evaluate materials, operate high-pressure cleaning equipment for decontamination, and package radioactive materials for transportation or disposal.

Decommissioning and decontamination workers remove and treat radioactive materials generated by nuclear facilities and power plants. With a variety of handtools, they break down contaminated items such as "gloveboxes," which are used to process radioactive materials. At decommissioning sites, the workers clean and decontaminate the facility, as well as remove any radioactive or contaminated materials.

Treatment, storage, and disposal workers transport and prepare materials for treatment or disposal. To ensure proper treatment of the materials, laws require these workers to be able to verify shipping manifests. At incinerator facilities, treatment, storage, and disposal workers transport materials from the customer or service center to the incinerator. At landfills, they follow a strict procedure for the processing and storage of hazardous materials. They organize and track the location of items in the landfill and may help change the state of a material from liquid to solid in preparation for its storage. These workers typically operate heavy machinery, such as forklifts, earthmoving machinery, and large trucks and rigs.

Mold remediation is a new and growing part of the work of some hazardous materials removal workers. Some types of mold can cause allergic reactions, especially in people who are susceptible to them.

Most hazardous materials removal workers are required to wear respirators to protect them from airborne particles.

Although mold is present in almost all structures, some mold—especially the types that cause allergic reactions—can infest a building to such a degree that extensive efforts must be taken to remove it safely. Mold typically grows in damp areas, in heating and air-conditioning ducts, within walls, and in attics and basements. Although some mold remediation work is undertaken by other construction workers, mold often must be removed by hazardous materials removal workers, who take special precautions to protect themselves and surrounding areas from being contaminated.

Hazardous materials removal workers also may be required to construct scaffolding or erect containment areas prior to abatement or decontamination. In most cases, government regulation dictates that hazardous materials removal workers be closely supervised on the worksite. The standard usually is 1 supervisor to every 10 workers. The work is highly structured, sometimes planned years in advance, and team oriented. There is a great deal of cooperation among supervisors and workers. Because of the hazard presented by the materials being removed, work areas are restricted to licensed hazardous materials removal workers, thus minimizing exposure to the public.

Working Conditions

Hazardous materials removal workers function in a highly structured environment, to minimize the danger they face. Each phase of an operation is planned in advance, and workers are trained to deal with safety breaches and hazardous situations. Crews and supervisors take every precaution to ensure that the worksite is safe. Whether they work in asbestos, mold, or lead abatement or in radioactive decontamination, hazardous materials removal workers must stand, stoop, and kneel for long periods. Some must wear fully enclosed personal protective suits for several hours at a time; these suits may be hot and uncomfortable and may cause some individuals to experience claustrophobia.

Hazardous materials removal workers face different working conditions, depending on their area of expertise. Although many work a standard 40-hour week, overtime and shift work are common, especially in asbestos and lead abatement. Asbestos abatement and lead abatement workers are found primarily in structures such as office buildings and schools. Because they are under pressure to complete their work within certain deadlines, workers may experience fatigue. Completing projects frequently requires night and weekend work, because hazardous materials removal workers often work around the schedules of others. Treatment, storage, and disposal workers are employed primarily at facilities such as landfills, incinerators, boilers, and industrial furnaces. These facilities often are located in remote areas, due to the kinds of work being done. As a result, workers employed by treatment, storage, or disposal facilities may commute long distances to their jobs.

Decommissioning and decontamination workers, decontamination technicians, and radiation protection technicians work at nuclear facilities and electric power plants. Like treatment, storage, and disposal facilities, these sites often are far from urban areas. Workers, who often perform jobs in cramped conditions, may need to use sharp tools to dismantle contaminated objects. A hazardous materials removal worker must have great self-control and a level head to cope with the daily stress associated with handling hazardous materials.

Hazardous materials removal workers may be required to travel outside their normal working areas in order to respond to emergencies, the cleanup of which sometimes take several days or weeks to complete. During the cleanup, workers may be away from home for the entire time.

Employment

Hazardous materials removal workers held about 38,000 jobs in 2002. About 7 in 10 were employed in waste management and remediation services. About 6 percent were employed by specialty trade contractors, primarily in asbestos abatement and lead abatement. A small number worked at nuclear and electric plants as decommissioning and decontamination workers and radiation safety and decontamination technicians.

Training, Other Qualifications, and Advancement

No formal education beyond a high school diploma is required for a person to become a hazardous materials removal worker. Federal regulations require an individual to have a license to work in the occupation, although, at present, there are few laws regulating mold removal. Most employers provide technical training on the job, but a formal 32- to 40-hour training program must be completed if one is to be licensed to as an asbestos abatement and lead abatement worker or a treatment, storage, and disposal worker. The program covers health hazards, personal protective equipment and clothing, site safety, recognition and identification of hazards, and decontamination. In some cases, workers discover one hazardous material while abating another. If they are not licensed to work with the newly discovered material, they cannot continue to work with it. Many experienced workers opt to take courses in additional disciplines to avoid this situation. Some employers prefer to hire workers licensed in multiple disciplines.

For decommissioning and decontamination workers employed at nuclear facilities, training is more extensive. In addition to the standard 40-hour training course in asbestos, lead, and hazardous waste, workers must take courses dealing with regulations governing nuclear materials and radiation safety. These courses add up to approximately 3 months of training, although most are not taken consecutively. Many agencies, organizations, and companies throughout the country provide training programs that are approved by the U.S. Environmental Protection Agency, the U.S. Department of Energy, and other regulatory bodies. Workers in all fields are required to take refresher courses every year in order to maintain their license.

Workers must be able to perform basic mathematical conversions and calculations, and should have good physical strength and manual dexterity. Because of the nature of the work and the time constraints sometimes involved, employers prefer people who are dependable, prompt, and detail-oriented. Because much of the work is done in buildings, a background in construction is helpful.

Job Outlook

Job opportunities are expected to be good for hazardous materials removal workers. The occupation is characterized by a relatively high rate of turnover, resulting in a number of job openings each year stemming from experienced workers leaving the occupation. In addition, many potential workers are not attracted to this occupation, because they may prefer work that is less strenuous and has safer working conditions. Experienced workers will have especially favorable opportunities, particularly in the private sector, as more State and local governments contract out hazardous materials removal work to private companies.

Employment of hazardous materials removal workers is expected to grow much faster than the average for all occupations through the year 2012, reflecting increasing concern for a safe and clean environment. Special-trade contractors will have strong demand for the largest segment of these workers, namely, asbestos abatement and lead abatement workers; lead abatement should offer par-

ticularly good opportunities. Mold remediation is an especially rapidly growing part of the occupation at the present time, but it is unclear whether its rapid growth will continue: until a few years ago, mold remediation was not considered a significant problem, and perhaps a few years from now, less attention will be paid to it again.

Employment of decontamination technicians, radiation safety technicians, and decommissioning and decontamination workers is expected to grow in response to increased pressure for safer and cleaner nuclear and electric generator facilities. In addition, the number of closed facilities that need decommissioning may continue to grow, due to Federal legislation. These workers also are less affected by economic fluctuations, because the facilities in which they work must operate, regardless of the state of the economy.

Earnings

Median hourly earnings of hazardous materials removal workers were $15.61 in 2002. The middle 50 percent earned between $12.37 and $22.18 per hour. The lowest 10 percent earned less than $10.29 per hour, and the highest 10 percent earned more than $26.60 per hour. The median hourly earnings in remediation and other waste management services, the largest industry employing hazardous materials removal workers in 2002, were $14.92 in 2002.

According to the limited data available, treatment, storage, and disposal workers usually earn slightly more than asbestos abatement and lead abatement workers. Decontamination and decommissioning workers and radiation protection technicians, though constituting the smallest group, tend to earn the highest wages.

Related Occupations

Asbestos abatement workers and lead abatement workers share skills with other construction trades workers, including painters and paperhangers; insulation workers; and sheet metal workers. Treatment, storage, and disposal workers, decommissioning and decontamination workers, and decontamination and radiation safety technicians work closely with plant and system operators, such as power-plant operators, distributors, and dispatchers and water and wastewater treatment plant operators.

Sources of Additional Information

For more information on hazardous materials removal workers, including information on training, contact

➤ Laborers-AGC Education and Training Fund, 37 Deerfield Rd., P.O. Box 37, Pomfret, CT 06259. Internet: **http://www.laborerslearn.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system, and links to State apprenticeship programs, check their website: **http:// www.doleta.gov**.

Insulation Workers

(0*NET 47-2131.00, 47-2132.00)

Significant Points

- Workers must follow strict safety guidelines to protect themselves from the dangers of insulating irritants.
- Most insulation workers learn their work informally on the job; others complete formal apprenticeship programs.
- Job opportunities in the occupation are expected to be excellent.

Nature of the Work

Properly insulated buildings reduce energy consumption by keeping heat in during the winter and out in the summer. Refrigerated storage rooms, vats, tanks, vessels, boilers, and steam and hot-water pipes also are insulated to prevent the wasteful transfer of heat. Insulation workers install the materials used to insulate buildings and equipment.

Insulation workers cement, staple, wire, tape, or spray insulation. When covering a steampipe, for example, insulation workers measure and cut sections of insulation to the proper length, stretch it open along a cut that runs the length of the material, and slip it over the pipe. They fasten the insulation with adhesive, staples, tape, or wire bands. Sometimes, they wrap a cover of aluminum, plastic, or canvas over the insulation and cement or band the cover in place. Insulation workers may screw on sheet metal around insulated pipes to protect the insulation from weather conditions or physical abuse.

When covering a wall or other flat surface, workers may use a hose to spray foam insulation onto a wire mesh that provides a rough surface to which the foam can cling and that adds strength to the finished surface. Workers may then install drywall or apply a final coat of plaster for a finished appearance.

In attics or exterior walls of uninsulated buildings, workers blow in loose-fill insulation. A helper feeds a machine with fiberglass, cellulose, or rock-wool insulation, while another worker blows the insulation with a compressor hose into the space being filled.

In new construction or on major renovations, insulation workers staple fiberglass or rock-wool batts to exterior walls and ceilings before drywall, paneling, or plaster walls are put in place. In making major renovations to old buildings or when putting new insulation around pipes and industrial machinery, insulation workers often must first remove the old insulation. In the past, asbestos—now known to cause cancer in humans-was used extensively in walls and ceilings and to cover pipes, boilers, and various industrial equipment. Because of this danger, U.S. Environmental Protection Agency regulations require that asbestos be removed before a building undergoes major renovations or is demolished. When asbestos is present, specially trained workers must remove the asbestos before insulation workers can install the new insulating materials. (See the statement on hazardous materials removal workers elsewhere in the *Handbook*.)

Insulation workers use common handtools—trowels, brushes, knives, scissors, saws, pliers, and stapling guns. They use power saws to cut insulating materials, welding machines to join sheet metal or secure clamps, and compressors to blow or spray insulation.

Working Conditions

Insulation workers generally work indoors. They spend most of the workday on their feet, either standing, bending, or kneeling. Sometimes, they work from ladders or in tight spaces. The work requires more coordination than strength. Insulation work often is dusty and dirty, and the summer heat can make the insulation worker very uncomfortable. Minute particles from insulation materials, especially when blown, can irritate the eyes, skin, and respiratory system. Workers must follow strict safety guidelines to protect themselves from the dangers of insulating irritants. They keep work areas well ventilated; wear protective suits, masks, and respirators; and take decontamination showers when necessary.

Employment

Insulation workers held about 53,000 jobs in 2002. The construction industry employed 4 out of 5 workers; most worked for building finishing contractors. Small numbers of insulation workers held jobs in the Federal Government, in wholesale trade, and in shipbuilding and other manufacturing industries that have extensive installations for power, heating, and cooling. Most worked in urban areas. In less populated areas, carpenters, heating and air-conditioning installers or drywall installers may do insulation work.

Training, Other Qualifications, and Advancement

Most insulation workers learn their trade informally on the job, although some complete formal apprenticeship programs. For entry-level jobs, insulation contractors prefer high school graduates who are in good physical condition and licensed to drive. High school courses in blueprint reading, shop mathematics, science, sheet metal layout, woodworking, and general construction provide a helpful background. Applicants seeking apprenticeship positions should have a high school diploma or its equivalent and be at least 18 years old.

Trainees who learn on the job receive instruction and supervision from experienced insulation workers. Trainees begin with simple tasks, such as carrying insulation or holding material while it is fastened in place. On-the-job training can take up to 2 years, depending on the nature of the work. A certification program is being developed by insulation contractor organizations to help all workers prove their skills and knowledge. Learning to install insulation in homes generally requires less training than does learning to apply insulation in commercial and industrial settings. As they

Insulation workers install the materials used to insulate buildings and equipment.

gain experience, trainees receive less supervision, more responsibility, and higher pay.

In contrast, trainees in formal apprenticeship programs receive indepth instruction in all phases of insulation. Apprenticeship programs may be provided by a joint committee of local insulation contractors and the local union of the International Association of Heat and Frost Insulators and Asbestos Workers, to which many insulation workers belong. Programs normally consist of 4 years of on-the-job training coupled with classroom instruction, and trainees must pass practical and written tests to demonstrate their knowledge of the trade.

Skilled insulation workers may advance to supervisor, shop superintendent, or insulation contract estimator, or they may set up their own insulation business.

Job Outlook

Job opportunities are expected to be excellent for insulation workers. Because there are no strict training requirements for entry, many people with limited skills work as insulation workers for a short time and then move on to other types of work, creating many job openings. In addition, many potential workers may prefer work that is less strenuous and that has more comfortable working conditions. Other opportunities will arise from the need to replace workers who leave the labor force.

In addition to opening up as a result of replacement needs, new jobs will arise as employment of insulation workers increases about as fast as the average for all occupations through the year 2012, due to growth in residential and nonresidential construction. Demand for insulation workers will be spurred by continuing concerns about the efficient use of energy to heat and cool buildings, resulting in increased demand for these workers in the construction of new residential, industrial, and commercial buildings. In addition, renovation and efforts to improve insulation in existing structures will increase demand.

Insulation workers in the construction industry may experience periods of unemployment because of the short duration of many construction projects and the cyclical nature of construction activity. Workers employed in industrial plants generally have more stable employment because maintenance and repair must be done on a continuing basis. Most insulation is applied after buildings are enclosed, so weather conditions have less effect on the employment of insulation workers than on that of some other construction occupations.

Earnings

In 2002, median hourly earnings of insulation workers were $13.91. The middle 50 percent earned between $10.58 and $18.36. The lowest 10 percent earned less than $8.45, and the highest 10 percent earned more than $26.29. Median hourly earnings in the industries employing the largest numbers of insulation workers in 2002 are shown in the following tabulation:

Building equipment contractors	$15.30
Building finishing contractors	12.97

Union workers tend to earn more than nonunion workers. Apprentices start at about one-half of the journey worker's wage. Insulation workers doing commercial and industrial work earn substantially more than those working in residential construction, which does not require as much skill.

Related Occupations

Insulation workers combine their knowledge of insulation materials with the skills of cutting, fitting, and installing materials. Workers in occupations involving similar skills include carpenters; carpet, floor, and tile installers and finishers; drywall installers, ceiling tile installers, and tapers; roofers; and sheet metal workers.

Sources of Additional Information

For information about training programs or other work opportunities in this trade, contact a local insulation contractor, the nearest office of the State employment service or apprenticeship agency, or either of the following organizations:

➤ National Insulation Association, 99 Canal Center Plaza, Suite 222, Alexandria, VA 22314. Internet: **http://www.insulation.org/**

➤ Insulation Contractors Association of America, 1321 Duke St., Suite 303, Alexandria, VA 22314. Internet: **http://www.insulate.org**

Painters and Paperhangers

(0*NET 47-2141.00, 47-2142.00)

Significant Points

- Largely due to worker turnover, employment prospects should be good.
- Most workers learn informally on the job as helpers; however, training authorities recommend completion of an apprenticeship program.
- Two in five painters and paperhangers are self-employed, compared with one in five of all construction trades workers.
- Working conditions can be hazardous.

Nature of the Work

Paint and wall coverings make surfaces clean, attractive, and bright. In addition, paints and other sealers protect exterior surfaces from wear caused by exposure to the weather. Apprentices learn both painting and paperhanging, even though each requires different skills.

Painters apply paint, stain, varnish, and other finishes to buildings and other structures. They choose the right paint or finish for the surface to be covered, taking into account durability, ease of handling, method of application, and customers' wishes. Painters first prepare the surfaces to be covered, so that the paint will adhere properly. This may require removing the old coat of paint by stripping, sanding, wire brushing, burning, or water and abrasive blasting. Painters also wash walls and trim to remove dirt and grease, fill nail holes and cracks, sandpaper rough spots, and brush off dust. On new surfaces, they apply a primer or sealer to prepare the surface for the finish coat. Painters also mix paints and match colors, relying on knowledge of paint composition and color harmony. In large paint shops or hardware stores, these functions are automated.

There are several ways to apply paint and similar coverings. Painters must be able to choose the right paint applicator for each job, depending on the surface to be covered, the characteristics of the finish, and other factors. Some jobs need only a good bristle brush with a soft, tapered edge; others require a dip or fountain pressure roller; still others can best be done using a paint sprayer. Many jobs need several types of applicators. The right tools for each job not only expedite the painter's work but also produce the most attractive surface.

When working on tall buildings, painters erect scaffolding, including "swing stages," scaffolds suspended by ropes, or cables attached to roof hooks. When painting steeples and other conical structures, they use a bosun's chair, a swing-like device.

Paperhangers cover walls and ceilings with decorative wall coverings made of paper, vinyl, or fabric. They first prepare the surface to be covered by applying "sizing," which seals the surface and makes the covering stick better. When redecorating, they may first remove the old covering by soaking, steaming, or applying solvents. When necessary, they patch holes and take care of other imperfections before hanging the new wall covering.

After the surface has been prepared, paperhangers must prepare the paste or other adhesive. Then, they measure the area to be covered, check the covering for flaws, cut the covering into strips of the proper size, and closely examine the pattern in order to match it when the strips are hung. Much of this process can now be handled by specialized equipment.

The next step is to brush or roll the adhesive onto the back of the covering and to then place the strips on the wall or ceiling, making sure the pattern is matched, the strips are hung straight, and the edges are butted together to make tight, closed seams. Finally, paperhangers smooth the strips to remove bubbles and wrinkles, trim the top and bottom with a razor knife, and wipe off any excess adhesive.

Working Conditions

Most painters and paperhangers work 40 hours a week or less; about one-quarter have variable schedules or work part time. Painters and paperhangers must stand for long periods. Their jobs also require a considerable amount of climbing and bending. These workers must have stamina, because much of the work is done with their arms raised overhead. Painters often work outdoors but seldom in wet, cold, or inclement weather.

Painters and paperhangers risk injury from slips or falls off ladders and scaffolds. They sometimes may work with materials that can be hazardous if masks are not worn or if ventilation is poor. Some painting jobs can leave a worker covered with paint. In some cases, painters may work in a sealed self-contained suit to prevent inhalation of or contact with hazardous materials.

Employment

Painters and paperhangers held about 468,000 jobs in 2002; most were painters. Around 42 percent of painters and paperhangers work for contractors engaged in new construction, repair, restoration, or remodeling work. In addition, organizations that own or manage large buildings—such as apartment complexes—employ maintenance painters, as do some schools, hospitals, factories, and government agencies.

Self-employed independent painting contractors accounted for two in five of all painters and paperhangers, significantly greater than the one in five of construction trades workers in general.

Training, Other Qualifications, and Advancement

Painting and paperhanging are learned through apprenticeship or informal, on-the-job instruction. Although training authorities recommend completion of an apprenticeship program as the best way to become a painter or paperhanger, most painters learn the trade informally on the job as a helper to an experienced painter. Limited

Self-employed independent painting contractors accounted for 2 in 5 of all painters and paperhangers, double the 1 in 5 of construction trades workers in general.

opportunities for informal training exist for paperhangers because few paperhangers need helpers.

The apprenticeship for painters and paperhangers consists of 2 to 4 years of on-the-job training, in addition to 144 hours of related classroom instruction each year. Apprentices receive instruction in color harmony, use and care of tools and equipment, surface preparation, application techniques, paint mixing and matching, characteristics of different finishes, blueprint reading, wood finishing, and safety.

Whether a painter learns the trade through a formal apprenticeship or informally as a helper, on-the-job instruction covers similar skill areas. Under the direction of experienced workers, trainees carry supplies, erect scaffolds, and do simple painting and surface preparation tasks while they learn about paint and painting equipment. As they gain experience, trainees learn to prepare surfaces for painting and paperhanging, to mix paints, and to apply paint and wall coverings efficiently and neatly. Near the end of their training, they may learn decorating concepts, color coordination, and cost-estimating techniques. In addition to learning craft skills, painters must become familiar with safety and health regulations so that their work complies with the law.

Apprentices or helpers generally must be at least 18 years old and in good physical condition. A high school education or its equivalent, with courses in mathematics, usually is required to enter an apprenticeship program. Applicants should have good manual dexterity and color sense.

Painters and paperhangers may advance to supervisory or estimating jobs with painting and decorating contractors. Many establish their own painting and decorating businesses.

Job Outlook

Job prospects should be good, as thousands of painters and paperhangers transfer to other occupations or leave the labor force each year. Because there are no strict training requirements for entry, many people with limited skills work as painters or paperhangers for a short time and then move on to other types of work. Many fewer openings will arise for paperhangers because the number of these jobs is comparatively small.

In addition to the need to replace experienced workers, new jobs will be created. Employment of painters and paperhangers is expected to grow about as fast as the average for all occupations through the year 2012, reflecting increases in the level of new construction and in the stock of buildings and other structures that require maintenance and renovation. Painting is very labor-intensive and not susceptible to technological changes that might make workers more productive and, thus, restrict employment growth.

Jobseekers considering these occupations should expect some periods of unemployment, especially until they gain experience. Many construction projects are of short duration, and construction activity is cyclical and seasonal in nature. Remodeling, restoration, and maintenance projects, however, often provide many jobs for painters and paperhangers even when new construction activity declines. The most versatile painters and skilled paperhangers generally are best able to keep working steadily during downturns in the economy.

Earnings

In 2002, median hourly earnings of painters, construction and maintenance, were $13.98. The middle 50 percent earned between $11.08 and $18.00. The lowest 10 percent earned less than $9.10, and the highest 10 percent earned more than $23.90. Median hourly earnings in the industries employing the largest numbers of painters in 2002 are shown below:

Local government	$17.46
Residential building construction	14.01
Building finishing contractors	14.00
Lessors of real estate	11.62
Employment services	10.21

In 2002, median earnings for paperhangers were $15.22. The middle 50 percent earned between $11.52 and $20.38. The lowest 10 percent earned less than $9.04, and the highest 10 percent earned more than $25.64.

Earnings for painters may be reduced on occasion because of bad weather and the short-term nature of many construction jobs. Hourly wage rates for apprentices usually start at 40 to 50 percent of the rate for experienced workers and increase periodically.

Some painters and paperhangers are members of the International Brotherhood of Painters and Allied Trades. Some maintenance painters are members of other unions.

Related Occupations

Painters and paperhangers apply various coverings to decorate and protect wood, drywall, metal, and other surfaces. Other construction occupations in which workers do finishing work include carpenters; carpet, floor, and tile installers and finishers; drywall installers, ceiling tile installers, and tapers; painting and coating workers, except construction and maintenance; and plasterers and stucco masons.

Sources of Additional Information

For details about painting and paperhanging apprenticeships or work opportunities, contact local painting and decorating contractors, a local of the International Union of Painters and Allied Trades, a local joint union-management apprenticeship committee, or an office of the State apprenticeship agency or employment service.

For information about the work of painters and paperhangers and training opportunities, contact:

➤ International Union of Painters and Allied Trades, 1750 New York Ave. NW., Washington, DC 20006. Internet: **http://www.iupat.org**

➤ Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.

➤ Painting and Decorating Contractors of America, 3913 Old Lee Hwy., Fairfax, VA, 22030. Internet: **http://www.pdca.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their Web site: **http://www.doleta.gov**.

Pipelayers, Plumbers, Pipefitters, and Steamfitters

(0*NET 47-2151.00, 47-2152.01, 47-2152.02, 47-2152.03)

Significant Points

- Job opportunities should be excellent because not enough people are seeking training.
- Most workers learn the trade through 4 or 5 years of formal apprenticeship training.
- Pipelayers, plumbers, pipefitters, and steamfitters make up one of the largest and highest paid construction occupations.

Nature of the Work

Most people are familiar with plumbers, who come to their home to unclog a drain or install an appliance. In addition to these activities, however, pipelayers, plumbers, pipefitters, and steamfitters install, maintain, and repair many different types of pipe systems. For example, some systems move water to a municipal water treatment plant and then to residential, commercial, and public buildings. Other systems dispose of waste, provide gas to stoves and furnaces, or supply air-conditioning. Pipe systems in powerplants carry the steam that powers huge turbines. Pipes also are used in manufacturing plants to move material through the production process. Specialized piping systems are very important in both pharmaceutical and computer-chip manufacturing.

Although pipelaying, plumbing, pipefitting, and steamfitting sometimes are considered a single trade, workers generally specialize in one of the four areas. *Pipelayers* lay clay, concrete, plastic, or cast-iron pipe for drains, sewers, water mains, and oil or gas lines. Before laying the pipe, pipelayers prepare and grade the trenches either manually or with machines. *Plumbers* install and repair the water, waste disposal, drainage, and gas systems in homes and commercial and industrial buildings. Plumbers also install plumbing fixtures—bathtubs, showers, sinks, and toilets—and appliances such as dishwashers and water heaters. *Pipefitters* install and repair both high- and low-pressure pipe systems used in manufacturing, in the generation of electricity, and in heating and cooling buildings. They also install automatic controls that are increasingly being used to regulate these systems. Some pipefitters specialize in only one type of system. *Steamfitters*, for example, install pipe systems that move liquids or gases under high pressure. *Sprinklerfitters* install automatic fire sprinkler systems in buildings.

Pipelayers, plumbers, pipefitters, and steamfitters use many different materials and construction techniques, depending on the type of project. Residential water systems, for example, incorporate copper, steel, and plastic pipe that can be handled and installed by one or two workers. Municipal sewerage systems, on the other hand, are made of large cast-iron pipes; installation normally requires crews of pipefitters. Despite these differences, all pipelayers, plumbers, pipefitters, and steamfitters must be able to follow building plans or blueprints and instructions from supervisors, lay out the job, and work efficiently with the materials and tools of the trade. Computers often are used to create blueprints and plan layouts.

When construction plumbers install piping in a house, for example, they work from blueprints or drawings that show the planned location of pipes, plumbing fixtures, and appliances. Recently, plumbers have become more involved in the design process. Their knowledge of codes and the operation of plumbing systems can cut costs. They first lay out the job to fit the piping into the structure of the house with the least waste of material. Then they measure and mark areas in which pipes will be installed and connected. Construction plumbers also check for obstructions such as electrical wiring and, if necessary, plan the pipe installation around the problem.

Sometimes, plumbers have to cut holes in walls, ceilings, and floors of a house. For some systems, they may hang steel supports from ceiling joists to hold the pipe in place. To assemble a system, plumbers—using saws, pipe cutters, and pipe-bending machines—cut and bend lengths of pipe. They connect lengths of pipe with fittings, using methods that depend on the type of pipe used. For plastic pipe, plumbers connect the sections and fittings with adhesives. For copper pipe, they slide a fitting over the end of the pipe and solder it in place with a torch.

After the piping is in place in the house, plumbers install the fixtures and appliances and connect the system to the outside water or sewer lines. Finally, using pressure gauges, they check the system to ensure that the plumbing works properly.

Working Conditions

Because pipelayers, plumbers, pipefitters, and steamfitters frequently must lift heavy pipes, stand for long periods, and sometimes work in uncomfortable or cramped positions, they need physical strength as well as stamina. They also may have to work outdoors in

Pipelayers, plumbers, pipefitters, and steamfitters use many different materials and construction techniques, depending on the type of project.

inclement weather. In addition, they are subject to possible falls from ladders, cuts from sharp tools, and burns from hot pipes or soldering equipment.

Pipelayers, plumbers, pipefitters, and steamfitters engaged in construction generally work a standard 40-hour week; those involved in maintaining pipe systems, including those who provide maintenance services under contract, may have to work evening or weekend shifts, as well as be on call. These maintenance workers may spend quite a bit of time traveling to and from worksites.

Employment

Pipelayers, plumbers, pipefitters, and steamfitters constitute one of the largest construction occupations, holding about 550,000 jobs in 2002. About 7 in 10 worked for plumbing, heating, and air-conditioning contractors engaged in new construction, repair, modernization, or maintenance work. Others did maintenance work for a variety of industrial, commercial, and government employers. For example, pipefitters were employed as maintenance personnel in the petroleum and chemical industries, in which manufacturing operations require the moving of liquids and gases through pipes. About 1 of every 10 pipelayers, plumbers, pipefitters, and steamfitters was self-employed. One in three pipelayers, plumbers, pipefitters, and steamfitters belong to a union.

Jobs for pipelayers, plumbers, pipefitters, and steamfitters are distributed across the country in about the same proportion as the general population.

Training, Other Qualifications, and Advancement

Virtually all pipelayers, plumbers, pipefitters, and steamfitters undergo some type of apprenticeship training. Many apprenticeship programs are administered by local union-management committees made up of members of the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada, and local employers who are members of either the Mechanical Contractors Association of America, the National Association of Plumbing-Heating-Cooling Contractors, or the National Fire Sprinkler Association.

Nonunion training and apprenticeship programs are administered by local chapters of the Associated Builders and Contractors, the National Association of Plumbing-Heating-Cooling Contractors, the American Fire Sprinkler Association, or the Home Builders Institute of the National Association of Home Builders.

Apprenticeships—both union and nonunion—consist of 4 or 5 years of on-the-job training, in addition to at least 144 hours per year of related classroom instruction. Classroom subjects include drafting and blueprint reading, mathematics, applied physics and chemistry, safety, and local plumbing codes and regulations. On the job, apprentices first learn basic skills, such as identifying grades and types of pipe, using the tools of the trade, and safely unloading materials. As apprentices gain experience, they learn how to work with various types of pipe and how to install different piping systems and plumbing fixtures. Apprenticeship gives trainees a thorough knowledge of all aspects of the trade. Although most pipelayers, plumbers, pipefitters, and steamfitters are trained through apprenticeship, some still learn their skills informally on the job.

Applicants for union or nonunion apprentice jobs must be at least 18 years old and in good physical condition. Apprenticeship committees may require applicants to have a high school diploma or its equivalent. Armed Forces training in pipelaying, plumbing, and pipefitting is considered very good preparation. In fact, persons with this background may be given credit for previous experience when entering a civilian apprenticeship program. Secondary or postsecondary courses in shop, plumbing, general mathematics, drafting, blueprint reading, computers, and physics also are good preparation.

Although there are no uniform national licensing requirements, most communities require plumbers to be licensed. Licensing requirements vary from area to area, but most localities require workers to pass an examination that tests their knowledge of the trade and of local plumbing codes.

With additional training, some pipelayers, plumbers, pipefitters, and steamfitters become supervisors for mechanical and plumbing contractors. Others, especially plumbers, go into business for themselves, often starting as a self-employed plumber working from home. Some eventually become owners of businesses employing many workers and may spend most of their time as managers rather than as plumbers. Others move into closely related areas such as construction management or building inspection.

Job Outlook

Job opportunities are expected to be excellent, as demand for skilled pipelayers, plumbers, pipefitters, and steamfitters is expected to outpace the supply of workers trained in this craft. Many potential workers may prefer work that is less strenuous and has more comfortable working conditions.

Employment of pipelayers, plumbers, pipefitters, and steamfitters is expected to grow about as fast as the average for all occupations through the year 2012. Demand for plumbers will stem from building renovation, including the increasing installation of sprinkler systems; repair and maintenance of existing residential systems; and maintenance activities for places having extensive systems of pipes, such as powerplants, water and wastewater treatment plants, pipelines, office buildings, and factories. The enforcement of laws pertaining to the certification requirements of workers on jobsites will create additional opportunities and demand for skilled workers. However, the number of new jobs will be limited by the growing use of plastic pipe and fittings, which are much easier to install and repair than other types, and by increasingly efficient sprinkler systems. In addition to new positions resulting from employment growth, many jobs will become available each year because of the need to replace experienced workers who retire or leave the occupation for other reasons.

Traditionally, many organizations with extensive pipe systems have employed their own plumbers or pipefitters to maintain equipment and keep systems running smoothly. But, to reduce labor costs, many of these firms no longer employ a full-time, in-house plumber or pipefitter. Instead, when they need a plumber, they rely on workers provided under service contracts by plumbing and pipefitting contractors.

Construction projects provide only temporary employment. So, when a project ends, pipelayers, plumbers, pipefitters, and steamfitters working on the project may experience bouts of unemployment. Because construction activity varies from area to area, job openings, as well as apprenticeship opportunities, fluctuate with local economic conditions. However, employment of pipelayers, plumbers, pipefitters, and steamfitters generally is less sensitive to changes in economic conditions than is employment of some other construction trades. Even when construction activity declines, maintenance, rehabilitation, and replacement of existing piping systems, as well as the increasing installation of fire sprinkler systems, provide many jobs for pipelayers, plumbers, pipefitters, and steamfitters.

Earnings

Pipelayers, plumbers, pipefitters, and steamfitters are among the highest paid construction occupations. In 2002, median hourly earnings of pipelayers were $13.70. The middle 50 percent earned between $10.96 and $18.43. The lowest 10 percent earned less than $9.20, and the highest 10 percent earned more than $24.31. Also in 2002, median hourly earnings of plumbers, pipefitters, and steamfitters were $19.31. The middle 50 percent earned between $14.68 and $25.87. The lowest 10 percent earned less than $11.23, and the highest 10 percent earned more than $32.27. Median hourly earnings in the industries employing the largest numbers of plumbers, pipefitters, and steamfitters in 2002 are shown below:

Nonresidential building construction	$19.65
Building equipment contractors	19.52
Utility system construction	17.81
Ship and boat building	16.62
Local government	16.21

Apprentices usually begin at about 50 percent of the wage rate paid to experienced pipelayers, plumbers, pipefitters, and steamfitters. Wages increase periodically as skills improve. After an initial waiting period, apprentices receive the same benefits as experienced pipelayers, plumbers, pipefitters, and steamfitters.

Many pipelayers, plumbers, pipefitters, and steamfitters are members of the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada.

Related Occupations

Other occupations in which workers install and repair mechanical systems in buildings are boilermakers; electricians; elevator installers and repairers; heating, air-conditioning, and refrigeration mechanics and installers; industrial machinery installation, repair, and maintenance workers, except millwrights; millwrights; sheet metal workers; and stationary engineers and boiler operators. Other related occupations include construction managers and construction and building inspectors.

Sources of Additional Information

For information about apprenticeships or work opportunities in pipelaying, plumbing, pipefitting, and steamfitting, contact local plumbing, heating, and air-conditioning contractors; a local or State chapter of the National Association of Plumbing, Heating, and Cooling Contractors; a local chapter of the Mechanical Contractors Association; a local chapter of the United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry of the United States and Canada; or the nearest office of your State employment service or apprenticeship agency.

For information about apprenticeship opportunities for pipelayers, plumbers, pipefitters, and steamfitters, contact:

➤ United Association of Journeymen and Apprentices of the Plumbing and Pipefitting Industry, 901 Massachusetts Ave. NW., Washington, DC 20001. Internet: **http://www.ua.org**

For more information about training programs for pipelayers, plumbers, pipefitters, and steamfitters, contact:

➤ Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.

➤ National Association of Home Builders, 1201 15th St. NW., Washington, DC 20005. Internet: **http://www.nahb.org**

➤ Home Builders Institute**,** 1201 15th St., NW., Washington, DC 20005. Internet: **http://www.hbi.org**

For general information about the work of pipelayers, plumbers, and pipefitters, contact:

➤ Mechanical Contractors Association of America, 1385 Piccard Dr., Rockville, MD 20850. Internet: **http://www.mcaa.org**

➤ National Association of Plumbing-Heating-Cooling Contractors, 180 S. Washington St, Falls Church, VA 22040. Internet: **http://www.phccweb.org**

For general information about the work of sprinklerfitters, contact:

➤ American Fire Sprinkler Association, Inc., 9696 Skillman St. Suite 300, Dallas, TX 75243-8264. Internet: **http://www.firesprinkler.org**

➤ National Fire Sprinkler Association, P.O. Box 1000, Patterson, NY 12563. Internet: **http://www.nfsa.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their website: **http://www.doleta.gov**

Plasterers and Stucco Masons

(0*NET 47-2161.00)

Significant Points

- Plastering is physically demanding.
- Plastering is learned on the job, either through a formal apprenticeship program or by working as a helper.
- Job opportunities are expected to be good, particularly in the South and Southwest.

Nature of the Work

Plastering—one of the oldest crafts in the building trades—is enjoying resurgence in popularity because of the introduction of newer, less costly materials and techniques. Plasterers apply plaster to interior walls and ceilings to form fire-resistant and relatively soundproof surfaces. They also apply plaster veneer over drywall to create smooth or textured abrasion-resistant finishes. In addition, plasterers install prefabricated exterior insulation systems over existing walls—for good insulation and interesting architectural effects—and cast ornamental designs in plaster. Stucco masons apply durable plasters, such as polymer-based acrylic finishes and stucco, to exterior surfaces. Plasterers and stucco masons should not be confused with drywall installers, ceiling tile installers, and tapers—discussed elsewhere in the *Handbook*—who use drywall instead of plaster when erecting interior walls and ceilings.

Plasterers can plaster either solid surfaces, such as concrete block, or supportive wire mesh called lath. When plasterers work with interior surfaces, such as concrete block and concrete, they first apply a brown coat of gypsum plaster that provides a base, which is followed by a second, or finish, coat—also called "white coat"—made of a lime-based plaster. When plastering metal lath foundations, they apply a preparatory, or "scratch," coat with a trowel. They spread this rich plaster mixture into and over the metal lath. Before the plaster sets, plasterers scratch its surface with a rake-like tool to produce ridges, so that the subsequent brown coat will bond tightly.

Laborers prepare a thick, smooth plaster for the brown coat. Plasterers spray or trowel this mixture onto the surface, then finish by smoothing it to an even, level surface.

For the finish coat, plasterers prepare a mixture of lime, plaster of paris, and water. They quickly apply this to the brown coat using a "hawk"—a light, metal plate with a handle—trowel, brush, and water. This mixture, which sets very quickly, produces a very smooth, durable finish.

Plasterers also work with a plaster material that can be finished in a single coat. This "thin-coat" or gypsum veneer plaster is made of lime and plaster of paris and is mixed with water at the jobsite This plaster provides a smooth, durable, abrasion-resistant finish on interior masonry surfaces, special gypsum baseboard, or drywall prepared with a bonding agent.

Plasterers create decorative interior surfaces as well. They do this by pressing a brush or trowel firmly against a wet plaster surface and using a circular hand motion to create decorative swirls.

For exterior work, stucco masons usually apply stucco—a mixture of Portland cement, lime, and sand—over cement, concrete, masonry, or lath. Stucco may also be applied directly to a wire lath with a scratch coat, followed by a brown coat and then a finish coat. Stucco masons may also embed marble or gravel chips into the finish coat to achieve a pebblelike, decorative finish.

Increasingly, plasterers apply insulation to the exteriors of new and old buildings. They cover the outer wall with rigid foam insulation board and reinforcing mesh, and then trowel on a polymer-based or polymer-modified base coat. They may apply an additional coat of this material with a decorative finish.

Plasterers sometimes do complex decorative and ornamental work that requires special skill and creativity. For example, they may mold intricate wall and ceiling designs. Following an architect's blueprint, plasterers pour or spray a special plaster into a mold and allow it to set. Workers then remove the molded plaster and put it in place, according to the plan.

Working Conditions

Most plastering jobs are indoors; however, plasterers and stucco masons work outside when applying stucco or exterior wall insulation and decorative finish systems. Sometimes, plasterers work on scaffolds high above the ground.

Plastering is physically demanding, requiring considerable standing, bending, lifting, and reaching overhead. The work can be dusty and dirty, soiling shoes and clothing, and can irritate the skin and eyes.

Employment

Plasterers and stucco masons held about 59,000 jobs in 2002. Most plasterers and stucco masons work on new construction sites, particularly where special architectural and lighting effects are required. Some repair and renovate older buildings. Many plasterers and stucco masons are employed in Florida, California, and the Southwest, where exterior stucco with decorative finishes is very popular.

Most plasterers and stucco masons work for independent contractors. About 1out of every 10 plasterers and stucco masons is self-employed.

Training, Other Qualifications, and Advancement

Although most employers recommend apprenticeship as the best way to learn plastering, many people learn the trade by working as helpers for experienced plasterers and stucco masons. Those who learn the trade informally as helpers usually start by carrying materials, setting up scaffolds, and mixing plaster. Later, they learn to apply the scratch, brown, and finish coats.

Most plasterers and stucco masons work for independent contractors.

Apprenticeship programs, sponsored by local joint committees of contractors and unions, generally consist of 2 or 3 years of on-the-job training, in addition to at least 144 hours annually of classroom instruction in drafting, blueprint reading, and mathematics for layout work.

In the classroom, apprentices start with a history of the trade and the industry. They also learn about the uses of plaster, estimating materials and costs, and casting ornamental plaster designs. On the job, they learn about lath bases, plaster mixes, methods of plastering, blueprint reading, and safety. They also learn how to use various tools, such as hand and powered trowels, floats, brushes, straightedges, power tools, plaster-mixing machines, and piston-type pumps. Some apprenticeship programs allow individuals to obtain training in related occupations, such as cement masonry and bricklaying.

Applicants for apprentice or helper jobs normally must be at least 18 years old, in good physical condition, and have good manual dexterity. Applicants who have a high school education are preferred. Courses in general mathematics, mechanical drawing, and shop provide a useful background.

With additional training and experience, plasterers and stucco masons may advance to positions as supervisors, superintendents, or estimators for plastering contractors. Many become self-employed contractors. Others become building inspectors.

Job Outlook

Job opportunities for plasterers and stucco masons are expected to be good through 2012. Many potential workers may choose not to enter this occupation because they prefer work that is less strenuous and has more comfortable working conditions. The best employment opportunities should continue to be in Florida, California, and the Southwest, where exterior plaster and decorative finishes are expected to remain popular.

Employment of plasterers and stucco masons is expected to increase about as fast as the average for all occupations through the year 2012. Jobs will become available as plasterers and stucco masons transfer to other occupations or leave the labor force.

In past years, employment of plasterers declined as more builders switched to drywall construction. This decline has halted, however, and employment of plasterers is expected to continue growing as a result of the appreciation for the durability and attractiveness that troweled finishes provide. Thin-coat plastering—or veneering—in particular is gaining wide acceptance as more builders recognize its ease of application, durability, quality of finish, and soundproofing and fire-retarding qualities, although the increased use of fire sprinklers will reduce the demand for fire-resistant plaster work. Prefabricated wall systems and new polymer-based or polymer-modified acrylic exterior insulating finishes also are gaining popularity, particularly in the South and Southwest regions of the country. This is not only because of their durability, attractiveness, and insulating properties, but also because of their relatively low cost. In addition, plasterers will be needed to renovate plasterwork in old structures and to create special architectural effects, such as curved surfaces, which are not practical with drywall materials.

Most plasterers and stucco masons work in construction, where prospects fluctuate from year to year due to changing economic conditions. Bad weather affects plastering less than other construction trades because most work is indoors. On exterior surfacing jobs, however, plasterers and stucco masons may lose time because plastering materials cannot be applied under wet or freezing conditions.

Earnings

In 2002, median hourly earnings of plasterers and stucco masons were $15.91. The middle 50 percent earned between $12.33 and $20.67. The lowest 10 percent earned less than $9.94, and the top 10 percent earned more than $26.81.

The median hourly earnings in the largest industries employing plasterers and stucco masons in 2002 were $15.99 in building finishing contractors, and $14.94 in foundation, structure, and building exterior contractors.

Apprentice wage rates start at about half the rate paid to experienced plasterers and stucco masons. Annual earnings for plasterers and stucco masons and apprentices can be less than the hourly rate would indicate, because poor weather and periodic declines in construction activity can limit work hours.

Related Occupations

Other construction workers who use a trowel as their primary tool include brickmasons, blockmasons, and stonemasons; cement masons, concrete finishers, segmental pavers, and terrazzo workers; and drywall installers, ceiling tile installers, and tapers.

Sources of Additional Information

For information about apprenticeships or other work opportunities, contact local plastering contractors, locals of the unions mentioned below, a local joint union-management apprenticeship committee, or the nearest office of your State apprenticeship agency or employment service.

For general information about the work of plasterers and stucco masons, contact:

➤ International Union of Bricklayers and Allied Craftworkers, 1776 I St. NW., Washington, DC 20006.

➤ Association of Wall and Ceiling Industries International, 803 West Broad St., Falls Church, VA 22046. Internet: **http://www.awci.org**

For information about plasterers, contact:

➤ Operative Plasterers' and Cement Masons' International Association of the United States and Canada, 14405 Laurel Place, Suite 300, Laurel, MD 20707.

For information on the training of plasterers and stucco masons, contact:

➤ International Masonry Institute, The James Brice House, 42 East St., Annapolis, MD 21401. Internet**: http://www.imiweb.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their website: **http://www.doleta.gov**

Roofers

(0*NET 47-2181.00)

Significant Points

- Most roofers acquire their skills informally on the job; some roofers train through 3-year apprenticeship programs.
- Jobs for roofers should be plentiful because the work is hot, strenuous, and dirty, resulting in higher job turnover than in most construction trades.
- Demand for roofers is less susceptible to downturns in the economy than demand for other construction trades because most roofing work consists of repair and reroofing.

Nature of the Work

A leaky roof can damage ceilings, walls, and furnishings. To protect buildings and their contents from water damage, roofers repair and install roofs made of tar or asphalt and gravel; rubber or thermoplastic; metal; or shingles made of asphalt, slate, fiberglass, wood, tile, or other material. Repair and reroofing—replacing old roofs on existing buildings—provide many job opportunities for these workers. Roofers also may waterproof foundation walls and floors.

There are two types of roofs—flat and pitched (sloped). Most commercial, industrial, and apartment buildings have flat or slightly sloping roofs. Most houses have pitched roofs. Some roofers work on both types; others specialize.

Most flat roofs are covered with several layers of materials. Roofers first put a layer of insulation on the roof deck. Over the insulation, they then spread a coat of molten bitumen, a tarlike substance. Next, they install partially overlapping layers of roofing felt—a fabric saturated in bitumen—over the surface. Roofers use a mop to spread hot bitumen over the surface and under the next layer. This seals the seams and makes the surface watertight. Roofers repeat these steps to build up the desired number of layers, called "plies." The top layer either is glazed to make a smooth finish or has gravel embedded in the hot bitumen to create a rough surface.

An increasing number of flat roofs are covered with a single-ply membrane of waterproof rubber or thermoplastic compounds. Roofers roll these sheets over the roof's insulation and seal the seams. Adhesive, mechanical fasteners, or stone ballast hold the sheets in place. The building must be of sufficient strength to hold the ballast.

Most residential roofs are covered with shingles. To apply shingles, roofers first lay, cut, and tack 3-foot strips of roofing felt lengthwise over the entire roof. Then, starting from the bottom edge, they staple or nail overlapping rows of shingles to the roof. Workers measure and cut the felt and shingles to fit intersecting roof surfaces and to fit around vent pipes and chimneys. Wherever two roof surfaces intersect, or shingles reach a vent pipe or chimney, roofers cement or nail flashing-strips of metal or shingle over the joints to make them watertight. Finally, roofers cover exposed nailheads with roofing cement or caulking to prevent water leakage. Roofers who use tile, metal shingles, or shakes follow a similar process.

Some roofers also waterproof and dampproof masonry and concrete walls and floors. To prepare surfaces for waterproofing, they hammer and chisel away rough spots, or remove them with a rubbing brick, before applying a coat of liquid waterproofing compound. They also may paint or spray surfaces with a waterproofing material, or attach waterproofing membrane to surfaces. When dampproofing, they usually spray a bitumen-based coating on interior or exterior surfaces.

Working Conditions

Roofing work is strenuous. It involves heavy lifting, as well as climbing, bending, and kneeling. Roofers work outdoors in all types of weather, particularly when making repairs. These workers risk slips or falls from scaffolds, ladders, or roofs, or burns from hot bitumen. In addition, roofs become extremely hot during the summer.

Employment

Roofers held about 166,000 jobs in 2002. Almost all wage and salary roofers worked for roofing contractors. About 1 out of every 3 roofers was self-employed. Many self-employed roofers specialized in residential work.

Training, Other Qualifications, and Advancement

Most roofers acquire their skills informally by working as helpers for experienced roofers. Safety training is increasing to reduce the number of accidents on the job and is one of the first classes that a worker takes. Trainees scart by carrying equipment and material, and erecting scaffolds and hoists. Within 2 or 3 months, trainees are taught to measure, cut, and fit roofing materials and, later, to lay asphalt or fiberglass shingles. Because some roofing materials are used infrequently, it can take several years to get experience working on all the various types of roofing applications.

Some roofers train through 3-year apprenticeship programs administered by local union-management committees representing roofing contractors and locals of the United Union of Roofers, Waterproofers, and Allied Workers. The apprenticeship program generally consists of a minimum of 2,000 hours of on-the-job training annually, plus a minimum of 144 hours of classroom instruction a year in subjects such as tools and their use, arithmetic, and safety. On-the-job training for apprentices is similar to that for helpers, except that the apprenticeship program is more structured. Apprentices also learn to dampproof and waterproof walls.

Good physical condition and good balance are essential for roofers. A high school education, or its equivalent, is helpful, as are courses in mechanical drawing and basic mathematics. Most apprentices are at least 18 years old. Experience with metal-working is helpful for workers who install metal roofing.

About 1 out of every 3 roofers is self-employed.

Roofers may advance to supervisor or estimator for a roofing contractor, or become contractors themselves.

Job Outlook

Jobs for roofers should be plentiful through the year 2012, primarily because of the need to replace workers who transfer to other occupations or leave the labor force. Turnover is higher than in most construction trades—roofing work is hot, strenuous, and dirty, and a significant number of workers treat roofing as a temporary job until something better comes along. Some roofers leave the occupation to go into other construction trades.

Employment of roofers is expected to grow as fast as the average for all occupations through the year 2012. Roofs deteriorate faster and are more susceptible to weather damage than most other parts of buildings and periodically need to be repaired or replaced. Roofing has a much higher proportion of repair and replacement work than most other construction occupations. As a result, demand for roofers is less susceptible to downturns in the economy than demand for other construction trades. In addition to repair and reroofing work on the growing stock of buildings, new construction of industrial, commercial, and residential buildings will add to the demand for roofers. Jobs should be easiest to find during spring and summer when most roofing is done.

Earnings

In 2002, median hourly earnings of roofers were $14.51. The middle 50 percent earned between $11.23 and $19.56. The lowest 10 percent earned less than $9.15, and the highest 10 percent earned more than $25.35. The median hourly earnings of roofers in the foundation, structure, and building exterior contractors industry were $14.57 in 2002.

Apprentices usually start at about 40 percent to 50 percent of the rate paid to experienced roofers and receive periodic raises as they acquire the skills of the trade. Earnings for roofers are reduced on occasion because poor weather often limits the time they can work.

Some roofers are members of the United Union of Roofers, Waterproofers, and Allied Workers.

Related Occupations

Roofers use shingles, bitumen and gravel, single-ply plastic or rubber sheets, or other materials to waterproof building surfaces. Workers in other occupations who cover surfaces with special materials for protection and decoration include carpenters; carpet, floor, and tile installers and finishers; cement masons, concrete finishers, segmental pavers, and terrazzo workers; drywall installers, ceiling tile installers, and tapers; and plasterers and stucco masons.

Sources of Additional Information

For information about apprenticeships or job opportunities in roofing, contact local roofing contractors, a local chapter of the roofers union, a local joint union-management apprenticeship committee, or the nearest office of your State employment service or apprenticeship agency.

For information about the work of roofers, contact:

➤ National Roofing Contractors Association, 10255 W. Higgins Rd., Suite 600, Rosemont, IL 60018-5607. Internet: **http://www.nrca.net**

➤ United Union of Roofers, Waterproofers, and Allied Workers, 1660 L St. NW., Suite 800, Washington, DC 20036. Internet: **http://www.unionroofers.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their website: **http://www.doleta.gov**

Sheet Metal Workers

(0*NET 47-2211.00)

Significant Points

- Nearly two-thirds of the jobs are found in the construction industry; about one quarter are in manufacturing.
- Apprenticeship programs lasting 4 or 5 years are considered the best training.
- Job opportunities in construction should be good.

Nature of the Work

Sheet metal workers make, install, and maintain heating, ventilation, and air-conditioning duct systems; roofs; siding; rain gutters; downspouts; skylights; restaurant equipment; outdoor signs; railroad cars; tailgates; customized precision equipment; and many other products made from metal sheets. They also may work with fiberglass and plastic materials. Although some workers specialize in fabrication, installation, or maintenance, most do all three jobs. Sheet metal workers do both construction-related sheet metal work and mass production of sheet metal products in manufacturing.

Sheet metal workers first study plans and specifications to determine the kind and quantity of materials they will need. They then measure, cut, bend, shape, and fasten pieces of sheet metal to make ductwork, countertops, and other custom products. In an increasing number of shops, sheet metal workers use computerized metalworking equipment. This enables them to perform their tasks more quickly and to experiment with different layouts to find the one that results in the least waste of material. They cut, drill, and form parts with computer-controlled saws, lasers, shears, and presses.

In shops without computerized equipment, and for products that cannot be made on such equipment, sheet metal workers use hand calculators to make the required calculations and use tapes, rulers, and other measuring devices for layout work. They then cut or stamp the parts on machine tools.

Before assembling pieces, sheet metal workers check each part for accuracy using measuring instruments such as calipers and micrometers and, if necessary, finish it by using hand, rotary, or squaring shears and hacksaws. After the parts have been inspected, workers fasten seams and joints together with welds, bolts, cement, rivets, solder, specially formed sheet metal drive clips, or other connecting devices. They then take the parts to the construction site, where they further assemble the pieces as they install them. These workers install ducts, pipes, and tubes by joining them end to end and hanging them with metal hangers secured to a ceiling or a wall. They also use shears, hammers, punches, and drills to make parts at the worksite or to alter parts made in the shop.

Some jobs are done completely at the jobsite. When installing a metal roof, for example, sheet metal workers measure and cut the roofing panels that are needed to complete the job. They secure the first panel in place and interlock and fasten the grooved edge of the next panel into the grooved edge of the first. Then, they nail or weld the free edge of the panel to the structure. This two-step process is repeated for each additional panel. Finally, the workers fasten machine-made molding at joints, along corners, and around windows and doors for a neat, finished effect.

In addition to installation, some sheet metal workers specialize in testing, balancing, adjusting, and servicing existing air-conditioning and ventilation systems to make sure they are functioning properly and to improve their energy efficiency. Properly installed duct systems are a key component to heating, ventilation, and air-conditioning (HVAC) systems, which causes duct installers to sometimes be referred to as *HVAC technicians*. A duct system allows for even air distribution while minimizing leaks and temperature differentiation that can cause other problems, such as mold.

Sheet metal workers in manufacturing plants make sheet metal parts for products such as aircraft or industrial equipment. Although some of the fabrication techniques used in large-scale manufacturing are similar to those used in smaller shops, the work may be highly automated and repetitive. Sheet metal workers doing such work may be responsible for reprogramming the computer control systems of the equipment they operate.

Working Conditions

Sheet metal workers usually work a 40-hour week. Those who fabricate sheet metal products work in shops that are well-lighted and well-ventilated. However, they stand for long periods and lift heavy materials and finished pieces. Sheet metal workers must follow safety practices because working around high-speed machines can be dangerous. They also are subject to cuts from sharp metal, burns from soldering and welding, and falls from ladders and scaffolds. They usually wear safety glasses but must not wear jewelry or loose-fitting clothing that could easily be caught in a machine. They may work at a variety of different production stations to reduce the repetitiveness of the work.

Those performing installation work do considerable bending, lifting, standing, climbing, and squatting, sometimes in close quarters or in awkward positions. Although duct systems and kitchen equipment are installed indoors, the installation of siding, roofs, and gutters involves much outdoor work, requiring sheet metal workers to be exposed to various kinds of weather.

Employment

Sheet metal workers held about 205,000 jobs in 2002. Nearly two-thirds of all sheet metal workers were found in the construction industry. Of those employed in construction, almost half worked for plumbing, heating, and air-conditioning contractors; most of the rest worked for roofing and sheet metal contractors. Some worked for other special trade contractors and for general contractors engaged in residential and commercial building. One-quarter of all sheet metal workers work outside of construction and are found in

In addition to performing installation, some sheet metal workers specialize in testing, balancing, adjusting, and servicing existing air-conditioning and ventilation systems to make sure that they are functioning properly and to improve their energy efficiency.

manufacturing industries, such as the fabricated metal products, machinery, and aerospace products and parts industries. Some work for the Federal Government.

Compared with workers in most construction craft occupations, relatively few sheet metal workers are self-employed.

Training, Other Qualifications, and Advancement

Apprenticeship generally is considered to be the best way to learn this trade. The apprenticeship program consists of 4 or 5 years of on-the-job training and an average of 200 hours per year of classroom instruction. Apprenticeship programs provide comprehensive instruction in both sheet metal fabrication and installation. They may be administered by local joint committees composed of the Sheet Metal Workers' International Association and local chapters of the Sheet Metal and Air-Conditioning Contractors National Association.

On the job, apprentices learn the basics of pattern layout and how to cut, bend, fabricate, and install sheet metal. They begin by learning to install and maintain basic ductwork and gradually advance to more difficult jobs, such as making more complex ducts, commercial kitchens, and decorative pieces. They also use materials such as fiberglass, plastics, and other nonmetallic materials. Some workers may focus on exterior or architectural sheet metal installation.

In the classroom, apprentices learn drafting, plan and specification reading, trigonometry and geometry applicable to layout work, the use of computerized equipment, welding, and the principles of heating, air-conditioning, and ventilating systems. Safety is stressed throughout the program. In addition, apprentices learn the relationship between sheet metal work and other construction work.

Some persons pick up the trade informally, usually by working as helpers to experienced sheet metal workers. Most begin by carrying metal and cleaning up debris in a metal shop while they learn about materials and tools and their uses. Later, they learn to operate machines that bend or cut metal. In time, helpers go out on the jobsite to learn installation. Those who acquire their skills this way often take vocational school courses in mathematics or sheet metal fabrication to supplement their work experience. To be promoted to the journey level, helpers usually must pass the same written examination as apprentices. Most sheet metal workers in large-scale manufacturing receive on-the-job training, with additional classwork or in-house training when necessary.

Applicants for jobs as apprentices or helpers should be in good physical condition and have mechanical and mathematical aptitude as well as good reading skills. Good eye-hand coordination, spatial and form perception, and manual dexterity also are important. Local apprenticeship committees require a high school education or its equivalent. Courses in algebra, trigonometry, geometry, mechanical drawing, and shop provide a helpful background for learning the trade, as does related work experience obtained in the Armed Services.

It is important for experienced sheet metal workers to keep abreast of new technological developments, such as the growing use of computerized layout and laser-cutting machines. Workers often take additional training, provided by the union or by their employer, to improve existing skills or to acquire new ones.

Sheet metal workers in construction may advance to supervisory jobs. Some of these workers take additional training in welding and do more specialized work. Others go into the contracting business for themselves. Because a sheet metal contractor must have a shop with equipment to fabricate products, this type of contracting business is more expensive to start than other types of construction contracting. Sheet metal workers in manufacturing may advance to positions as supervisors or quality inspectors. Some of these workers may move into other management positions.

Job Outlook

Job opportunities are expected to be good for sheet metal workers in the construction industry and in construction-related sheet metal fabrication, reflecting both employment growth and openings arising each year as experienced sheet metal workers leave the occupation. In addition, many potential workers may prefer work that is less strenuous and that has more comfortable working conditions, thus limiting the number of applicants for sheet metal jobs. Opportunities should be particularly good for individuals who acquire apprenticeship training. Job prospects in manufacturing will not be as good because construction is expected to grow faster than the manufacturing industries that employ sheet metal workers. Because some sheet metal manufacturing is labor-intensive, manufacturers sometimes move production to lower wage areas or countries.

Employment of sheet metal workers in construction is expected to increase about as fast as the average for all occupations through 2012, reflecting growth in the demand for sheet metal installations as more industrial, commercial, and residential structures are built. The need to install energy-efficient air-conditioning, heating, and ventilation systems in the increasing stock of old buildings and to perform other types of renovation and maintenance work also should boost employment. In addition, the popularity of decorative sheet metal products and increased architectural restoration are expected to add to the demand for sheet metal workers. On the other hand, slower-than-average job growth is projected for sheet metal workers in manufacturing.

Sheet metal workers in construction may experience periods of unemployment, particularly when construction projects end and economic conditions dampen construction activity. Nevertheless, employment of sheet metal workers is less sensitive to declines in new construction than is the employment of some other construction workers, such as carpenters. Maintenance of existing equipment—which is less affected by economic fluctuations than is new construction—makes up a large part of the work done by sheet metal workers. Installation of new air-conditioning and heating systems in existing buildings continues during construction slumps, as individuals and businesses adopt more energy-efficient equipment to cut utility bills. In addition, a large proportion of sheet metal installation and maintenance is done indoors, so sheet metal workers usually lose less worktime due to bad weather than other construction workers do.

Earnings

In 2002, median hourly earnings of sheet metal workers were $16.62. The middle 50 percent earned between $12.15 and $23.03. The lowest 10 percent of all sheet metal workers earned less than $9.50, and the highest 10 percent earned more than $29.53. The median hourly earnings of the largest industries employing sheet metal workers in 2002 are shown below:

Federal Government	$19.73
Building equipment contractors	17.47
Building finishing contractors	16.77
Foundation, structure, and building exterior contractors	15.48
Architectural and structural metals manufacturing	14.60

Apprentices normally start at about 40 to 50 percent of the rate paid to experienced workers. As apprentices acquire more skills throughout the course of their training, they receive periodic increases until their pay approaches that of experienced workers. In

addition, union workers in some areas receive supplemental wages from the union when they are on layoff or shortened workweeks.

Related Occupations

To fabricate and install sheet metal products, sheet metal workers combine metalworking skills and knowledge of construction materials and techniques. Other occupations in which workers lay out and fabricate metal products include assemblers and fabricators; machinists; machine setters, operators, and tenders—metal and plastic; and tool and die makers. Construction occupations requiring similar skills and knowledge include glaziers and heating, air-conditioning, and refrigeration mechanics and installers.

Sources of Additional Information

For more information about apprenticeships or other work opportunities, contact local sheet metal contractors or heating, refrigeration, and air-conditioning contractors; a local of the Sheet Metal Workers International Association; a local of the Sheet Metal and Air-Conditioning Contractors National Association; a local joint union-management apprenticeship committee; or the nearest office of your State employment service or apprenticeship agency.

For general and training information about sheet metal workers, contact:

➤ International Training Institute for the Sheet Metal and Air-Conditioning Industry, 601 N. Fairfax St., Suite 240, Alexandria, VA 22314. Internet: **http://www.sheetmetal-iti.org**

➤ Sheet Metal and Air-Conditioning Contractors National Association, 4201 Lafayette Center Dr., Chantilly, VA 20151-1209. Internet: **http://www.smacna.org**

➤ Sheet Metal Workers International Association, 1750 New York Ave. NW., Washington, DC 20006. Internet: **http://www.smwia.org**

There are more than 500 occupations registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check their Web site: **http://www.doleta.gov**.

Structural and Reinforcing Iron and Metal Workers

(0*NET 47-2171.00, 47-2221.00)

Significant Points

- Most employers recommend a 3- or 4-year apprenticeship.
- During economic downturns, workers can experience high rates of unemployment.
- The danger of injuries due to falls is high; those who work at great heights do not work during wet, icy, or extremely windy conditions.

Nature of the Work

Structural and reinforcing iron and metal workers place and install iron or steel girders, columns, and other construction materials to form buildings, bridges, and other structures. They also position and secure steel bars or mesh in concrete forms in order to reinforce the concrete used in highways, buildings, bridges, tunnels, and other structures. In addition, they repair and renovate older buildings and structures. Even though the primary metal involved in this work is steel, these workers often are known as *ironworkers*.

Before construction can begin, ironworkers must erect steel frames and assemble the cranes and derricks that move structural steel, reinforcing bars, buckets of concrete, lumber, and other materials and equipment around the construction site. Once this job has been completed, workers begin to connect steel columns, beams, and girders according to blueprints and instructions from supervisors and superintendents. Structural steel, reinforcing rods, and ornamental iron generally come to the construction site ready for erection—cut to the proper size, with holes drilled for bolts and numbered for assembly.

Ironworkers at the construction site unload and stack the prefabricated steel so that it can be hoisted easily when needed. To hoist the steel, ironworkers attach cables (slings) to the steel and to the crane or derrick. One worker directs the hoist operator with hand signals while another worker holds a rope (tag line) attached to the steel to prevent it from swinging. The crane or derrick hoists steel into place in the framework, whereupon several ironworkers position the steel with connecting bars and jacks. Workers using driftpins or the handle of a spud wrench—a long wrench with a pointed handle—align the holes in the steel with the holes in the framework. Before the bolts are permanently tightened, ironworkers check vertical and horizontal alignment with plumb bobs, laser equipment, transits, or levels; then they bolt or weld the piece permanently in place.

Reinforcing iron and rebar workers set reinforcing bars (often called rebar) in the forms that hold concrete, following blueprints showing the location, size, and number of bars. They then fasten the bars together by tying wire around them with pliers. When reinforcing floors, ironworkers place spacers under the rebar to hold the bars off the deck. Although these materials usually arrive ready to use, ironworkers occasionally must cut bars with metal shears or acetylene torches, bend them by hand or machine, or weld them with arc-welding equipment. Some concrete is reinforced with welded wire fabric. Using hooked rods, workers cut and fit the fabric, and while a concrete crew places the concrete, ironworkers properly position the fabric into the concrete. Posttensioning is another technique used in reinforcing concrete. In this technique, workers substitute cables for reinforcing bars. When the concrete is poured, the ends of the cables are left exposed. After the concrete cures, ironworkers tighten the cables with jacking equipment specially designed for the purpose. Posttensioning allows designers to create larger open areas in a building, because supports can be placed further apart. This technique is commonly employed in parking garages and arenas.

Ornamental ironworkers install elevator shafts, stairs, curtain walls (the nonstructural walls and window frames of many large buildings), and other ornamentation after the structure of the building has been completed. As they hoist pieces into position, ornamental ironworkers make sure that the pieces are properly fitted and aligned before bolting, brazing, or welding them for a secure fit.

Working Conditions

Structural and reinforcing iron and metal workers usually work outside in all kinds of weather. However, those who work at great heights do not work during wet, icy, or extremely windy conditions. Because the danger of injuries due to falls is great, ironworkers use safety devices such as safety belts, scaffolding, and nets to reduce risk.

Some ironworkers fabricate structural metal in fabricating shops, which usually are located away from the construction site. These workers are covered in the statement on assemblers and fabricators found elsewhere in the *Handbook*.

Employment

Structural and reinforcing iron and metal workers held about 107,000 jobs in 2002. Around 4 out of 5 worked in construction, with nearly half working for foundation, structure, and building exterior contractors. Most of the remaining ironworkers worked for contractors specializing in the construction of homes; factories; commercial buildings; religious structures; schools; bridges and tunnels; and water, sewer, communications, and power lines.

Structural and reinforcing iron and metal workers are employed in all parts of the country, but most work in metropolitan areas, where the bulk of commercial and industrial construction takes place.

Even though the primary metal involved in this work is steel, these workers often are known as ironworkers.

Training, Other Qualifications, and Advancement

Most employers recommend a 3- or 4-year apprenticeship consisting of on-the-job training and evening classroom instruction as the best way to learn this trade. Apprenticeship programs usually are administered by committees made up of representatives of local unions of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers or the local chapters of contractors' associations.

Ironworkers must be at least 18 years old. A high school diploma is preferred by employers and local apprenticeship committees. High school courses in general mathematics, mechanical drawing, and shop are helpful. Because materials used in iron working are heavy and bulky, ironworkers must be in good physical condition. They also need good agility, balance, eyesight, and depth perception to work safely at great heights on narrow beams and girders. Ironworkers should not be afraid of heights or suffer from dizziness.

In the classroom, apprentices study blueprint reading; mathematics for layout work; the basics of structural erecting, rigging, reinforcing, welding, and burning; ornamental erection; and assembling. Apprentices also study the care and safe use of tools and materials. On the job, apprentices work in all aspects of the trade, such as unloading and storing materials at the job site, rigging materials for movement by crane, connecting structural steel, and welding.

Some ironworkers learn the trade informally on the job, without completing an apprenticeship. These workers generally do not receive classroom training, although some large contractors have extensive training programs. On-the-job trainees usually begin by assisting experienced ironworkers on simple jobs, such as carrying various materials. With experience, trainees perform more difficult tasks, such as cutting and fitting different parts; however, learning through work experience alone may not provide training as complete as an apprenticeship program, and it usually takes longer.

Some experienced workers are promoted to supervisor. Others may go into the contracting business for themselves.

Job Outlook

Employment of structural and reinforcing iron and metal workers is expected to rise about as fast as the average for all occupations through the year 2012, largely on the basis of continued growth in industrial and commercial construction. The rehabilitation, maintenance, and replacement of a growing number of older buildings, factories, powerplants, highways, and bridges is expected to create employment opportunities. In addition to new jobs that arise, other job openings will result from the need to replace experienced ironworkers who transfer to other occupations or leave the labor force.

The number of job openings fluctuates from year to year with economic conditions and the level of construction activity. During economic downturns, ironworkers can experience high rates of unemployment. Similarly, job opportunities for ironworkers may vary widely by geographic area. Job openings for ironworkers usually are more abundant during the spring and summer months, when the level of construction activity increases.

Earnings

In 2002, median hourly earnings of structural iron and steel workers in all industries were $19.55. The middle 50 percent earned between $14.45 and $26.00. The lowest 10 percent earned less than $10.81, and the highest 10 percent earned more than $31.81. In 2002, median hourly earnings of reinforcing iron and rebar workers in all industries were $17.66. The middle 50 percent earned between $12.72 and $25.74. The lowest 10 percent earned less than $10.07, and the highest 10 percent earned more than $31.40.

Median hourly earnings of structural iron and steel workers in 2002 in foundation, structure, and building exterior contractors were $21.35 and in nonresidential building construction, $16.98. Reinforcing iron and rebar workers earned median hourly earnings of $18.46 in foundation, structure, and building exterior contractors in 2002.

Many workers in this trade are members of the International Association of Bridge, Structural, Ornamental, and Reinforcing Iron Workers. According to the union, average hourly earnings, including benefits, for structural and reinforcing metal workers who belonged to a union and worked full time were 34 percent higher than the hourly earnings of nonunion workers. Structural and reinforcing iron and metal workers in New York, Boston, San Francisco, Chicago, Los Angeles, Philadelphia, and other large cities received the highest wages.

Apprentices generally start at about 50 percent to 60 percent of the rate paid to experienced journey workers. Throughout the course of the apprenticeship program, as they acquire the skills of the trade, they receive periodic increases until their pay approaches that of experienced workers.

Earnings for ironworkers may be reduced on occasion because work can be limited by bad weather, the short-term nature of construction jobs, and economic downturns.

Related Occupations

Structural and reinforcing iron and metal workers play an essential role in erecting buildings, bridges, highways, power lines, and other structures. Others who work on these construction jobs include assemblers and fabricators; boilermakers; civil engineers; cement masons, concrete finishers, segmental pavers, and terrazzo workers; construction managers; and welding, soldering, and brazing workers.

Sources of Additional Information

For more information on apprenticeships or other work opportunities, contact local general contractors; a local of the International Association of Bridge, Structural, Ornamental, and Reinforcing Iron Workers Union; a local ironworkers' joint union-management apprenticeship committee; a local or State chapter of the Associated Builders and Contractors or the Associated General Contractors; or the nearest office of your State employment service or apprenticeship agency.

For apprenticeship information, contact

➤ International Association of Bridge, Structural, Ornamental, and Reinforcing Iron Workers, Apprenticeship Department, 1750 New York Ave. NW., Suite 400, Washington, DC 20006.

For general information about ironworkers, contact either of the following sources:

➤ Associated Builders and Contractors, Workforce Development Department, 4250 North Fairfax Dr., 9th Floor, Arlington, VA 22203.

➤ Associated General Contractors of America, 333 John Carlyle St., Suite 200, Alexandria, VA 22314. Internet: **http://www.agc.org**

More than 500 occupations are registered by the U.S. Department of Labor's National Apprenticeship system. For more information on the Labor Department's registered apprenticeship system and links to State apprenticeship programs, check the Department's website: **http://www.doleta.gov**

Welding, Soldering, and Brazing Workers

(0*NET 51-4121.01, 51-4121.02, 51-4121.03, 51-4121.04, 51-4121.05, 51-4122.01, 51-4122.02, 51-4122.03, 51.4122.04)

Significant Points

- Job prospects should be excellent.
- Training ranges from a few weeks of school or on-the-job training for low-skilled positions to several years of combined school and on-the-job training for highly skilled jobs.

Nature of the Work

Welding is the most common way of permanently joining metal parts. In this process, heat is applied to metal pieces, melting and fusing them to form a permanent bond. Because of its strength, welding is used in shipbuilding, automobile manufacturing and repair, aerospace applications, and thousands of other manufacturing activities. Welding also is used to join beams when constructing buildings, bridges, and other structures, and to join pipes in pipelines, power plants, and refineries.

Welders use many types of welding equipment set up in a variety of positions, such as flat, vertical, horizontal, and overhead. They may perform manual welding, in which the work is entirely controlled by the welder, or semiautomatic welding, in which the welder uses machinery, such as a wire feeder, to perform welding tasks.

Arc welding is the most common type of welding. Standard arc welding involves two large metal alligator clips that carry a strong electrical current. One clip is attached to any part of the workpiece being welded. The second clip is connected to a thin welding rod. When the rod touches the workpiece, a powerful electrical circuit is created. The massive heat created by the electrical current causes both the workpiece and the steel core of the rod to melt together, cooling quickly to form a solid bond. During welding, the flux that surrounds the rod's core vaporizes, forming an inert gas that serves to protect the weld from atmospheric elements that might weaken it. Welding speed is important. Variations in speed can change the amount of flux applied, weakening the weld, or weakening the surrounding metal by increasing heat exposure.

Two common but advanced types of welding are Gas Tungsten Arc (TIG) and Gas Metal Arc (MIG) welding. TIG welding often is used with stainless steel or aluminum. While TIG uses welding rods, MIG uses a spool of continuously fed wire, which allows the welder to join longer stretches of metal without stopping to replace the rod. In TIG welding, the welder holds the welding rod in one hand and an electric torch in the other hand. The torch is used to simultaneously melt the rod and the workpiece. In MIG welding, the welder holds the wire feeder, which functions like the alligator clip in arc welding. Instead of using gas flux surrounding the rod, TIG and MIG protect the initial weld from the environment by blowing inert gas onto the weld.

Like arc welding, soldering and brazing use molten metal to join two pieces of metal. However, the metal added during the process has a melting point lower than that of the workpiece, so only the added metal is melted, not the workpiece. Soldering uses metals with a melting point below 800 degrees Fahrenheit; brazing uses metals with a higher melting point. Because soldering and brazing do not melt the workpiece, these processes normally do not create the distortions or weaknesses in the workpiece that can occur with welding. Soldering commonly is used to join electrical, electronic, and other small metal parts. Brazing produces a stronger joint than does soldering, and often is used to join metals other than steel, such as brass. Brazing can also be used to apply coatings to parts to reduce wear and protect against corrosion.

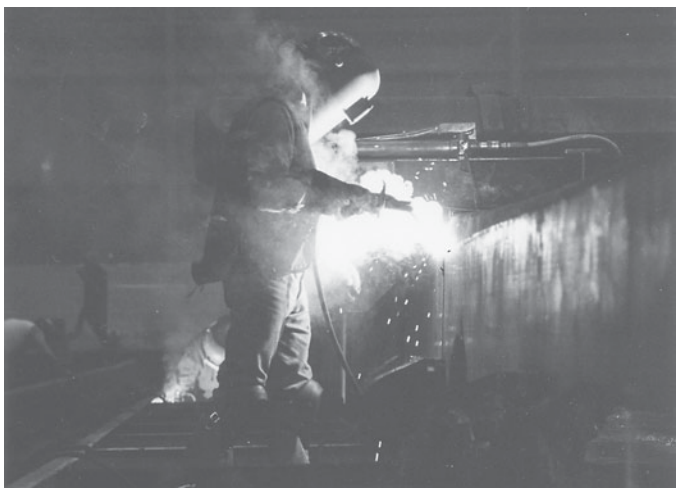
Skilled welding, soldering, and brazing workers generally plan work from drawings or specifications or use their knowledge of fluxes and base metals to analyze the parts to be joined. These workers then select and set up welding equipment, execute the planned welds, and examine welds to ensure that they meet standards or specifications. Highly skilled welders often are trained to work with a wide variety of materials in addition to steel, such as titanium, aluminum, or plastics. Some welders have more limited duties, however. They perform routine jobs that already have been planned and laid out and do not require extensive knowledge of welding techniques.

Automated welding is used in an increasing number of production processes. In these instances, a machine or robot performs the welding tasks while monitored by a welding machine operator. Welding, soldering, and brazing machine setters, operators, and tenders follow specified layouts, work orders, or blueprints. Operators must load parts correctly and constantly monitor the machine to ensure that it produces the desired bond.

The work of arc, plasma, and oxy-gas cutters is closely related to that of welders. However, instead of joining metals, cutters use the heat from an electric arc, a stream of ionized gas (plasma), or burning gases to cut and trim metal objects to specific dimensions. Cutters also dismantle large objects, such as ships, railroad cars, automobiles, buildings, or aircraft. Some operate and monitor cutting machines similar to those used by welding machine operators. Plasma cutting has been increasing in popularity because, unlike other methods, it can cut a wide variety of metals, including stainless steel, aluminum, and titanium.

Working Conditions

Welding, soldering, and brazing workers often are exposed to a number of hazards, including the intense light created by the arc, poisonous fumes, and very hot materials. They wear safety shoes, goggles, hoods with protective lenses, and other devices designed to prevent burns and eye injuries and to protect them from falling objects. They normally work in well-ventilated areas to limit their exposure to fumes. Automated welding, soldering, and brazing machine operators are not exposed to as many dangers, however,



Some welding, soldering, and brazing workers are employed in ship and boat building.

and a face shield or goggles usually provide adequate protection for these workers.

Welders and cutters may work outdoors, often in inclement weather, or indoors, sometimes in a confined area designed to contain sparks and glare. Outdoors, they may work on a scaffold or platform high off the ground. In addition, they may be required to lift heavy objects and work in a variety of awkward positions, while bending, stooping, or standing to perform work overhead.

Although about 55 percent of welders, solderers, and brazers work a 40-hour week, overtime is common, and some welders work up to 70 hours per week. Welders also may work in shifts as long as 12 hours. Some welders, solderers, brazers, and machine operators work in factories that operate around the clock, necessitating shift work.

Employment

Welding, soldering, and brazing workers held about 452,000 jobs in 2002. Of these jobs, about 2 of every 3 were found in manufacturing. Jobs were concentrated in transportation equipment manufacturing (motor vehicle body and parts and ship and boat building), machinery manufacturing (agriculture, construction, and mining machinery), and architectural and structural metals manufacturing. Most jobs for welding, soldering, and brazing machine setters, operators, and tenders were found in the same manufacturing industries as skilled welding, soldering, and brazing workers.

Training, Other Qualifications, and Advancement

Training for welding, soldering, and brazing workers can range from a few weeks of school or on-the-job training for low-skilled positions to several years of combined school and on-the-job training for highly skilled jobs. Formal training is available in high schools, vocational schools, and postsecondary institutions, such as vocational-technical institutes, community colleges, and private welding schools. The Armed Forces operate welding schools as well. Some employers provide training. Courses in blueprint reading, shop mathematics, mechanical drawing, physics, chemistry, and metallurgy are helpful. Knowledge of computers is gaining importance, especially for welding, soldering, and brazing machine operators, who are becoming responsible for the programming of computer-controlled machines, including robots.

Some welders become certified, a process whereby the employer sends a worker to an institution, such as an independent testing lab or technical school, to weld a test specimen according to specific codes and standards required by the employer. Testing procedures are based on the standards and codes set by one of several industry associations with which the employer may be affiliated. If the welding inspector at the examining institution determines that the worker has performed according to the employer's guidelines, the inspector will then certify the welder being tested as able to work with a particular welding procedure.

Welding, soldering, and brazing workers need good eyesight, hand-eye coordination, and manual dexterity. They should be able to concentrate on detailed work for long periods and be able to bend, stoop, and work in awkward positions. In addition, welders increasingly need to be willing to receive training and perform tasks in other production jobs.

Welders can advance to more skilled welding jobs with additional training and experience. For example, they may become welding technicians, supervisors, inspectors, or instructors. Some experienced welders open their own repair shops.

Job Outlook

Job prospects should be excellent, as many potential entrants who could be welders may prefer to attend college or may prefer work that has more comfortable working conditions. Employment of welding, soldering, and brazing workers is expected to grow about as fast as the average for all occupations over the 2002-12 period. In addition, many openings will arise as workers retire or leave the occupation for other reasons.

The major factor affecting employment of welders is the health of the industries in which they work. Because almost every manufacturing industry uses welding at some stage of manufacturing or in the repair and maintenance of equipment, a strong economy will keep demand for welders high. A downturn affecting industries such as auto manufacturing, construction, or petroleum, however, would have a negative impact on the employment of welders in those areas, and could cause some layoffs. Levels of government funding for shipbuilding as well as for infrastructure repairs and improvements are expected to be another important determinant of the future number of welding jobs.

Regardless of the state of the economy, the pressures to improve productivity and hold down labor costs are leading many companies to invest more in automation, especially computer-controlled and robotically-controlled welding machinery. This will reduce the demand for some low-skilled welders, solderers, and brazers because these simple, repetitive jobs are being automated. The growing use of automation, however, should increase demand for welding, soldering, and brazing machine setters, operators, and tenders. Welders working on construction projects or in equipment repair will not be affected by technology change to the same extent, because their jobs are not as easily automated.

Technology is helping to improve welding, creating more uses for welding in the workplace and expanding employment opportunities. For example, new ways are being developed to bond dissimilar materials and nonmetallic materials, such as plastics, composites, and new alloys. Also, laser beam and electron beam welding, new fluxes, and other new technologies and techniques are improving the results of welding, making it useful in a wider assortment of applications. Improvements in technology have also boosted welding productivity, making welding more competitive with other methods of joining materials.

Earnings

Median hourly earnings of welders, cutters, solderers, and brazers were $14.02 in 2002. The middle 50 percent earned between $11.41 and $17.34. The lowest 10 percent had earnings of less than $9.41, while the top 10 percent earned over $21.79. The range of earnings of welders reflects the wide range of skill levels. Median hourly earnings in the industries employing the largest numbers of welders, cutters, solderers, and brazers in 2002 were:

Motor vehicle parts manufacturing	$16.02
Agriculture, construction, and mining machinery manufacturing	13.74
Architectural and structural metals manufacturing	13.34
Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	13.06
Motor vehicle body and trailer manufacturing	12.83

Median hourly earnings of welding, soldering, and brazing machine setters, operators, and tenders were $13.90 in 2002. The middle 50 percent earned between $11.22 and $17.77. The lowest 10 percent had earnings of less than $9.36, while the top 10 percent earned over $24.60. Median hourly earnings in motor vehicle parts manufacturing, the industry employing the largest numbers of welding machine operators in 2002 were $18.29.

Many welders belong to unions. Among these are the International Association of Machinists and Aerospace Workers; the International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers; the International Union, United Automobile, Aerospace and Agricultural Implement Workers of America; the United Association of Journeymen and Apprentices of the Plumbing, Pipefitting, Sprinkler Fitting Industry of the United States and Canada; and the United Electrical, Radio, and Machine Workers of America.

Related Occupations

Welding, soldering, and brazing workers are skilled metal workers. Other metal workers include machinists; machine setters, operators, and tenders—metal and plastic; computer-control programmers and operators; tool and die makers; sheet metal workers; and boilermakers. Assemblers and fabricators of electrical and electronic equipment often assemble parts using soldering.

Sources of Additional Information

For information on training opportunities and jobs for welding, soldering, and brazing workers, contact local employers, the local office of the State employment service, or schools providing welding, soldering, or brazing training.

Information on careers and educational opportunities in welding is available from:

➤ American Welding Society, 550 N.W. Lejeune Rd., Miami, FL 33126-5699. Internet: **http://www.aws.org**

Woodworkers

(0*NET 51-7011.00, 51-7021.00, 51-7031.00, 51-7032.00, 51-7041.01, 51-7041.02, 51-7042.01, 51-7042.02, 51-7099.99)

Significant Points

- Most woodworkers are trained on the job; basic machine operations may be learned in a few months, but becoming a skilled woodworker often requires 2 or more years.
- Employment of woodworkers is expected to grow more slowly than average through the year 2012. Little or no growth is expected among woodworking machine setters, operators, and tenders.
- Job prospects will be best for workers with knowledge of computerized numerical control machine tool operation.

Nature of the Work

Despite the development of sophisticated plastics and other materials, the demand for wood products continues unabated. Helping to meet this demand are woodworkers. Woodworkers are found in industries that produce wood, such as sawmills and plywood mills; in industries that use wood to produce furniture, kitchen cabinets, musical instruments, and other fabricated wood products; or in small shops that make architectural woodwork, furniture, and many other specialty items.

All woodworkers are employed at some stage of the process through which logs of wood are transformed into finished products. Some of these workers produce the structural elements of buildings; others mill hardwood and softwood lumber; still others assemble finished wood products. They operate machines that cut, shape, assemble, and finish raw wood to make the doors, windows, cabinets, trusses, plywood, flooring, paneling, molding, and trim that are components of most homes. Others may fashion home accessories, such as beds, sofas, tables, dressers, and chairs. In addition to these household goods, woodworkers also make sporting goods, including baseball bats and oars, as well as musical instruments, toys, caskets, tool handles, and thousands of other wooden items.

Production woodworkers set up, operate, and tend woodworking machines such as power saws, planers, sanders, lathes, jointers, and routers that cut and shape components from lumber, plywood, and other wood products. In sawmills, *sawing machine operators and tenders* set up, operate, or tend wood sawing machines that cut logs into planks, timbers, or boards. In plants manufacturing wood products, woodworkers first determine the best method of shaping and assembling parts, working from blueprints, supervisors' instructions, or shop drawings that woodworkers themselves produce. Before cutting, they often must measure and mark the materials. They verify dimensions and may trim parts using handtools such as planes, chisels, wood files, or sanders to ensure a tight fit. *Woodworking machine operators and tenders* set up, operate, or tend specific woodworking machines, such as drill presses, lathes, shapers, routers, sanders, planers, and wood-nailing machines. Lower skilled operators may merely press a switch on a woodworking machine and monitor the automatic operation, whereas more highly skilled operators set up equipment, cut and shape wooden parts, and verify dimensions using a template, caliper, or rule.

The next step in the manufacturing process is the production of subassemblies using fasteners and adhesives. Next, the pieces are brought together to form a complete unit. The product is then finish-sanded, stained, and, if necessary, coated with a sealer, such as lacquer or varnish. Woodworkers may perform this work in teams or be assisted by a helper.

Woodworkers have been greatly affected by the introduction of computer-controlled machinery. This technology has raised worker productivity by allowing one operator to simultaneously tend a greater number of machines. With computerized numerical controls (CNC), an operator can program a machine to perform a sequence of operations automatically, resulting in greater precision and reliability. The integration of computers with equipment has improved production speeds and capabilities, simplified setup and maintenance requirements, and increased the demand for workers with computer skills.

While this costly equipment has had a great impact on workers in the largest, most efficient firms, precision or custom woodworkers—who generally work in smaller firms—have continued to employ the same production techniques they have used for many years. Workers such as *cabinetmakers and bench carpenters; model makers and patternmakers;* and *furniture finishers* work on a customized basis, often building one-of-a-kind items. These highly skilled precision woodworkers usually perform a complete cycle of tasks—cutting, shaping, and preparing surfaces, and assembling prepared parts of complex wood components into a finished wood product. For this reason, these workers normally need substantial training and an ability to work from detailed instructions and specifications. In addition, they often are required to exercise independent judgment when undertaking an assignment.

Working Conditions

Working conditions vary by industry and specific job duties. In logging and sawmills, for example, working conditions are physically demanding due to the handling of heavy, bulky material. Workers in these industries also may encounter excessive noise, dust, and other air pollutants. However, the use of earplugs and respirators may partially alleviate these problems. Also, rigid adherence to safety precautions minimizes risk of injury from contact with rough wood stock, sharp tools, and power equipment. The risk of injury also is lowered by the installation of computer-controlled equipment, which reduces the physical labor and hands-on contact with machinery.

All woodworkers are employed at some stage of the process through which logs of wood are transformed into finished products.

In furniture and kitchen cabinet manufacturing, employees who operate machinery often must wear ear and eye protection. They also must follow operating safety instructions and use safety shields or guards to prevent accidents. Those who work in the finishing area must be provided with an appropriate dust or vapor mask or a complete protective safety suit, or must work in a finishing environment that removes all vapors and dust particles from the atmosphere. Prolonged standing, lifting, and fitting of heavy objects are common characteristics of the job.

Employment

Woodworkers held about 374,000 jobs in 2002. Self-employed woodworkers, mostly cabinetmakers and furniture finishers, accounted for 10 percent of these jobs. Employment among detailed woodworking occupations was distributed as follows:

Cabinetmakers and bench carpenters	147,000
Woodworking machine setters, operators, and tenders, except sawing	95,000
Sawing machine setters, operators, and tenders, wood	56,000
Furniture finishers	39,000
Model makers, wood	4,400
Patternmakers, wood	4,200
All other woodworkers	29,000

About 3 out of 4 woodworkers were employed in manufacturing industries. Among these woodworkers, 41 percent were found in establishments fabricating household and office furniture and fixtures and 28 percent worked in wood product manufacturing, producing a variety of raw, intermediate, and finished wood stock. Wholesale and retail lumber dealers, furniture stores, reupholstery and furniture repair shops, and construction firms also employ woodworkers.

Woodworking jobs are found throughout the country. However, production jobs are concentrated in the South and Northwest, close to the supply of wood, whereas furniture makers are more prevalent in the East. Custom shops can be found everywhere, but generally are concentrated in or near highly populated areas.

Training, Other Qualifications, and Advancement

Most woodworkers are trained on the job, picking up skills informally from experienced workers. Most woodworkers learn basic machine operations and job tasks in a few months, but becoming a skilled woodworker often requires 2 or more years.

Some woodworkers acquire skills through vocational education or by working as carpenters on construction jobs. Others may attend colleges or universities that offer training in areas including wood technology, furniture manufacturing, wood engineering, and production management. These programs prepare students for positions in production, supervision, engineering, and management.

Beginners usually observe and help experienced machine operators. They may supply material to, or remove fabricated products from, machines. Trainees also do simple machine operating jobs, while at first closely supervised by experienced workers. As beginners gain experience, they perform more complex jobs with less supervision. Some may learn to read blueprints, set up machines, and plan the sequence of the work.

Employers increasingly seek applicants with a high school diploma or the equivalent, because of the growing sophistication of machinery and the constant need for retraining. Persons seeking woodworking jobs can enhance their employment and advancement prospects by completing high school and receiving training in mathematics, science, and computer applications. Other important qualities for entrants in this occupation include mechanical ability, manual dexterity, and the ability to pay attention to detail.

Advancement opportunities often are limited and depend upon availability, seniority, and a worker's skills and initiative. Sometimes experienced woodworkers become inspectors or supervisors responsible for the work of a group of woodworkers. Production workers often can advance into these positions by assuming additional responsibilities and by attending workshops, seminars, or college programs. Those who are highly skilled may set up their own woodworking shops.

Job Outlook

Employment of woodworkers is expected to grow more slowly than average through the year 2012. Little or no growth is expected among woodworking machine setters, operators, and tenders. Employment of cabinetmakers and bench carpenters and furniture finishers is expected to grow more slowly than average and employment of model makers and patternmakers is expected to grow about as fast as the average for all occupations. Job openings also will arise each year because of the need to replace experienced woodworkers who transfer to other occupations or leave the labor force.

Demand for woodworkers will stem from increases in population, personal income, and business expenditures, in addition to the continuing need for repair and renovation of residential and commercial properties. Therefore, opportunities should be available for woodworkers who specialize in such items as moldings, cabinets, stairs, and windows. Due to increasingly automated manufacturing processes, job prospects will be best for highly skilled woodworkers with knowledge of computerized numerical control machine tool operation.

Several factors may limit the growth of woodworking occupations. Technological advances, such as robots and CNC machinery, will continue to increase productivity among woodworkers, preventing employment from rising as fast as the demand for wood products, particularly in the mills and manufacturing plants where many processes can be automated. In addition, more jobs in the United States will be lost as imports continue to grow and as U.S. firms move some production to other countries. Also, the demand for wood may be reduced somewhat, as materials such as metal, plastic, and fiberglass continue to be used in many products as alternatives to wood. Environmental measures designed to control various pollutants used in, or generated by, woodworking processes also may adversely impact employment.

Employment in all woodworking specialties is highly sensitive to economic cycles. During economic downturns, workers are subject to layoffs or reductions in hours.

Earnings

Median hourly earnings of cabinetmakers and bench carpenters were $11.54 in 2002. The middle 50 percent earned between $9.26 and $14.66. The lowest 10 percent earned less than $7.70, and the highest 10 percent earned more than $18.11. Median hourly earnings in the industries employing the largest numbers of cabinetmakers and bench carpenters in 2002 are shown below:

Office furniture (including fixtures) manufacturing	$13.02
Household and institutional furniture and kitchen cabinet manufacturing	11.19
Other wood product manufacturing	11.14

Median hourly earnings of sawing machine setters, operators, and tenders, wood were $10.62 in 2002. The middle 50 percent earned between $8.70 and $13.11. The lowest 10 percent earned less than $7.36, and the highest 10 percent earned more than $15.94. Median hourly earnings in the industries employing the largest numbers of sawing machine setters, operators, and tenders, wood in 2002 are shown below:

Sawmills and wood preservation	$11.59
Veneer, plywood, and engineered wood product manufacturing	10.91
Household and institutional furniture and kitchen cabinet manufacturing	10.40
Other wood product manufacturing	10.06

Median hourly earnings of woodworking machine setters, operators, and tenders, except sawing were $10.59 in 2002. The middle 50 percent earned between $8.72 and $13.03. The lowest 10 percent earned less than $7.39, and the highest 10 percent earned more than $15.93. Median hourly earnings in the industries employing the largest numbers of woodworking machine setters, operators, and tenders, except sawing in 2002 are shown below:

Office furniture (including fixtures) manufacturing	$11.00
Sawmills and wood preservation	10.99
Veneer, plywood, and engineered wood product manufacturing	10.99
Household and institutional furniture and kitchen cabinet manufacturing	10.54
Other wood product manufacturing	10.26

In 2002, median hourly earnings were $10.92 for furniture finishers and $10.11 for all other woodworkers.

Some woodworkers, such as those in logging or sawmills who are engaged in processing primary wood and building materials, are members of the International Association of Machinists. Others belong to the United Brotherhood of Carpenters and Joiners of America.

Related Occupations

Carpenters also work with wood. In addition, many woodworkers follow blueprints and drawings and use machines to shape and form raw wood into a final product. Workers who perform similar functions working with other materials include sheet metal workers, structural and reinforcing iron and metal workers, computer-control programmers and operators, machinists, and tool and die makers.

Sources of Additional Information

For information about woodworking occupations, contact local furniture manufacturers, sawmills and planing mills, cabinetmaking or millwork firms, lumber dealers, a local of one of the unions mentioned above, or the nearest office of the State employment service.