



Occupational Outlook Quarterly

U.S. Department of Labor  
U.S. Bureau of Labor Statistics  
Fall 2012



**Also inside:**

Careers in online creativity

My career: Health educator

You're a what? Rodeo clown

# Math at work:

## Using numbers on the job



## New subscriptions

2 years \$34 (\$47.60 foreign)  
1 year \$17 (\$24.80 foreign)  
Single copy \$7 (\$9.80 foreign)

Be certain of receiving our newest biennial projections by ordering a 2-year subscription!

To subscribe to the *Occupational Outlook Quarterly*,

Order online: <http://bookstore.gpo.gov>

Telephone: 1 (866) 512-1800 (toll free)  
(202) 512-1706 (D.C. area)  
(202) 512-2250 (fax)

Write: Superintendent of Documents  
U.S. Government Printing Office  
P.O. Box 979050  
St. Louis, MO 63197

When writing or faxing, cite *Occupational Outlook Quarterly (OOQ)*. Include your address, phone number, and check or VISA, MasterCard, Discover/NOVUS, or American Express number and expiration date.

## Note

The *Occupational Outlook Quarterly* (USPS 492-690) (ISSN 0199-4786) is published four times a year by the Office of Occupational Statistics and Employment Projections, U.S. Bureau of Labor Statistics, U.S. Department of Labor. The Secretary of Labor has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department.

Government agencies, industrial organizations, professional societies, trade associations, and unions often provide career information that is valuable to counselors and jobseekers. Many *Quarterly* articles provide, as a convenience to readers, organizations' mailing addresses, telephone numbers, and, in some cases, Internet addresses. Although these references were carefully selected, the U.S. Bureau of Labor Statistics has neither the authority nor the facilities to investigate the organizations or the information that they may send in response to a request, including the accuracy of such information. Therefore, a reference to an organization in no way constitutes an endorsement or recommendation by the Bureau either of the organization and its activities or of the information it may provide.

## Postmaster:

Send address changes to the *Occupational Outlook Quarterly*, Superintendent of Documents, Attn: Chief, Mail List Branch, Mail Stop: SSOM, Washington, DC 20402. Second-class postage paid at Washington, D.C., and at additional mailing offices.

## U.S. Department of Labor

Hilda L. Solis, Secretary

## U.S. Bureau of Labor Statistics

John M. Galvin, Acting Commissioner



## Index of OOQ articles

Each year's winter issue includes a 5-year index.

## Questions about current subscriptions and address changes

Telephone: 1 (866) 512-1800 (toll free)  
(202) 512-1706 (D.C. area)

Write or fax your mailing label and new address to:

Superintendent of Documents  
Attn: Chief, Mail List Branch  
Mail Stop: SSOM  
Washington, DC 20402  
(202) 512-2168 (fax)

## Editorial matters

All text, charts, and tables are in the public domain and, with appropriate credit, may be reproduced without permission. Most photographs and illustrations are protected by copyright.

To discuss editorial matters (not subscriptions) or request permission to reprint articles (although permission is not required), contact the editor.

E-mail: [ooqinfo@bls.gov](mailto:ooqinfo@bls.gov)  
Telephone: (202) 691-5717  
Write: *Occupational Outlook Quarterly*  
U.S. Department of Labor  
U.S. Bureau of Labor Statistics  
Room 2135  
2 Massachusetts Ave., NE  
Washington, DC 20212

## For the sensory impaired

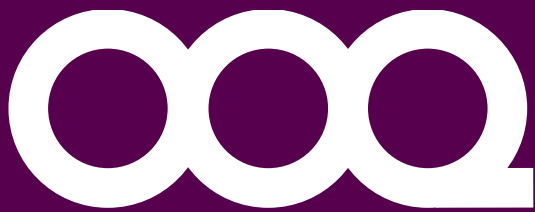
Upon request, people with sensory impairments may obtain information in this publication by telephone at (202) 691-5200 or by Federal Relay Service at 1 (800) 877-8339 (toll free).



---

Read the OOQ online at  
[www.bls.gov/ooq](http://www.bls.gov/ooq)

---



## 2 Math at work: Using numbers on the job

by Elka Torpey

Jobs for workers who use math take many forms. Learn how to formulate a career to make numbers work for you.



## 14 My career: Health educator

In some career fields, a little mentoring goes a long way. Thuy Vu's work in cancer research is one example.

**My career**

## 16 Bloggers and webcomic artists: Careers in online creativity

by Drew Liming

The Internet has changed how artists produce and sell their work. Find out how bloggers and webcomic artists capitalize on their creativity online.



## 22 Grab bag

Scholarships for STEM students, new dual enrollment programs, *Beyond the Numbers*, and National Disability Employment Awareness Month



## 24 Helping others travel abroad: Careers in international preparation

by Dennis Vilorio

People traveling to foreign countries sometimes need assistance planning their trips. Explore the ways in which international preparation workers help make traveling abroad a breeze.



## 34 You're a *what?* Rodeo clown

by Drew Liming

Dale McCracken loves clowning around—with 2,000-pound bulls.



## 36 OOCart

New school year, old story: Education pays



### Editorial staff

Kathleen Green, Editor  
Sara Royster, Managing editor  
Elka Torpey, Contributing editor  
Dennis Vilorio, Design and layout  
Monica Gabor, Associate editor  
Bruce Boyd, Design consultant  
Keith Tapscott, Design consultant

The background is a dark green chalkboard with various white chalk drawings. On the left, there is a large wireframe sphere. In the center, a cube is drawn in perspective. To the right, there is a smaller wireframe sphere and a dome-like structure. At the bottom, a coiled spring is drawn. The overall theme is mathematical and technical.

# Math at work:

## Using numbers on the job

**L**ois Coles teaches algebra to eighth graders in Brentwood, Tennessee. Each year she has her students talk to workers in careers that interest them, asking for examples of how they use math in their jobs.

“It’s unbelievable,” says Coles. “The students ask everyone—from figure skaters to real estate agents, nurses, and airline pilots—and they all give us math problems.”

Math is used in many occupations. And, experts say, workers with a strong background in mathematics are increasingly in demand. “Employers are looking for math majors a lot more than they used to,” says Mike Breen of the American Mathematical Society. That equals prime opportunity for career-minded math enthusiasts.

This article describes how math factors into careers. The first section talks about some of the ways workers use math in the workplace. The second section focuses on three occupations that use math: cryptologists, health data analysts, and math teachers. A third section highlights reasons why workers enjoy their math-related careers and discusses some of their challenges. And a final section suggests sources for more information.

## Math: A formula for career success

Mastering mathematics is helpful in almost any career. Learning math helps workers analyze and solve problems—abilities that most employers value. And math teaches other important practices, including how to approach tasks methodically, pay attention to detail, and think abstractly.

Some number-focused occupations, such as accountants and cost estimators, are obvious. However, workers in other occupations combine mathematical know-how with knowledge specific to their field. Science, technology, and engineering disciplines, for example, rely heavily on mathematics. And other disciplines, such as economics, also use math.



“Mathematics is so prevalent across all kinds of fields,” says Michael Pearson, executive director of the Mathematical Association of America. Math-intensive occupations include computational biologists, who use statistics to analyze molecular datasets; graphics programmers, who use vector mathematics to create movies and video games; and patent lawyers, who use mathematical concepts to better understand some inventions.

The level of math needed in occupations ranges from basic calculations to complex mathematical theories. Carpenters, electricians, and other skilled trade workers may use basic geometry and algebra to calculate the cost and amount of materials they need. Financial quantitative analysts, in contrast, often use graduate-level statistical, quantitative, or econometric techniques to create mathematical models for analyzing investments.

Even in occupations that don’t require it, math knowledge can open the door to lots of careers, says Pearson: “A mathematical background gives you the chance to move in all kinds of directions.”

Elka Torpey

*Elka Torpey is an economist in the Office of Occupational Statistics and Employment Projections, BLS. She is available at [torpey.elka@bls.gov](mailto:torpey.elka@bls.gov).*

## Math on the job: A look at three occupations

We know that lots of workers use math on the job. But in what way do they use it?

In the three occupations described here—cryptologist, health data analyst, and math teacher—workers use math in different ways. Details about their math-related job tasks follow, along with the occupations’ outlook, wages, and required preparation.

A box on page 9 covers four math occupations profiled in the *Occupational Outlook Handbook*: actuaries, mathematicians, operations research analysts, and statisticians.

### Cryptologist

Private information—from government secrets to personal financial records—is usually intended to be kept private. This type of information is usually kept secret by a computerized encryption scheme. Cryptologists use their knowledge of math to create, to improve—and, sometimes, to break these encryptions.

Today, many encryptions are created with algorithms, sets of mathematical instructions that computers use to make information unreadable for people who don’t have the key. Depending on their project, cryptologists rely on various types of math: abstract algebra, number theory, probability, statistics, and other specialties. Other job titles for cryptologists include cryptanalyst and cryptographer.

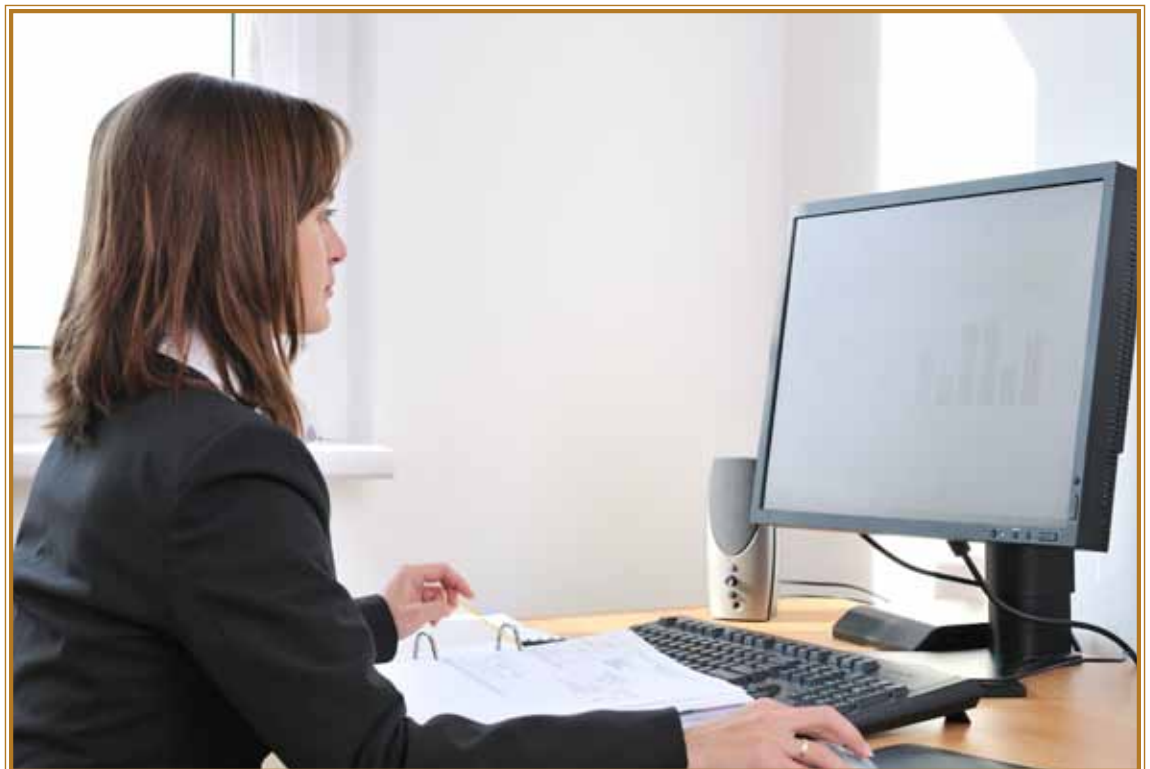
Cryptologists often write computer programs for the algorithms they are creating, refining, or trying to break. Most encryption algorithms are one of two types: symmetric key or asymmetric (public) key. In symmetric-key encryption, the person encrypting the information and the person receiving that information use the same key for decryption. Asymmetric-key encryption uses two different keys.

The need for two keys in public-key encryption increases its complexity. “The algorithms used for public-key cryptology tend to be very mathematical, relying on large prime numbers, exponentiation, or other concepts to prove they’re secure,” says Greg Rose, a cryptologist in San Diego, California.

---

*Workers use math on the job in different ways, depending on their occupation.*

---



Rose was working as a security engineer when he identified weaknesses in cell phone encryption algorithms. He used cryptology to develop a better way to encrypt the information. “It’s very exciting,” says Rose, “like solving puzzles.”

Unlike Rose, cryptologist Roger Barkan tries to break encryptions created by potential U.S. adversaries. His work for the National Security Agency in Fort Meade, Maryland, involves analyzing encrypted data to decipher this secret information.

To determine if an encryption can be broken, cryptologists like Barkan use statistical analysis to figure out which aspects of encrypted data are clues to solving the encryption—and which are merely coincidental. The results of their inquiry determine whether they design followup tests to look for additional clues.

For example, Barkan might look at an encrypted message and notice that the binary data contain more ones than zeros. His next step would be to use statistics to decide whether the number of ones and zeros is meaningful. This analysis helps Barkan to determine what the encryption scheme is or how the decrypted message may appear. “Ultimately, a good cryptologist needs to be like a detective,” he says.

Another task cryptologists have is to ensure that algorithms are as effective as possible. “There are plenty of algorithms out there that work,” says Rose, “but their efficiency is becoming more important.” For example, cryptologists may refine algorithms so that they take less time to complete and use less computer memory.

The encryption algorithms that cryptologists work on are used around the world to help keep information secure. “I’ve written a piece of math that millions of people use every day,” says cryptologist Bruce Schneier of Minneapolis, Minnesota. “That’s pretty cool.”

**Employment, wages, and outlook.** BLS does not collect data specifically on cryptologists. Many workers in this occupation are classified by BLS as mathematicians. In May

2011, BLS data show, there were 2,980 wage and salary mathematicians. These workers had a median annual wage of \$101,040.

According to BLS, mathematicians are projected to add about 500 new jobs between 2010 and 2020. Many jobs related to national security are expected to have continued employment growth. Still, competition for cryptologist and other mathematician jobs is expected, given the relatively few number of available positions. Workers may need to relocate to an area where major employers are based, such as near Washington, D.C.

Most cryptologists work for the National Security Agency or other government intelligence agencies or in academia. Some large, multinational corporations also hire these workers, industry sources say.

Many types of businesses—such as banks and cable companies—rely on cryptology to help keep information secure. Most of the encryption algorithms in use today have already been written, however, so the number of jobs with these organizations is small.

**Preparation.** Cryptologists need excellent math, computer programming, and problem-solving skills. They also must be organized, persistent, and able to think creatively.

Most cryptologists need at least a bachelor’s degree in mathematics or a related field to enter the occupation. For some positions, a master’s degree or Ph.D. is required. But sometimes, related experience can substitute for education.

For some entry-level government cryptologist positions, workers can have a college degree in a nontechnical field, such as music or history. These workers provide a different perspective when helping to analyze encryptions—and, like other government cryptologists, they usually receive on-the-job training and take classes in subjects related to their work.

Cryptologists who work for the U.S. government must pass a security background investigation and a polygraph test. An internship with a federal agency that employs cryptologists is helpful for gaining experience and contacts in the field.

## Health data analyst

Thanks to the work of health data analysts, math provides answers that help people make informed healthcare decisions. Health data analysts collect, manage, and analyze health-care information. They use this information to identify ways to lower costs and improve services.

Some health data analysts perform mathematical calculations to better understand how a healthcare facility functions. Ellen Berkowitz, a senior health data analyst in Toledo, Ohio, produces reports that compare her hospital's care with that of established best practice standards. She may calculate how long it typically takes for a patient to receive an electrocardiogram (EKG), for example, or calculate the percentage of heart failure patients readmitted within 30 days. Then, depending on the results, Berkowitz tries to identify areas for improvement and reports the data in executive summaries, graphs, and other presentations.

Other health data analysts use statistics to establish connections between healthcare experiences and patients' results—and to make predictions about the future. Analysts like Chet Deshmukh of Apex, North Carolina, for example, may do a regression analysis to determine which factors are most likely to affect stroke patients' rehabilitation and recovery times. "You start to connect the dots to envision certain patterns and trends," says Deshmukh. "You take information specific to one person and try to connect it to the overall population."

Health data analysts' jobs vary by employer and position. Analysts who work for insurance companies, for example, may develop predictive models to help the company determine ways to save costs by encouraging at-risk plan members to take preventive measures.

Most health data analysts work with electronic health records to compile and analyze data. Some analysts transfer data from paper-based to electronic records. Others set up systems for entering health data. Still others

specialize in helping their organization meet data collection and reporting requirements.

Workers other than health data analysts also study health data. Medical records and health information technicians, for example, organize and manage data related to patient care. Healthcare administrators, nurses, and case managers sometimes analyze health information. And many statisticians, epidemiologists, and medical scientists focus on interpreting medical and health data.

**Employment, wages, and outlook.** BLS does not collect data specifically on health data analysts. Some of the duties of health data analysts are similar to those of medical records and health information technicians. BLS data show that in May 2011 wage and salary medical records and health information technicians held 180,280 jobs and had a median annual wage of \$33,310.

Health data analysts who perform sophisticated research often have tasks that overlap with those of statisticians or of epidemiologists. In May 2011, wage and salary epidemiologists held 4,610 jobs and earned a median annual wage of \$64,220. And BLS counted 23,770 wage and salary statisticians, who had a median annual wage of \$73,880, in May 2011.

Anecdotal information suggests that wages for most health data analysts fall between those of the technicians and statisticians—in the \$40,000 to \$60,000 range.

BLS projects that employment for medical records and health information technicians should grow faster than the average for all occupations, adding 37,700 new jobs between 2010 and 2020. Employment growth of epidemiologists is projected to be faster than average and to add 1,200 new jobs. And statistician employment is projected to grow at an average rate and to add 3,500 new jobs.

Health data analysts work for hospitals, nursing homes, and other healthcare facilities. Other major employers include insurance companies, government agencies, research institutions, and consulting firms.

**Preparation.** Health data analysts must be detail oriented and have good math and





---

*Health data analysts use math to help people make informed decisions about healthcare.*

---

analytical skills. They also must be able to communicate well so that they can explain their findings to others.

Knowledge of healthcare practices is important for health data analysts. These workers must understand disease classification systems, medical terminology, and healthcare reimbursement methods so that they can interpret data and understand how it relates to improving costs and patient care. Many health data analysts have worked as medical coders. Others have experience in patient care or healthcare administration.

An associate's degree is typically the minimum education required to become a health data analyst. As job duties of health data analysts evolve, some employers prefer to hire workers who have a bachelor's or higher degree, especially for positions requiring higher level statistical analysis. Fields of study may include health information management,

health informatics, health services research, or public health.

In addition, coursework in statistics, computer science, physical sciences, and business administration are valuable. Workers also must be comfortable using electronic health records systems, as well as database, spreadsheet, presentation, statistical, and other types of software.

### **Math teacher**

Math is used every day for many things, such as paying bills and measuring ingredients. With the help of math teachers, students gain the math knowledge they need for everyday tasks—and, at higher levels, they learn the advanced math skills required in some careers.

To help their students become more engaged, math teachers frequently use real-world examples. For example, Nikita

Midamba, who teaches algebra, trigonometry, geometry, and basic math for a nonprofit organization in Philadelphia, Pennsylvania, uses nutrition labels and local crime statistics to make math relatable for her students.

Math teachers also may use hooks—such as clips from television shows or commercials—to attract students' attention so that they become intrigued in a lesson or with a problem. Middle school algebra teacher Lois Coles, for example, has her students play games, and she tells jokes at the end of her slideshow presentations. "If you can find ways to make math fun," agrees Midamba, "students will learn it."

By the very nature of their work, math teachers regularly apply their mathematical knowledge on the job. The types of math that they teach range from basic math, such as addition and multiplication, at the elementary school level to more complex subjects, such as geometry and calculus, in high school. Some math instructors and professors teach

statistics, differential equations, and other topics at the undergraduate and graduate levels; some also do original research.

Like all teachers, math teachers spend time creating lesson plans, presenting material to students, and grading assignments. They often use their math skills during these activities. When grading math problems, for example, math teachers check students' work to ensure that students follow the proper steps to get their answers. Teachers also help students prepare for standardized tests.

Some teachers focus only on math. Others, especially those who work with younger students, teach more than one subject. Math teachers may specialize in education for specific groups, such as elementary, postsecondary, or adult literacy and GED students.

Because students learn in different ways, math teachers often use a variety of techniques to present concepts. For example,

*(Continued on page 10)*

*To keep students engaged in a lesson, math teachers may tell jokes or have students play games in class.*



## Four occupations in which math is prime

Some workers specialize in mathematics—or a particular branch of it. These workers include actuaries, mathematicians, operations research analysts, and statisticians. The table shows BLS wage and employment data for each of these occupations.

Read the detailed profiles for these four occupations, listed under math occupations in the *Occupational Outlook Handbook*, at [www.bls.gov/ooh/math/home.htm](http://www.bls.gov/ooh/math/home.htm).

**Actuaries.** Sometimes called actuarial analysts, actuaries use mathematical models to analyze statistical data and to forecast risk. They help develop, price, and evaluate products related to health insurance, life insurance, property and casualty insurance, or pension and retirement benefits.

Actuaries typically need a bachelor's degree in a discipline such as mathematics, statistics, business, or actuarial science. Computer programming skills are also important. To become fully qualified, actuaries must pass a series of exams, but workers need not have passed all of these exams before being hired. Employers often pay for the exams and allow time on the job to study for them.

**Mathematicians.** These workers advance mathematical knowledge and solve problems using high-level mathematics and technology. They explore new mathematical theories and ideas in specific areas of math, such as geometry, number theory, or logic. And they look for ways to apply mathematical principles to disciplines like engineering or science. Cryptologists, described in greater detail above, are a type of mathematician.

Mathematician jobs typically require a master's degree in mathematics, but many workers have a Ph.D. Some jobs are available for workers with a bachelor's degree.

**Operations research analysts.** To help organizations solve problems and improve decisionmaking using mathematical models, operations research analysts collect and study information from databases and other sources. They use their analyses to make recommendations related to production, sales, logistics, or other areas of operation.

To enter the occupation, workers must know how to use advanced statistical and database software. In addition, they typically need a bachelor's degree in operations research, management science, or a related field. Degrees in mathematics, engineering, computer science, physics, or other technical fields are also common. Many employers prefer to hire people who have a master's or higher degree.

**Statisticians.** Statisticians collect and interpret data using a variety of statistical methods and theories. They design surveys and other methods for gathering data representative of a population. Statisticians also identify trends in data, draw conclusions, and assess whether their results are reliable.

These workers typically need a master's degree in statistics, mathematics, or survey methodology. But a bachelor's degree is sufficient for some entry-level jobs. A Ph.D. usually is required for academic or research jobs. Statisticians need computer programming skills and use statistical software to analyze data.

### Wages, employment, and outlook in math occupations,\* May 2011 and projected 2010–20

Math occupations	May 2011		Projected 2010-20	
	Median annual wage	Employment	Numeric change	Percent change
Actuaries	\$91,060	19,590	5,800	Faster than average
Mathematicians	101,040	2,980	500	About as fast as average
Operations research analysts	71,950	65,030	9,400	About as fast as average
Statisticians	73,880	23,770	3,500	About as fast as average

\* Table includes the four mathematical occupations BLS profiles in the *OOH*. As the article explains, many other occupations use math. Source: BLS, Occupational Employment Statistics Survey (wages and employment), Employment Projections Program (numeric and percent change).

Math teachers must be able to break down complicated concepts into ones that are easier for their students to grasp.



(Continued from page 8)

some concepts may be explained using words and graphs along with numbers. Coles and other math teachers combine two or more approaches to reach out to all types of learners. “My kids get it,” Coles says. “One way or another, they get it.”

**Employment, wages, and outlook.** BLS does not collect data on math teachers separately. Instead, BLS counts math teachers among other types of teachers.

There were more than 3 million wage and salary elementary, middle, and high school teachers in May 2011, according to BLS. Adult literacy and GED teachers accounted for about 68,000 additional wage and salary jobs. And postsecondary mathematical science teachers held about 54,000 wage and salary jobs.

Median annual wages in May 2011 ranged from \$47,370 for adult literacy and GED teachers to \$66,680 for postsecondary

mathematical science teachers. Teachers typically work during a 10-month academic year, with 2 months off in the summer.

According to BLS, the job outlook for teachers varies by region of employment and the level of education that they teach. Altogether, teachers are projected to add more than 700,000 new jobs between 2010 and 2020. And because math is a subject for which many schools report difficulty finding qualified instructors, math teachers are expected to have better job prospects than other types of teachers.

Most math teachers work in public or private elementary, middle, and high schools. Others teach at the college level. Some, like Midamba, work for community-based organizations.

**Preparation.** Creativity, patience, and enthusiasm about the subject matter are some of the most important qualities for teachers. But teachers need other skills, too.

“You really have to be able to engage the students and be able to understand where

they're coming from," says Midamba. "You can know math, but that doesn't necessarily mean you will be a great math teacher." The ability to break down complicated concepts into ones that are easier to grasp is also important.

Teachers typically need at least a bachelor's degree. Public school teachers also need a state-issued certification or license. To teach higher level math, workers often must have majored or minored in mathematics or a related field. Teacher education classes and supervised teaching experiences also help to prepare these workers—and may be required for certification. Specific requirements vary by state or employer or by the group of students that workers teach.

Some teachers earn a master's degree, which may lead to higher pay. Those who teach at the college level usually need a Ph.D.

## Pluses and minuses of math work

There's a lot to like about jobs that use math. "For something that many people tend to think of as boring, mathematics is actually really exciting," says cryptologist Rose.

Finding opportunities to share that excitement with others attracts workers to these jobs. "Math is something I like," says Midamba, "and it's rewarding for me to be able to show students that math isn't scary and that they're smart enough to do it."

Career satisfaction starts early for math workers. According to the National Center for Education Statistics Baccalaureate and Beyond Study, math majors in 2009 reported higher levels of satisfaction with the challenge of their work 1 year after graduation than many other majors, including those in engineering and engineering technology, computer and information sciences, business, social sciences, and biological or physical sciences.

Studying math often pays off right away: math majors have starting salaries that are higher than college graduates in many other disciplines. (See the box on page 12.)

BLS data show that math occupations (actuaries, mathematicians, operations research analysts, and statisticians) had median annual wages that were more than double the \$34,460 median annual wage for all occupations in May 2011. And other occupations that require advanced math skills—such as physicists, engineers, and computer scientists—also had very high median annual wages: often close to or greater than \$100,000.

But those personal and financial rewards are usually the result of hard work and study. Most math-intensive jobs require at least a bachelor's degree. Others require a master's degree or Ph.D.

And even after years of study, finding the answers to practical or theoretical problems in math isn't always easy. Health data analyst



---

*Some math problems take years to solve, but workers say the challenge makes their efforts gratifying.*

---

## Study math, multiply your earnings

Math majors often fare well in the job market, according to data from the National Association of Colleges and Employers (NACE).

Data from the NACE winter 2012 salary survey indicate that the average starting salary for mathematics majors was \$43,800, higher than the average of \$41,701 for all 2011 graduates. As table 1 shows, math majors' starting salaries compared favorably with those of other majors in 2011. And graduates who majored in engineering and computer science—two disciplines that use plenty of

math—had the highest starting salaries of any majors.

Furthermore, in four of the top five industries in which they were employed, math majors had starting salaries that exceeded \$50,000. (See table 2.) According to NACE, there were about 16,000 new graduates employed in these five industries. Job titles for math majors employed in these industries might include operations research analyst, systems engineer, data manager, data mining analyst, cryptanalyst, programmer, financial analyst, actuarial analyst, or teacher.

**Table 1: Average starting salaries of selected majors, 2011**

Engineering	\$61,872
Computer science	60,594
Business	48,144
Mathematics	43,800
Sciences	40,204
Education	37,830
Humanities and social sciences	35,503

**Table 2: Average starting salaries of 2011 math majors, by industry**

Elementary and secondary schools	\$37,550
Insurance carriers and related activities	51,510
Management, scientific, and technical consulting services	53,610
Computer systems design and related services	53,020
Manufacturing	54,120

Source: National Association of Colleges and Employers, January 2012 salary survey.

Deshmukh says it's frustrating when predictions don't always hold true and data quality isn't always optimal.

On the other hand, says Barkan, time spent on a mathematical inquiry or analysis can be gratifying in the end: "The extreme difficulty of our problems makes our achievements that much more satisfying when we accomplish them."

## For more information

To learn more about many of the occupations in this article, as well as hundreds of others, refer to the *Occupational Outlook Handbook (OOH)*, online at [www.bls.gov/ooh](http://www.bls.gov/ooh).

Recent articles in the *Occupational Outlook Quarterly (OOQ)* focus on people whose math backgrounds are important in their work. "My career: Manager," in the summer 2012 *OOQ*, is available at [www.bls.gov/ooq/2012/summer/mycareer.htm](http://www.bls.gov/ooq/2012/summer/mycareer.htm). And "You're a what? Psychometrician" appears in the fall 2011 issue at [www.bls.gov/ooq/2011/fall/yawhat.htm](http://www.bls.gov/ooq/2011/fall/yawhat.htm).

General information about math careers is available from the following organizations:

American Mathematical Society

201 Charles St.

Providence, RI 02904

Toll free: 1 (800) 321-4267

[www.ams.org/careers](http://www.ams.org/careers)

Mathematical Association of America  
1529 18th St. NW.  
Washington, DC 20036  
Toll free: 1 (800) 741-9415  
[maahq@maa.org](mailto:maahq@maa.org)  
[www.maa.org/students/career.html](http://www.maa.org/students/career.html)

Society for Industrial and Applied  
Mathematics  
3600 Market St., 6th Floor  
Philadelphia, PA 19104  
Toll free: 1 (800) 447-7426  
[service@siam.org](mailto:service@siam.org)  
[www.siam.org/careers](http://www.siam.org/careers)

Association for Women in Mathematics  
11240 Waples Mill Rd., Suite 200  
Fairfax, VA 22030  
(703) 934-0163  
[awm@awm-math.org](mailto:awm@awm-math.org)  
[sites.google.com/site/awmmath/awm-  
resources/career](http://sites.google.com/site/awmmath/awm-resources/career)

For more information about cryptologists,  
contact:

International Association for Cryptologic  
Research  
[www.iacr.org](http://www.iacr.org)

National Security Agency  
9800 Savage Rd.  
Fort Meade, MD 20755  
Toll free: 1 (866) 672-4473  
[customercare@nsa.gov](mailto:customercare@nsa.gov)  
[www.nsa.gov/careers](http://www.nsa.gov/careers)

For more information about health data  
analysts, contact:

American Health Information  
Management Association (AHIMA)  
233 N. Michigan Ave., 21st Floor  
Chicago, IL 60601  
Toll free: 1 (800) 335-5535  
[www.ahima.org](http://www.ahima.org)

For more information about math teach-  
ers, contact:

National Council of Teachers of  
Mathematics  
1906 Association Dr.  
Reston, VA 20191  
Toll free: 1 (800) 235-7566  
[nctm@nctm.org](mailto:nctm@nctm.org)  
[www.nctm.org](http://www.nctm.org)



# My career

## Health educator

### Thuy Vu

Research Coordinator at the University of Washington and Project Director at the Fred Hutchinson Cancer Research Center, Seattle, Washington

#### BLS fast facts: Health educators

- May 2011 wage and salary employment: 56,610
- 2010–20 projection: 37 percent growth (much faster than average)
- May 2011 median annual wage: \$47,940
- Typical education and training: Bachelor's degree. Some positions, such as those in public health, require a master's degree.
- May 2011 top employing industries: Hospitals, local and state governments, individual and family services, and outpatient care centers

**A** mentor made the difference at the start of Thuy Vu's career. If not for the encouragement of her mentor, Thuy wouldn't have pursued the master's degree that is critical to professional development in her field.

In her jobs at the University of Washington and the Fred Hutchinson Cancer Research Center, Thuy coordinates and directs projects related to cancer research. The jobs overlap, with both focusing on analyzing data and sharing research results for preventing cancer and promoting good health.

Although the U.S. Bureau of Labor Statistics (BLS) classifies the type of work Thuy does as that of a health educator, her job tasks differ from most of the health educators she knows. Other health educators with whom Thuy collaborates have more direct interaction with patients than she does in her research-based work.

Job guidance from a mentor can be helpful. But it was especially important to Thuy, whose mentor helped her from the beginning to become involved in research and in

promoting good health. In an occupation like Thuy's, which can vary from one job to another, understanding why her work matters was a key factor in pursuing this career.

#### What do you do?

I research cancer prevention and promote good health, help communities understand research data and how to use it, and promote best practices (ways of doing the same thing in different situations) that are based on evidence. I work with academic researchers, healthcare professionals, community groups, and state and local health departments.

For example, one of my projects is to evaluate a national colorectal cancer screening program. (A screening is a type of exam to detect disease in people, even when they have no symptoms.) There are guidelines that outline evidence-based strategies for promoting colorectal cancer screening. I'm working with a team to identify which strategies the states are using and to study how states are adapting and using the strategies. We hope this information helps us to understand ways that these strategies can be used with different populations and in different settings to increase colorectal cancer screening rates.

#### How did you get these jobs?

Through networking and word of mouth. But the work I do now has evolved from what I was originally hired to do. Initially, my experience was in designing educational, intervention, and recruitment materials that would be tested in the field. Now, my focus is more on evaluating and sharing results.

#### How does your education tie in?

My bachelor's degree is in political science, with a minor in public health and community medicine. The job tasks themselves reflect my minor field of study, but the political science gives me an understanding of the policy behind the work.

I also have an MPH (master of public health) degree with training in the social



and behavioral sciences. During grad school, I held a graduate-student appointment that required a practicum (supervised, hands-on experience) at a cancer research center. I had been exposed to a lot of the MPH curriculum before grad school because of my job, but grad school brought together everything I'd already been doing and gave me the perspective to fully understand it.

The only reason I have my MPH is because of my mentor, Deb, who was the principal investigator of a research group I was part of. Deb made me understand the importance of having a graduate degree in this field. I had no interest in going back to school after college until she encouraged me to get my master's.

### **What was your first job out of college?**

I had a temporary job with a small accounting firm. The head of the firm was very helpful to me when I got an offer elsewhere for a full-time job. He took on a "big brother" role to help me with things like negotiating a salary and benefits.

The job itself didn't necessarily influence my future career plans. But what was meaningful to me was having someone be so supportive even as I was leaving. I got that same kind of support, and more, from Deb later on.

### **What else led you to your current jobs?**

Once, when I was almost finished with my bachelor's, I was home on break and talking about school. Someone asked what I was interested in, and I said, "Psychology." After I got back to school, I wondered why I'd said that—I was a political science major and had taken only one psychology class. But I think I knew even then that I had an interest in understanding behavior.

And in the field, in my job, working in the community, the behavioral science part has been a critical piece. The hard part about

science is that what works in research works in a vacuum. But interacting with other people is what's illuminating and informative. It's the human part that can really throw a wrench in the scientific data.


### **Any surprises along the way?**

The piece that's been most surprising to me is the value placed on mentoring in the academic research community. I'm humbled by the passion and seriousness of mentors, especially the degree of their dedication in helping younger researchers to grow. I'm where I am today because of Deb.

Deb was a phenomenal mentor who took the nurturing of younger staff very seriously. I felt like I was such a priority in her life. Along with helping me develop in my career, she taught me to have confidence in myself, nurtured my interests, and counseled me. Deb really gave me opportunities that made me understand the world of research and working with communities.

### **What's your best advice?**

Actively peruse job postings to strengthen your skill set. If you see a posting for a job that you think looks interesting, dissect it to see what the job really is, what skills are required, and what is required to get those skills. Try to build up your skill set based on those known criteria, or at least study the job posting and know what's involved so you can speak intelligently about it. Beyond that, get hands-on experience through a practicum, internship, or volunteer opportunity.

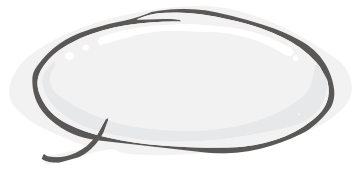
More broadly, my advice is to find somebody who is willing to take you under his or her wing to teach you and support you. Ideally, a mentor might be able to provide opportunities to grow, but it's important to understand that a mentor's job is not to get you, or give you, a job. A good mentor can be invaluable in jumpstarting a career. 

---

*Thuy Vu was interviewed by Kathleen Green, an economist in the Office of Occupational Statistics and Employment Projections, BLS. Kathleen can be reached at (202) 691-5711 or at [green.kathleen@bls.gov](mailto:green.kathleen@bls.gov).*

# Bloggers and webcomic artists: Careers in online creativity





**T**he expansion of the Internet has created many new opportunities for people to share their talents. Many people share just for fun—but some do it for fun and money.

Online, these artists can reach a global audience. The rapid growth of online media excites many people working in the field. “There are a billion new opportunities that weren’t there 5 years ago,” says Greg Wyshynski, editor of hockey blog *Puck Daddy*.

This article describes careers for digital media workers. The first section focuses on two online occupations: bloggers and webcomic artists. The second section discusses why bloggers and webcomic artists enjoy their work and some of the challenges that they face. A final section suggests sources for more information. And the box on page 20 provides tips for developing your own blog or webcomic.

## Jobs in digital media

The growth of the Internet and the availability of simple Web publishing tools have made it easy to share content online. Many people create websites as a hobby or as a way to share news with family and friends. Artists—including photographers, writers, filmmakers, and musicians—put their work online in the hopes of attracting attention and building a following. These artists enjoy sharing their creations with people around the world.

Some artists, however, are able to make a living creating content for their websites. Workers in the occupations covered in this article, bloggers and webcomic artists, produce online content as their primary source of revenue. The U.S. Bureau of Labor Statistics has no employment or wage data for bloggers or webcomic artists. Their wages vary significantly depending on their employer and the size of their audience.

### Bloggers

Bloggers are writers who regularly post content on a Web log, or blog. These blog posts can be of any length and on any topic.

Some bloggers post many times a day; others post less frequently. In their posts, bloggers occasionally use other media and content that aren’t possible in print. Cooking blogs might include instructional videos of cooking techniques, for example, or news blogs provide interactive maps. Bloggers can be self-employed, employed by print media or other companies, or work as contractors.

Depending on their interests, self-employed bloggers write on a number of topics, such as offering financial advice or reviewing restaurants. They have complete creative control over their own content and set their own schedules. Most self-employed bloggers make money through advertising on their websites. The amount of money they make from ads depends on the number of times people visit their website, called traffic. As traffic increases, advertisers pay bloggers more. Well-known bloggers may also make money through sponsorships, book or product sales, and speaking fees.

When employed by traditional print media companies, such as newspapers and magazines, bloggers may write for both print and online editions. For example, Brier Dudley, technology blogger for *The Seattle Times*, writes a weekly column in addition to his regular blog entries. According to Dudley, the tone of his blog differs from that of his column. “Blog items tend to be more conversational and casual,” he says.

Bloggers who work for newspapers or magazines are more like traditional journalists than are self-employed bloggers. News bloggers receive guidance from editors who review their posts. And like traditional journalists, news bloggers need to be ready to write whenever news occurs. Many readers turn to the Internet for breaking news, so bloggers often race to be the first to post news. “You’re like a doctor on call at all times,” says Wyshynski. “You have to be on the story first.”

Some bloggers work on a contract basis, not as employees of news media companies. These contractors usually write for online news websites that publish posts from many bloggers. Like news bloggers, these

Drew Liming

*Drew Liming is an economist. He worked in the Office of Occupational Statistics and Employment Projections, BLS, at the time he wrote this article.*



contractors submit their posts to editors for review. They are usually paid per post, similar to freelance reporters. Many contract bloggers write for several different sites to increase their income. They may also earn bonuses for writing posts that attract particularly high traffic.

**Skills and training.** As professional writers, bloggers must be excellent communicators and need to understand what content most appeals to their audiences. Bloggers also have to be disciplined to produce high-quality research and writing, while trying to meet deadlines or to post breaking news.

Bloggers employed by newspapers usually have a journalism degree or previous newspaper experience. Some contract bloggers have journalism degrees, but it is not a requirement. Like freelance journalists, contract blogger's posts are judged on their own merit.

There are no formal education requirements for self-employed bloggers. However, self-employed bloggers are usually experts in the field they blog about. They previously may have worked in a job related to their blog's topic. For example, a professional blogger who runs a home decorating blog may have experience with many different decorating or remodeling techniques.

Bloggers who are self-employed or who work with a small staff usually need experience with multimedia tools. Newspapers may have photographers and video editors on staff, but many bloggers lack these resources and produce the photos and videos themselves. "A lot of online media isn't just about being talented as a writer or a journalist," says Wyshynski. "You might have to shoot and edit your own video and audio."

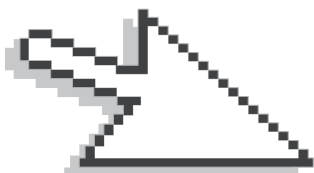
### Webcomic artists

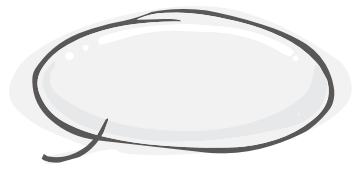
Although most comic artists work for newspaper syndicates or comic book companies, webcomic artists post their strips for readers online. Some webcomic artists post new strips daily; others post less frequently.

Creating a widely read webcomic requires more than excellent artwork. Webcomic artists must also write scripts for their strips before they begin drawing. In some webcomics, called one-shots, each strip is a self-contained story. Other webcomics are serials, which have long-running plots and regularly occurring characters.

For webcomic artists, developing a good script can be a quick or lengthy process. Sometimes, inspiration strikes early in the creative process, and they get an idea for a script immediately. Other times, webcomic artists may spend hours—or more—struggling to craft a script that their audiences will enjoy.

Webcomic artists may turn to outside influences for inspiration when they're having difficulty writing a script. For example, Tim Buckley, artist of *Ctrl + Alt + Del*, frequently uses video game humor in his comic. To find ideas, Buckley researches what new games are scheduled to be released and what issues are





of interest to the gaming community. He also draws inspiration from his personal life. “I’ve gotten many ideas from interactions with my friends and family,” he says.

After they’ve written the script for a strip, webcomic artists begin drawing. All artists have their own style. Some draw highly detailed characters and landscapes; others use a minimalist style. Many webcomics are in full color, but some artists prefer to work in black and white. Depending on the complexity of the artwork, drawing a strip may take anywhere from a few minutes to many hours.

Most webcomics are available online at no cost, so comic artists have to find alternative sources of revenue. Like bloggers, many webcomics make money through advertisements. Webcomic artists also earn money from selling products, such as t-shirts and compilation books of their comics, to fans.

When they’re not planning or drawing comic strips, webcomic artists are frequently creating new products to sell to fans. According to Jeph Jacques, artist of *Questionable Content*, coming up with good products can be a challenge. “Coming up with a t-shirt

design is like making a comic,” he says. “It can be quick, but it usually takes a long time.”

Webcomic artists are able to communicate directly with readers, which allows them to understand which products and scripts appeal most to their audience. Many webcomic artists spend part of their day replying to email from fans. Some webcomics also have message boards that allow artists to communicate with their fans. To share information with readers, webcomic artists sometimes write personal blogs on their websites.

Many webcomic artists also connect with readers by meeting them at conventions. Artists may travel to conventions to speak on panels and interact with fans and peers. Many artists also bring their products to conventions, where they can sell their merchandise directly.

**Skills and training.** Not all webcomic artists are formally trained. In fact, many are self-taught and have refined their artwork through years of practice. The artwork of different webcomics varies widely, and practice is essential for each artist to develop a unique style.



## Tips for developing your own blog or webcomic

Creating a popular blog or webcomic takes both hard work and luck. Here are some tips to help you be successful.

**Find your niche.** There are already many blogs and webcomics online. To distinguish yours, develop your own style or become an expert in a specific subject matter. If your content is unique and entertaining, casual browsers are more likely to become regular readers. To cultivate a group of fans, it may be beneficial to limit your scope. For example, if you want to write a blog of restaurant reviews, you might focus on restaurants in your local area or on a specific type of cuisine.

**Update regularly.** The more frequently you add content, the more often regular readers will come back to your website. If you post several times a day, regular readers might check the site multiple times, increasing your web traffic. This doesn't mean that you must update the website constantly. But if you have

a published update schedule, such as one new comic strip a week, stick to it. If readers see that you're not following your own schedule, they might stop visiting your site.

**Engage your audience.** Communicate with your readers through e-mail, message boards, or social media. If your audience feels personally invested in your blog or webcomic, they're more likely to read it regularly and support you financially. And the more you understand your audience, the better you'll be able to create content and products that appeal to them.

**Search for revenue.** Find creative ways to make money. If your blog or webcomic attracts a large audience, you can make money through advertising. However, even a smaller group of dedicated readers can be profitable. Dedicated readers are more likely to financially support your blog or webcomic, either through donations or product purchases.

Excellent artwork alone does not ensure success as a webcomic artist; artists also must write scripts that appeal to their audience. To improve their scripts, many artists practice writing dialogue and developing characters.

Because each webcomic operates as his or her own small business, operating it successfully also requires skill in business and math. These skills help artists evaluate companies to find the right manufacturer for their products, to price merchandise, and to complete tax forms for their small businesses.

## Rewards and challenges

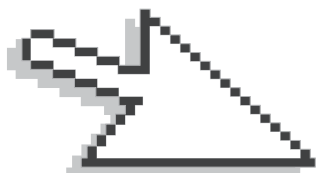
Sharing content online is often rewarding. Bloggers and webcomic artists can gain a global audience for their work, and they frequently develop close relationships with their fans. Unlike traditional media, digital media workers who post online can communicate directly with readers from all over the world. "You can get feedback instantly," says Dudley.

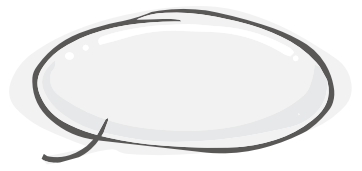
"And you're having a conversation with people everywhere."

Self-employed bloggers and webcomic artists enjoy having control over their work and making their own decisions. They set their own schedules and write or draw without supervision. "I have the freedom to work and to write stories and jokes that entertain me," says Buckley.

But establishing a popular blog or webcomic is difficult. New blogs and webcomics face competition from an immense crowd of previously existing sites. With so many competitors, new sites struggle to stand out. Even the best blog or webcomic may never be read by an audience large enough to make it profitable.

Blogs and webcomics that are able to attract a following usually have to wait years before they're financially stable. Bloggers and webcomic artists frequently develop and maintain their websites as side projects while working full time in another job. If





the website becomes profitable, then it might turn into a full-time job. But building a large audience usually takes a while. “You have to be willing to be poor,” warns Jacques. “There aren’t any instant millions.”

Bloggers and webcomic artists constantly search for ways to monetize the work they put online. Even online advertising, the most common way to make money, isn’t a guaranteed source of revenue anymore. To view blog and webcomics, many people now use Rich Site Summary (RSS) feeds to see updates from their favorite websites all in one place. RSS feeds frequently remove advertisements from posts and don’t count towards a webpage’s traffic totals. This decreased traffic reduces the amount of money bloggers and webcomic artists make from advertisers. In response to the increasing use of RSS feeds, bloggers and webcomic artists are searching for new ways to make money while continuing to put their content online for free.

Despite these challenges, many bloggers and webcomic artists are passionate about sharing their work directly with readers. “Even if I couldn’t make the living I do,” says

Buckley, “I’d still want to do this because I enjoy it so much.”

## For more information

To learn more about writing and artistic occupations, as well as hundreds of others, check the *Occupational Outlook Handbook (OOH)*, online at [www.bls.gov/ooh](http://www.bls.gov/ooh). The *OOH* does not have information specific to bloggers and webcomic artists, but it does include profiles of similar occupations, such as writers, journalists, and fine artists.

In addition, an article about cartoonists appeared in the fall 2008 *Occupational Outlook Quarterly*. It is available online at [www.bls.gov/ooq/2008/fall/yawhat.htm](http://www.bls.gov/ooq/2008/fall/yawhat.htm).

Because the occupations in this article are relatively new, there are no established associations for bloggers or webcomic artists. However, some professional bloggers and webcomic artists have posted advice for aspiring beginners. To find this information, search online for “how to become a blogger” or “how to become a webcomic artist.”





## Dual enrollment: Not just for high achievers anymore

Dual enrollment programs—which allow high school students to take college courses—were designed for high-achieving students hoping to get a head start on college. But a 2011 report published by the James Irvine Foundation suggests ways to expand dual enrollment to assist struggling, low-income, and other disadvantaged students.

The report, *Different Approaches to Dual Enrollment: Understanding Program Features and Their Implications*, describes eight dual-enrollment programs in California. Although the programs differ in some ways, all seek to help a broad range of students move successfully from high school to college. And each program uses a career-focused approach: Community and business partnerships enable students to apply on the job what they learn in the classroom.

According to the report, programs that offered student support services and relevant work-based learning experiences were among the most successful at encouraging low-income students to go to college. The Community College Research Center, which gathered data for the report, provides ongoing feedback to the programs.

The full report is available at [ccrc.tc.columbia.edu/Publication.asp?uid=971](http://ccrc.tc.columbia.edu/Publication.asp?uid=971).



## SMART scholarships for STEM students

You could get paid to earn a degree in science, technology, engineering, or math—and get hired at graduation. If you think that sounds like a SMART deal, you're right.

The Science, Mathematics And Research for Transformation (SMART) Scholarship for Service Program offers scholarships to undergraduate and graduate students in science, technology, engineering, and mathematics (STEM) disciplines. Administered by the U.S. Department of Defense, SMART scholarships offer full tuition and related expenses, paid summer internships, and cash awards of up to \$38,000 per year. The scholarships assist students seeking a degree in any of 19 STEM disciplines, including chemistry, computer science, oceanography, mechanical engineering, and behavioral science.

Award recipients must keep a minimum grade-point average (GPA) of 3.0 (on a 4.0 scale), pursue an eligible degree in a STEM discipline at an accredited U.S. college or university, and pass a security clearance. After graduation, recipients must work as a civilian research scientist or engineer at a Department of Defense facility for an amount of time equal to the duration of their scholarship.

Applicants must be U.S. citizens and at least 18 years old. The deadline for online applications, official transcripts, references, and other documents is Dec. 15. For more information and full eligibility requirements, visit [smart.asee.org](http://smart.asee.org), email [smart@asee.org](mailto:smart@asee.org), or call (202) 331-3544.



## Beyond the Numbers: A new way to look at BLS data

For a fresh perspective on labor statistics, see *Beyond the Numbers*. This online publication from the Bureau of Labor Statistics (BLS) presents a variety of information.

Articles in *Beyond the Numbers* highlight timely reports and trends from the many national and regional economic statistics that BLS produces. Several BLS publications—including *Issues in Labor Statistics*, *Program Perspectives*, *Focus on Prices and Spending*, and *OES Highlights*—have been consolidated to create *Beyond the Numbers*. By publishing articles related to many topics in one location, BLS makes analysis of its data more accessible to the general public.

Readers can browse the archives for a specific topic in *Beyond the Numbers*—and may discover related and other topics of interest. Recent article topics include energy prices, the employment situation of veterans, and changes in health benefits. New articles are published about every month and showcase the data that BLS produces.

*Beyond the Numbers* is published online in both PDF and HTML formats. Check it out at [www.bls.gov/opub/btn](http://www.bls.gov/opub/btn).



## Building a stronger and more inclusive workforce

October is National Disability Employment Awareness Month. This year's theme is "A Strong Workforce is an Inclusive Workforce: What Can YOU Do?"

To help strengthen the workforce, many organizations offer resources for jobseekers with disabilities, including the following:

- Disability.gov, the federal government's Web portal for disability programs and services, has employment resources for jobseekers and workers. Jobseekers can use a search engine to find resources by location and click other links on the webpage to access information about job accommodations, government grants, and more. For more information, visit [www.disability.gov/employment](http://www.disability.gov/employment).
- Ticket to Work, a career development program within the Social Security Administration, partners Social Security recipients ages 18 to 64 with an employment network for career counseling, job placement, and support services. For more information, visit [www.choosework.net](http://www.choosework.net) or call toll

free, 1 (866) 968-7842 or 1 (866) 833-2967 (TTY/TDD).

- Advocacy organization Autism Speaks provides 1-year internships for high school students with autism through Project SEARCH. Interns work in businesses to gain independence and marketable job skills. For more information about Project SEARCH and other employment resources, visit [www.projectsearch.us](http://www.projectsearch.us).
- The Arc, an advocacy group for people with intellectual and developmental disabilities, has many employment services. For example, the organization's School-to-Community Transition Initiative helps students move from high school to postsecondary education, employment, or independent living. For more information or to contact one of its 700 state or local chapters, visit [www.thearc.org](http://www.thearc.org).

Additional information and resources about National Disability Employment Awareness Month are available from the Department of Labor Office of Disability Employment Policy. Visit [www.dol.gov/odep](http://www.dol.gov/odep).

# Helping others travel abroad: Careers in international preparation



**P**eople travel abroad for reasons as diverse as their destinations. Many travel to sightsee, some to work, and others to study. Some stay indefinitely.

Behind a number of these trips, there are workers who help travelers overcome the challenges of going to a different country—such as learning about local customs and finding safe accommodations. As travel has become more affordable and the world grows increasingly interconnected, demand has risen for these international preparation workers.

This article covers some career options in international preparation. The first section of the article describes some of the services international preparation workers provide and the occupations related to those services. The second section explains how to prepare for jobs in international preparation—and what to expect if you get one. Sources for more information are listed at the end of the article.

## Jobs in international preparation

International preparation workers are employed by private organizations, the federal government, and individual or group travelers. The type of services these workers offer varies by client need. For example, they may provide less language training and a more detailed itinerary to a corporate traveler on a quick business trip than they would to someone moving abroad to retire.

International preparation workers provide services in three broad categories: culture, logistics, and health and safety. These workers help travelers before, during, and after a trip. Their services often run concurrently, and job duties may overlap.

### Teaching culture

Understanding a country's culture can make travel easier and, for many people, more interesting. Short-term travelers usually do not need to learn more than the basics, but long-term travelers should understand the culture well.



International preparation workers who specialize in culture instruction help travelers minimize misunderstandings and missteps. These workers include culture trainers and instructional coordinators. (To learn more about the added importance of culture training in the military, see the box on page 31.)

Due to many factors—including language, history, and religion—people develop different attitudes, values, and beliefs that affect how they communicate and behave. For example, some cultures value timeliness, and some cultures communicate with body language more than others. “Culture trainers give people a vocabulary to explain these differences and how they came to be that way,” says Anne Copeland, who works as a culture trainer and directs a nonprofit research organization in Brookline, Massachusetts.

Culture trainers work directly with travelers. The length of training varies by organization, from a few days to a few months. Class size also varies, from one traveler to small groups. Culture trainers tailor their lesson plans to fit the needs of a particular traveler or group. For example, they may use a questionnaire to gauge how much the traveler knows about a culture.

Culture trainers also consider the traveler's destination. “I figure out what the challenges of traveling to a particular country might be,” says Copeland, “and ask someone

Dennis Vilorio

*Dennis Vilorio is an economist in the Office of Occupational Statistics and Employment Projections, BLS. He can be reached at (202) 691-5711 or at vilorio.dennis@bls.gov.*

---

*Culture trainers help travelers understand another country's culture to minimize missteps.*

---



who's lived there for advice and guidance to make the material more relevant.”

Classes usually begin with an overview of the destination country, including its history and geography. Culture trainers then explain the characteristics of the country's culture, such as its social hierarchy. These workers also will compare the destination country's culture to U.S. culture. In addition, culture trainers discuss how to manage cultural transition and any potential issues, such as culture shock and homesickness.

Culture trainers may develop their own curriculum or teach a standardized one developed by the organization for which they work. Organizations that use a standardized curriculum often turn to instructional coordinators to help develop it.

When designing a curriculum, culture trainers and instructional coordinators first research essential information about a country or region and then determine learning objectives to focus the material. Common sources for information include books, experts, and research papers.

Instructional coordinators also provide training for culture trainers. Coordinators may teach about how to prepare lesson plans, use effective teaching methods, and evaluate performance. Some instructional coordinators cover other topics, too, such as recordkeeping and leadership skills. “My goal is to introduce the staff to the tools they will need to do their jobs,” says Jennifer Albee, who trains overseas staff for the Peace Corps in Washington, D.C.

To teach, both culture trainers and instructional coordinators use adult learning techniques. These techniques encourage participation through interactive activities, such as case studies, simulations, and discussions.

In an effort to help people retain information, culture trainers and instructional coordinators try to establish connections between the material and how to use it. For example, Copeland might ask travelers to talk about a frustrating situation that has occurred in a multicultural setting, to discuss the cultural differences involved, and to find ways to improve communication. “It's crucial to make the material relevant to their lives and work,” Albee says.

## Handling logistics

Every trip has logistical details, such as booking flights and finding places to stay. Some travelers have the time to take care of these issues themselves, but busier travelers and organizations often opt to hire help.

Logistics workers organize itineraries, coordinate travel, and plan orientation events. These workers have job titles such as operations managers, training specialists, and logistics coordinators.

The most time-consuming part of logistics work is scheduling. Some schedules may take as long as 6 months to complete. To schedule a trip, operations managers often coordinate with travelers, logistics workers, and other departments to find suitable dates and destinations.

“Scheduling is a huge logistical challenge,” says Zach Hickman, who oversees the language division at the Air Force Culture and Learning Center in Montgomery, Alabama.

“We have to work around people’s schedules, find programs abroad that fit their needs, and get approval from their supervisors.”

Many logistics departments are small and have limited budgets, which creates additional challenges. “There are about 950 participants in our language program, but only three of us,” Hickman says. To cope, operations managers in logistics departments often set up self-serve systems that allow travelers to do part of the work. For example, travelers may book their own flights or download the forms to apply for a visa or security clearance. Contractors may also help logistics departments with some duties.

Operations managers also may help the logistics department use its resources more efficiently. For example, to ensure that participants remain for the duration of their placements, operations managers may require culture training or testing of foreign language skills. “We are making a large investment in each of our participants,” says Hickman,

---

*To help groups prepare for their trips, logistics departments often hold orientation events.*

---

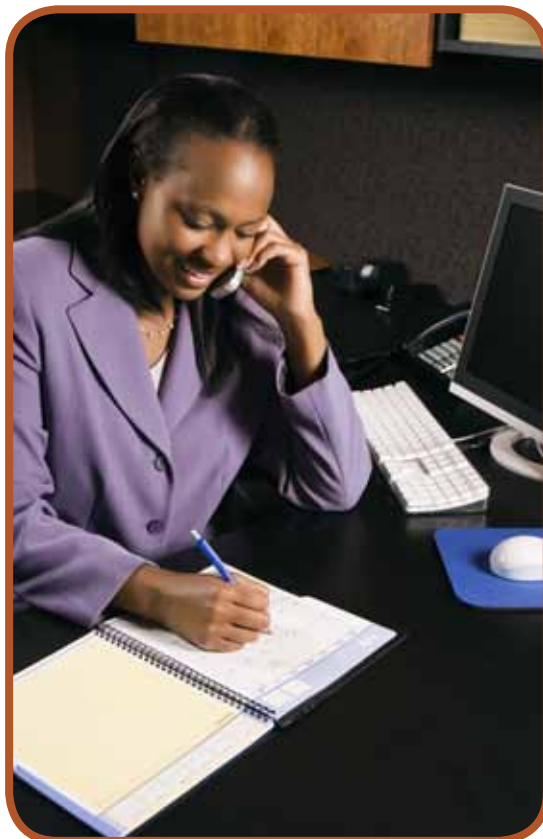


“so we have to make sure that they are viable assets and that we send them where they stand to gain the most.”

To help travelers prepare for their trips, logistics departments often hold orientation events. During these events, training specialists introduce travelers to their organization’s travel policies, discuss travel concerns, and handle administrative details.

Training specialists also encourage the group to get to know each other. “Orientation events are logistically valuable because we can bring people together to one place, deal with their required documentations and forms all at once, and send them out as a more cohesive group,” says Emily Harrington, who hosts orientation events for the Peace Corps.

When preparing for orientation, training specialists review the curriculum and concerns that travelers might have about a particular destination. Specialists also update the curriculum to reflect changes in the length of orientation events or in the organization’s policies.



*Training specialists often handle scheduling and administrative tasks.*

To ensure that there is someone available to host an event, training specialists also train other staff members. “Peace Corps hosts about 100 events with around 3,500 participants every year,” Harrington says. “I can’t do them all alone.”

## Ensuring health and safety

Every country has health and safety concerns. Travelers who visit developed countries find health facilities and safety concerns that are similar to those in the United States. But people who travel to developing countries can face more serious health and safety risks, such as poor sanitation, lack of medicine, and unwanted attention.

When health and safety risks are great, travelers may need professional assistance. International preparation workers who specialize in health and safety provide a variety of services, including dispensing vaccines, conducting physical exams, and developing guidelines for workplace health and safety standards.

Among the international preparation workers in the health and safety field are managers, occupational health and safety instructors, travel physicians, and medical records technicians. This section describes the work of managers and instructors who focus on health and safety issues for travelers abroad.

At large organizations, health and safety managers plan, direct, and oversee the health and safety of travelers by designing emergency procedures and providing travel recommendations. “It’s important that our travelers know who to call in case something happens,” says William Bunn, who oversees health, safety, and security for an international manufacturing and marketing company based in Lisle, Illinois. “We have local emergency contacts, and I’m always on call.”

These managers design health and safety procedures that adapt to the needs of travelers and their destinations. “We have to consider all medical and safety issues—such as a disability—that might preclude a traveler from going to certain countries,” says Bunn.

---

*Health and safety managers design procedures that adapt to the needs of travelers and their destinations.*

---



To establish procedures, health and safety managers use information from a variety of government sources, such as the U.S. Department of Labor Occupational Safety and Health Administration (OSHA), the U.S. Department of State, and the Centers for Disease Control and Prevention.

Most corporate health and safety managers also use a database that recommends—by city and country—health and safety precautions, medical facilities, and doctors. To ensure that recommendations stay accurate, health and safety managers update their procedures and audit worksites overseas each year.

Health and safety managers make certain that travelers follow health and safety recommendations before departing. These may include updating immunizations and submitting emergency contact information. These workers may also provide travelers with a guidebook and suggest instruction that travelers can take to learn ways to combat common health problems, such as jet lag and illness.

Health and safety managers also alert travelers to other recommendations and

requirements for arrival in their destination country. “We look at housing, transportation, and safety to brief travelers on best safety practices for that country,” Bunn says. “If there are transit issues, for example, we might require that they hire a driver or take public transportation.”

Health and safety managers travel frequently to keep up with changing regulations around the world and to inspect worksites and housing for safety. They also may need to travel abroad to lead an evacuation.

Some people travel to become employers or employees in another country. Occupational health and safety instructors train them and other workers to comply with regulations on safety, health, and the environment. These instructors develop training materials, hold workshops, and ensure that workers know how to do their jobs safely.

Health and safety instructors also promote cross-cultural understanding in multicultural workplaces. “Safety is all about people,” says Tomas Schwabe, who works as a bilingual instructor for OSHA in Salem, Oregon. “Most

Adult education teaching experience may be helpful in some of these careers, such as occupational safety and health instructors.



injuries occur because of unsafe behavior that results from lack of communication.”

These instructors usually give workshops and presentations to employers, usually at a training site. Occasionally, they may travel to a worksite to give customized evaluations of safety knowledge and procedures, help employees understand the health and safety regulations, and teach employers to communicate better about safety procedures. “The workshops empower employers and employees,” Schwabe says. “They recognize that they have the ability to reduce or eliminate hazards in the workplace.”

## Exploring international preparation careers

There are some ways in which jobseekers can get ready for a career in international preparation. They can travel abroad or perform job duties similar to the work they want to do. For some positions, jobseekers can learn what education and other qualifications are required to do the work.

But a career in international preparation is not for everyone. Like jobs in almost any field, these jobs offer rewards along with challenges—sometimes at the same time. For example, many of these workers enjoy the occasional travel required, but the erratic work

hours can be frustrating. The key to planning for a job in international preparation is becoming informed about the advantages and disadvantages of the career options.

### Education and qualifications

Jobs in international preparation are available for workers at nearly all education levels. Most of these workers have a bachelor’s degree, and a few workers in highly technical fields—such as travel physicians and academic experts—need a professional or doctoral degree. There are also opportunities for workers whose experience may substitute for education.

For example, experience with classroom management or adult education is helpful for training specialists and occupational safety and health instructors. In other fields, such as culture training, workers may have many educational options and come from different backgrounds, including business and language instruction.

Jobseekers in this field benefit from experience living or working abroad and speaking more than one language. For example, jobseekers applying for logistics work can use their personal travels as experience for the trip planning they would do for others. “In order to advise or train others, you must first experience what they do,” says Hickman.

*(Continued on page 32)*



## Cultural awareness in the military

Members of the military deployed to other countries face unique cultural challenges. As representatives of the United States, not only do they need to show cultural awareness of another country, but they should convey a tone of respect to ease tensions, improve communication, and avoid missteps.

To prepare its members, the military emphasizes culture and language training. For example, the U.S. Air Force hands out field guides to introduce airmen to their destination's culture, offers language and culture classes, and brings in speakers familiar with working with local people. "We care a lot about understanding and bridging cultural differences, because it allows us to build positive relationships," says Paul Firman, a program developer at the Air Force Culture and Language Center in Montgomery, Alabama.

Cultural awareness is particularly important because it helps to avoid misunderstandings and to rectify misunderstandings that have developed into animosity. For example, Afghan culture doesn't share the U.S. concept of personal space. Community members may want to touch you or hold your hand while speaking. "The way in which you react sends a message," says Firman. "If you lean away, you are saying, 'I don't value you.' You might never know you insulted them, unless you understand their culture first."

Cultural awareness also improves negotiations and engenders good will—for the benefit of all parties. "By putting in the effort to learn about them," says Firman, "we can change their perception of us, become friends, and open up room for forgiveness and understanding."



U.S. Army photo by Brian Ferguson

*(Continued from page 30)*

Also, enthusiasm helps jobseekers stand out. “You have to passionately want this type of work,” Harrington says. “Preparation and enthusiasm can show interviewers that, even if you don’t fully meet the educational or experience requirements, you will do a great job.”

### Rewards and challenges

The rewards and challenges of international preparation work vary with the job. But workers often share similar experiences because most travelers encounter similar issues with culture, logistics, and health and safety.

Many workers in international preparation careers find cross-cultural work interesting and exciting. “I never get tired of learning how other people see the world,” Copeland says. Bunn agrees: “Working globally around hundreds of perspectives is very intellectually stimulating.”

Some workers have the opportunity to travel and visit many cities, either abroad or domestically or both, at their employer’s expense. Training specialists travel to

different U.S. cities to host orientation events, for example, and health and safety managers travel abroad to inspect worksites. The opportunity to travel abroad also provides workers with a chance to practice their foreign language skills.

International preparation workers enjoy the diversity of their work. Many work in small offices or alone, which allows them to solve problems creatively, take on challenging tasks, and learn new skills.

And, although some workers teach the same material or deal with the same safety issues, they enjoy the variety of each traveler’s specific needs. “Even if the curriculum rarely changes, the audience always does,” says Albee. “You feed off each group’s energy, making every day unique.”

Other workers simply enjoy helping travelers get ready for their trips. Because most travelers are excited about their upcoming trips, they make cooperative students. “These people are here for a reason,” says Schwabe, “and they are very eager to learn.”

But work hours are a common source of frustration. Workers may need to put in long

*The travel in many of these jobs is sometimes considered a perk, but its frequency can be challenging.*





or odd hours, sometimes including weekends or holidays. “I’ve been in the office many times in the middle of the night to talk to someone in Asia because of time zone differences,” Hickman says.

Complications related to travel logistics are another common frustration. Workers may need to help a traveler visit more than one country during a trip or to coordinate itineraries for groups of travelers, each of whom might be visiting different countries.

Workers in international preparation must know each country’s entry requirements and laws well. For example, workers may need to keep up with changing health regulations in different countries or to help travelers secure a required visa or security clearance—a process that can take months.

Despite the challenges, international preparation workers are motivated by their accomplishments. Travelers can enjoy a vacation, immerse in a different culture, or learn a new language. “You know that your work makes a difference to these people,” says Hickman, “and it feels so good to help them finally fulfill their dreams.”

## For more information

The *Occupational Outlook Handbook (OOH)* has detailed information about many occupations related to international preparation. These profiles have information about each occupation’s job duties, employment, wages, usual qualifications, and more. The *OOH* is available online at [www.bls.gov/ooh](http://www.bls.gov/ooh).

For more information about culture training, including tips on how to begin a career in international preparation, visit the Interchange Institute online at [www.interchangeinstitute.org](http://www.interchangeinstitute.org).

Learn more about the knowledge international preparation workers need by exploring topics relevant to international travel. For example, the Bureau of Consular Affairs, [www.travel.state.gov](http://www.travel.state.gov), has up-to-date information about passports, visas, travel advisories, and tips for traveling, moving, and living abroad. And resources from the International Society of Travel Medicine, [www.istm.org](http://www.istm.org), include a global directory of clinics specializing in travel health and safety.



# You're a *what?*

## Rodeo clown

**W**earing his colorful face paint and costume, Dale “Gizmo” McCracken may look like a typical clown. But as a professional rodeo clown, in addition to making audiences laugh, he’s responsible for keeping bull riders safe.

Rodeo clowns entertain crowds during and between rodeo events, such as bull riding and steer roping. While these events take place in the center of the arena, rodeo clowns walk along the outskirts and provide comic narrative. “We call it ‘walk and talk,’” Dale says. “It’s standup comedy mixed with the action of competition.”

Between events, rodeo clowns take center stage and perform brief sketches to keep the crowd entertained. Rodeo clowns perform different types of sketches, depending on their specialties. Some rodeo clowns work with animals, such as horses or monkeys, that are trained to perform tricks. Others perform slapstick comedy or acrobatics.

Dale has a diverse cast of characters he uses to amuse audiences. In one sketch, Dale drives a golf cart—modified to resemble an ambulance—into the arena, where he plays a bungling medic clumsily attempting to treat a patient. In other sketches, he parodies characters from popular television shows. And, as befitting his clown name, “Gizmo,” Dale is known for using mechanical gadgets in his acts. Many of Dale’s gadgets, such as his mock ray gun, emit smoke and sparks to excite the crowd.

From a young age, Dale’s natural comedic ability and showmanship entertained his classmates—if not his teachers. “I was the

kid that they kept sending home from school with notes saying not to send him back,” Dale jokes.

As an adult, Dale continues to amuse—but now he does it professionally. He watches the news to prepare jokes on current events, such as political races and celebrity mishaps. Dale also gets ideas for new sketches from classic comedies and everyday life. “Sometimes, I just go to a fair or to the mall,” he says. “You can pick up some funny stuff just watching the world walk by.”

But being a rodeo clown isn’t just about the fun. Some rodeo clowns also perform an important safety job, called bullfighting. A typical comedian might have to dodge boos from a restless crowd, but rodeo clowns must know how to handle a much more dangerous threat: angry bulls.

In bull-riding events, cowboys hold on to a bucking bull. When a cowboy gets thrown from a bull’s back, the cowboy might be too injured or disoriented to escape the angry bull. Rodeo clowns, along with other bullfighters, attract the bull’s attention so the cowboy can escape from the arena safely.

After attracting a bull’s attention, rodeo clowns might try to escape the bull by climbing out of the arena or by taking cover behind a barrel that’s in the arena. Frequently, however, the safest place for a rodeo clown is to stand as close to the bull’s side as possible. As a bull twists its body to face the clown, it’s unable to charge. The rodeo clown moves with the bull, remaining in its blind spots, until the bull gets corralled and taken back into the pens.

Drew Liming

*Drew Liming is an economist. He worked in the Office of Occupational Statistics and Employment Projections, BLS, at the time he wrote this article.*

Getting close to an irate bull weighing almost 2,000 pounds requires caution—and nerves of steel. When sharing an arena with bulls, rodeo clowns need to know how to protect themselves. “You need to know how to fight bulls for your own safety,” Dale says.

The U.S. Bureau of Labor Statistics does not collect employment or wage data on rodeo clowns. Rodeo clowns are hired by rodeo organizers and are paid per performance. Depending on a clown’s experience and the size of the rodeo, the money they make varies considerably. New rodeo clowns might earn a couple hundred dollars for each show, and the most popular rodeo clowns at a large rodeo might make more than \$2,000 for a single performance.

Many older rodeo clowns learned their trade through on-the-job trial and error. Today, however, there are rodeo schools that teach bullfighting skills. These schools also help aspiring rodeo workers gain experience in different rodeo events and become comfortable working with livestock.

But becoming a professional rodeo clown isn’t easy. As self-employed workers, rodeo clowns need to generate their own business. Rodeo clowns build their reputations slowly, through networking and word of mouth. Beginners might start out by working at amateur rodeos, earning a small amount of money in exchange for making contacts and showcasing their acts.

Rodeo clowns work wherever there are rodeos across the United States. Because rodeos are temporary, rodeo clowns travel regularly. Dale estimates that he works in about 50 cities a year. In the summer—his busiest season of the year—he might work at a major rodeo every evening. This busy schedule means Dale spends a lot of time away from his family.

But the job’s danger and time away from home aren’t enough to keep Dale out of the arena. He loves entertaining the crowds at rodeos. “There’s nothing like walking out there and seeing those people have a good time,” Dale says. “It makes you feel good to see them laugh.”



---

*Dale “Gizmo” McCracken entertains audiences with his humorous costumes. But his work to keep bull riders safe isn’t for laughs.*

---

Photo courtesy of Dale McCracken.



## New school year, old story: Education pays

Wondering if your studies will pay off? Recent data from the U.S. Bureau of Labor Statistics (BLS) suggest that they will. As past studies have shown, as workers' level of education increases, their earnings rise and unemployment rates fall.

The chart groups workers' earnings and unemployment by their highest level of educational attainment. Workers with a bachelor's degree, for example, earned about \$415 more a week than workers whose highest level of education is a high school diploma. And the rate of unemployment for workers with a bachelor's degree was about half that of those with no education beyond high school.

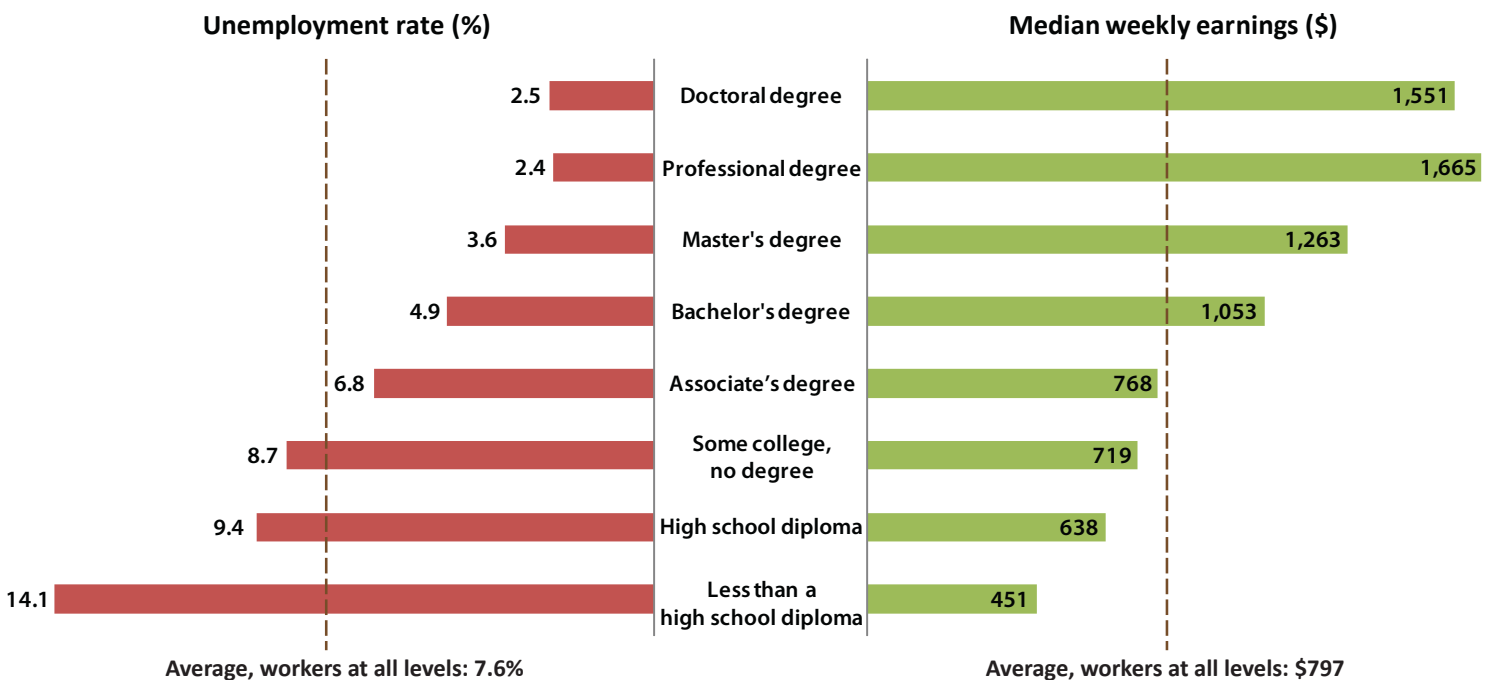
For students in graduate school, the payoff for a degree might be even greater. Workers with a professional degree, such as lawyers and physicians, earned about \$612 more a week than did workers with a bachelor's degree—and over \$1,000 more per week than

workers who have a high school diploma as their highest level of education. Plus, at 2.4 percent, the unemployment rate for workers with a professional degree was also the lowest of any education level.

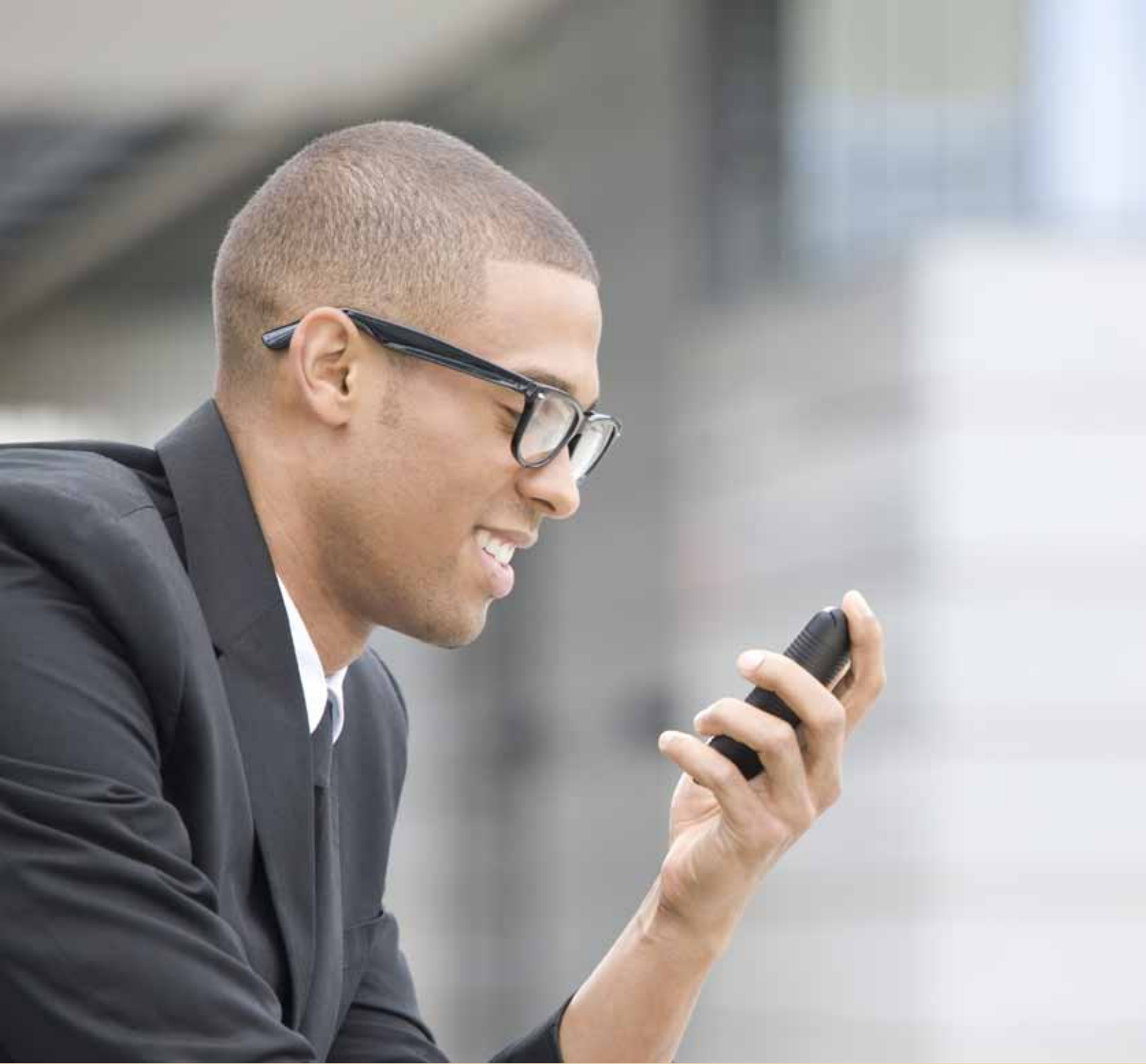
The numbers in the chart below are medians—meaning that half of all workers earned more than that amount, and half earned less. As the chart indicates, postponing work for school can pay off. But there are some financial drawbacks. Students often forego a full-time paycheck while they are in school. And when estimating the financial benefit of additional education, students who take out loans to pay for school should consider the amount they will be obligated to repay.

Data come from a special supplement to the BLS Current Population Survey. For more information, write to the BLS Division of Labor Force Statistics, 2 Massachusetts Avenue NE., Suite 4675, Washington, DC 20212; call (202) 691-6378; or visit [www.bls.gov/CPS](http://www.bls.gov/CPS).

**Unemployment rates and earnings for full-time wage and salary workers ages 25 and older, by educational attainment, 2011**



Source: BLS, Current Population Survey.



Now you can easily browse the  
*Occupational Outlook Handbook* on  
your mobile phone or tablet.

Visit [www.bls.gov/ooh/mobile](http://www.bls.gov/ooh/mobile)



U.S. BUREAU OF LABOR STATISTICS  
Postal Square Building, Rm. 2850  
2 Massachusetts Ave., NE  
Washington, DC 20212-0001

Official Business  
Address Service Requested

Periodicals  
Postage and Fees Paid  
U.S. Department of Labor  
USPS 492-690



## Helping others travel abroad: Careers in international preparation

page 24

