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WHAT DO PEOPLE DO AFTER EARNING A SCIENCE AND ENGINEERING BACHELOR'S DEGREE?

by Mark C. Regets

The science and engineering (S&E) bachelor's degree is the gateway degree for most of those seeking more advanced S&E education. It is also the highest level of education attained by the majority of those performing R&D in the United States, and it provides a large body of workers in many different occupations and work activities with S&E knowledge. This *InfoBrief* uses data from the National Science Foundation's 2003 SESTAT surveys to examine various educational and workforce characteristics of individuals whose first university degree was in science and engineering.[1] Data in the report on degree attainment as of 2003 are for individuals who received an S&E bachelor's degree before 1994—at least 10 years after their bachelor's degree. Data on employment patterns are for individuals whose only degree is an S&E bachelor's degree unless otherwise noted and include more recent S&E bachelor's degree recipients if they have no advanced degrees and are employed.

Education Patterns

A decade or more after earning their degree, about half of all S&E bachelor's degree recipients (51 percent) had earned no additional degrees (figure 1). The other half had earned a wide variety of additional degrees. About one in eight S&E bachelor's degree recipients (13 percent) had received an advanced degree in the same broad field of study as their first bachelor's degree, including 4 percent who had earned a doctorate in the same broad field.

The proportion of S&E bachelor's degree recipients who earned advanced degrees in the same field ranged from 9 percent in the social sciences to 21 percent in the physical sciences (table 1). A much larger proportion, 29 percent, went on to earn advanced degrees in non-S&E fields than continued on in any S&E field (20 percent).

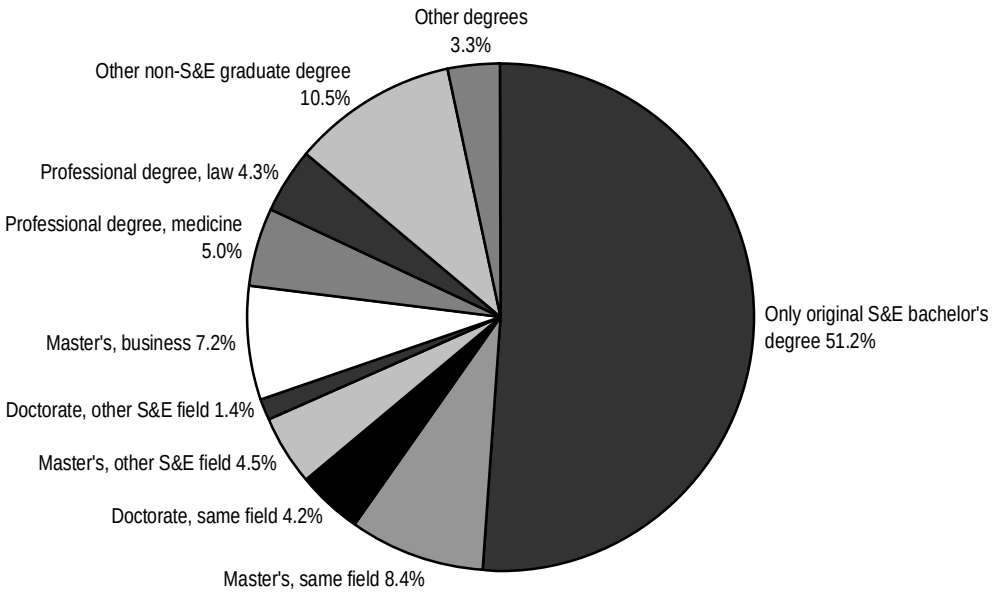
Additional-degree award patterns differ by broad field of initial bachelor's degree. Engineering (42 percent) and mathematics and computer sciences (39 percent) produced the lowest percentages of individuals earning additional degrees. About half or more of those who received bachelor's degrees in other S&E fields went on to earn additional degrees, ranging from 60 percent for those in the physical sciences to 49 percent for those in the social sciences.

The proportion of S&E bachelor's degree recipients who earned non-S&E degrees ranged from 38 percent in the life sciences to about 17 percent in both engineering and mathematics and computer sciences. Although some percentage of the recipients of bachelor's degrees in every broad S&E field went on to earn medical and law degrees, a larger proportion of those with social science degrees earned law degrees (9 percent) than did those with degrees in other S&E fields (1 to 2 percent). Medical degrees were earned by 19 percent of those with life sciences bachelor's degrees and by 9 percent of those with a bachelor's in

[1] SESTAT—the Scientists and Engineers Statistical Data System—comprises several large demographic and workforce surveys of individuals conducted by the National Science Foundation: the National Survey of College Graduates, the National Survey of Recent College Graduates, and the Survey of Doctorate Recipients. Following SESTAT definitions, S&E includes the life, physical, mathematical, computer, and social sciences, as well as engineering.

Information and data from the Division of Science Resources Statistics are available on the web at http://www.nsf.gov/statistics/. To request a printed copy of this report go to http://www.nsf.gov/publications/orderpub.jsp or call (703) 292-PUBS (7827). For NSF's Telephonic Device for the Deaf, dial toll-free (800) 281-8749 or (703) 292-5090.

FIGURE 1. Highest degree earned by those who earned S&E bachelor's degrees before 1994: 2003



SOURCE: National Science Foundation, Division of Science Resources Statistics, Scientists and Engineers Statistical Data System (SESTAT), 2003.

TABLE 1. Additional degrees earned by those who earned S&E bachelor's degrees before 1994: 2003
(Percent)

		Baccalaureate field				
Highest degree	All S&E fields	Life sciences	Mathematics and computer sciences	Physical sciences	Social sciences	Engineering
All with additional degree	48.8	57.3	39.0	60.2	49.2	42.1
Same S&E field	12.5	12.8	13.4	20.9	8.9	15.1
Master's	8.4	6.4	10.8	9.1	6.3	12.1
Doctorate	4.2	6.4	2.6	11.8	2.6	3.0
Other S&E field	7.8	6.5	8.5	15.4	5.1	10.3
Bachelor's	1.8	1.9	2.5	2.2	1.6	1.8
Master's	4.5	3.3	4.5	8.4	2.9	6.8
Doctorate	1.4	1.3	1.5	4.8	0.6	1.7
Non-S&E field	28.5	38.0	17.2	23.8	35.2	16.6
Masters in business	7.2	4.1	7.6	5.0	6.3	11.7
Professional degree in law	4.3	1.2	1.3	1.7	9.0	0.9
Professional degree in medicine	5.0	19.3	1.2	8.7	1.5	0.5
Other	12.0	13.4	7.1	8.4	18.4	3.5

SOURCE: National Science Foundation, Division of Science Resources Statistics, Scientists and Engineers Statistical Data System (SESTAT), 2003.

the physical sciences, but by only 1 to 2 percent of those in other S&E fields.

Employment Patterns

Reliance on S&E Knowledge

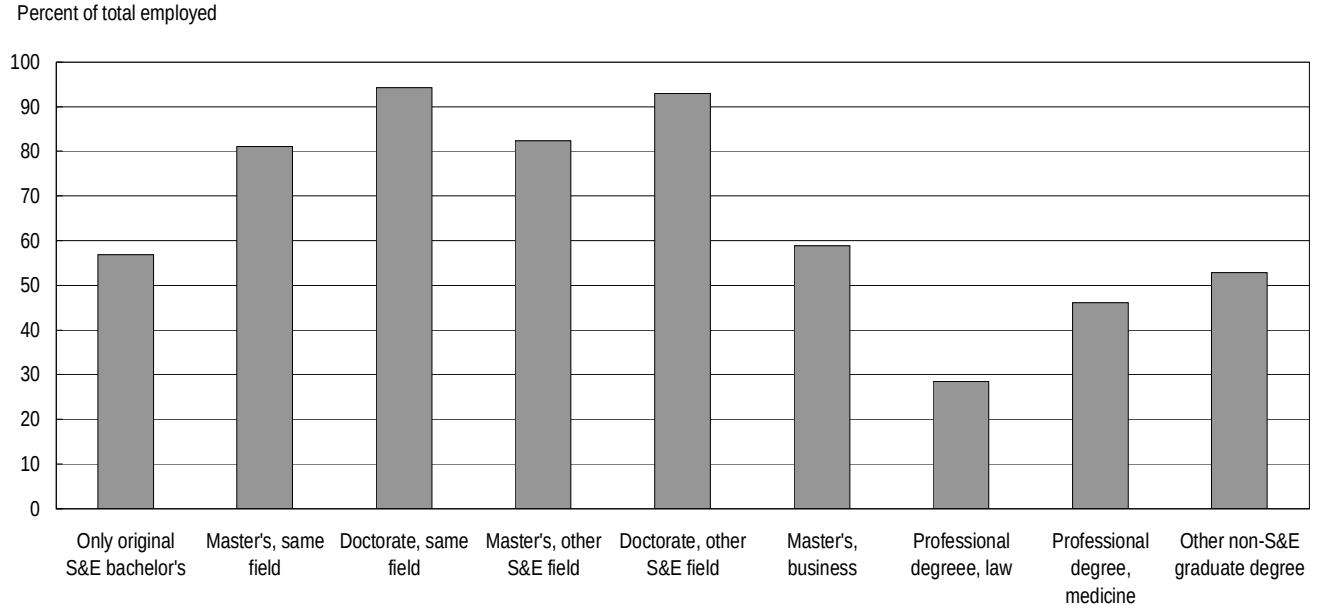
One measure of the utility of an S&E bachelor's degree in the workplace is gauged by two survey questions that ask respondents whether their job (1) requires a bachelor's degree level of knowledge or higher in the natural sciences (i.e., physical and life sciences), engineering, mathematics, or computer science[2] or (2) requires a bachelor's degree level of knowledge in the social sciences.

Bachelor's-degree only.—In 2003 a majority (57 percent) of those in the labor force with only their original S&E bachelor's degree reported that their job required at least a bachelor's degree level of S&E knowledge (figure 2). This percentage is only slightly smaller than that reported by those with more than one university degree (63 percent).

Advanced degrees.—Over half of S&E bachelor's degree recipients who went on to earn a master's degree in business (59 percent) reported in 2003 that they required at least a bachelor's degree level of S&E knowledge in their job. About one-third of those with a business master's earned their bachelor's degree in the social sciences. Although economics, a social science, has an obvious relationship to business, only 14 percent of S&E bachelor's degree holders with a business master's reported that social sciences were a job requirement, whereas over half (51 percent) reported that their job required at least a bachelor's degree level of knowledge in the natural sciences.

Reliance on S&E knowledge was reported by individuals who earned professional degrees in law or medicine: 29 percent of the former and 46 percent of the latter reported that their job required the knowledge conferred by an S&E bachelor's degree. Those with professional degrees in law tended to report that their job required knowledge of the social sciences, whereas their medical-degree counterparts tended to report a need for knowledge of the natural sciences. This division between social sciences and natural sciences in law and medicine is not absolute. Ten percent of those with medical degrees reported a need for knowledge in social sciences, and 8 percent of those with law degrees

FIGURE 2. S&E bachelor's degree holders who reported that their job requires at least a bachelor's degree level of science or engineering knowledge, by highest degree: 2003



SOURCE: National Science Foundation, Division of Science Resources Statistics, Scientists and Engineers Statistical Data System (SESTAT), 2003.

[2] In this report, fields listed in this question are referred to collectively as "natural sciences."

reported a need for natural sciences knowledge. Not surprisingly, individuals who earned advanced degrees in S&E fields reported the highest levels of reliance on S&E knowledge, 81 to 94 percent.

Relevance of Degree

Another measure of the utility of an S&E bachelor's degree is how relevant it is to the degree holder's job.

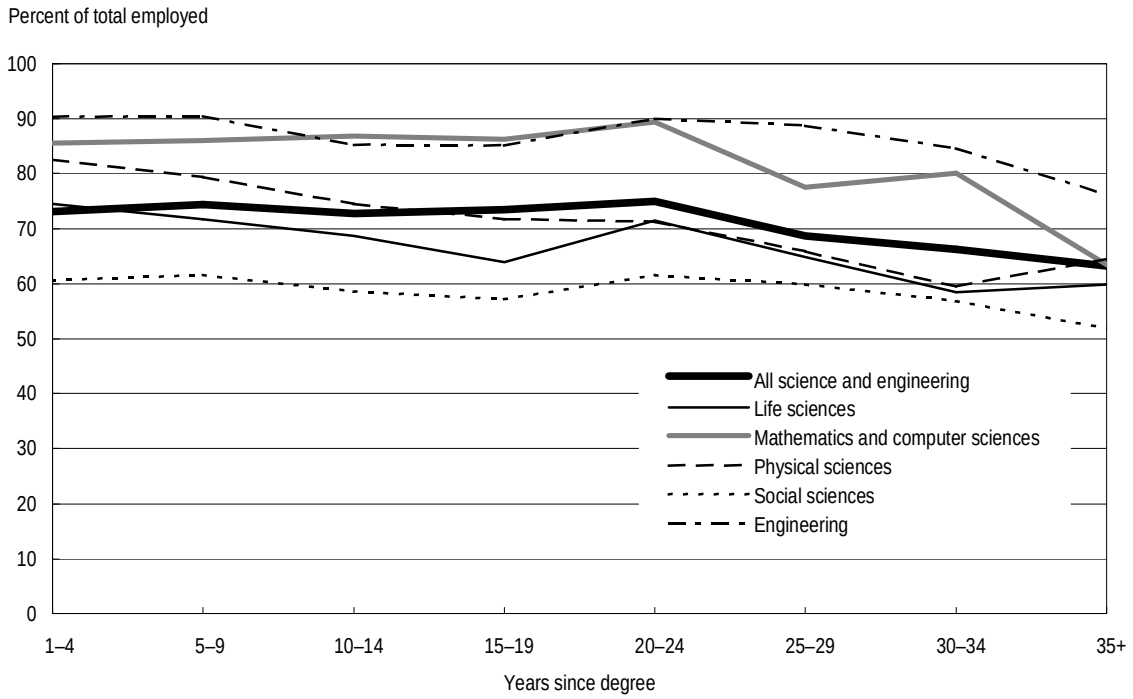
In 2003, 72 percent of workers with only an S&E bachelor's degree reported that their job was related to their degree.[3] Of these individuals, 40 percent said their current job was closely related to their field of degree, and 32 percent said their job was somewhat related. In 2003 for all S&E fields combined, just under three-quarters of those who had graduated 1 to 24 years earlier reported that their job was related to their degree, declining to around two-thirds for those who had graduated more than 25 years earlier (figure 3).

The extent to which a job was reported as being related to field of degree differed by broad field. In general, those with bachelor's degrees in engineering and in mathematics and computer sciences were the most likely to report that their job was related to their degree. Although bachelor's degree holders in the social sciences were the least likely to report that their job was related to their degree, a majority held jobs they reported as being related to their degree, even 35 or more years after graduation.

Research and Development

In 2003 less than half (44 percent) of those with only an S&E bachelor degree reported conducting R&D as their major work activity (one occupying the greatest, or second greatest, number of work hours), even 1 to 4 years after their degree. As time since the degree was earned increased, the percentage of degree holders reporting R&D as a major activity

FIGURE 3. S&E bachelor's degree holders reporting their job is related to their degree, by years since degree: 2003



SOURCE: National Science Foundation, Division of Science Resources Statistics, Scientists and Engineers Statistical Data System (SESTAT), 2003.

[3] In this report, "related to degree" includes both "closely related" and "somewhat related" responses. Detailed tabulations of the relationship between principal employment and degree appear in *Science and Engineering Indicators—2006*, chapter 3, "Science and Engineering Labor Force" (National Science Foundation, 2006, NSB-06-01).

declined more rapidly than did the percentage reporting their job being related to their degree. Among S&E bachelor's degree holders in 2003 who had graduated 35 or more years earlier, only 29 percent reported R&D as a major work activity (figure 4). The lower rates of participation in R&D by older graduation cohorts may reflect additional opportunities and career options as individuals gain general business and other work experience beyond their academic training.

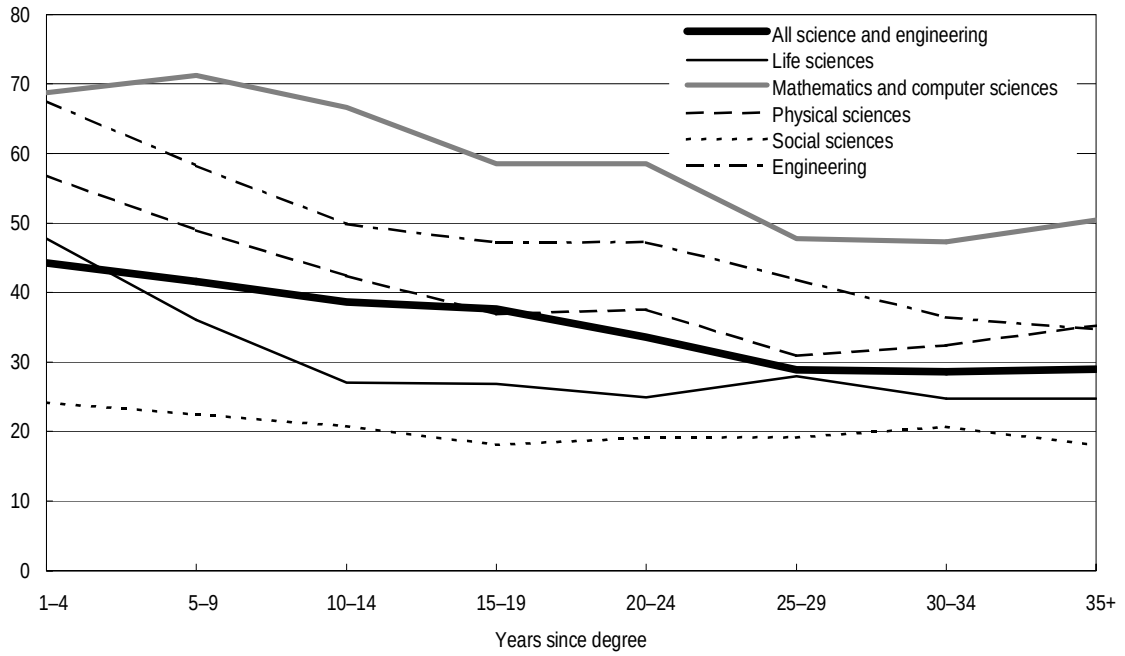
This general pattern, however, differed substantially by broad field of degree. Although more than two-thirds (68 percent) of recent (1–4 years after graduation) engineering bachelor's degree recipients reported R&D as a major activity, the percentage dropped to 35 percent among those for whom it had been 35 or more years since graduation. Recent bachelor's degree recipients in the physical sciences also reported an initially high rate of R&D as a major work activity, 57 percent, which fell to 35 percent among those for whom it had been 35 or more years since graduation. In contrast, in the social sciences, 24 percent of recent bachelor's degree recipients and 18 percent of those who had received their degree 35 or more years earlier reported R&D as a major activity.

Movement into Management

Regardless of the relationship of their job to their degree, many workers whose sole degree is an S&E bachelor's appear to move into management occupations during their career (figure 5). In 2003, for all S&E degree fields, the proportion in management occupations was highest (22–23 percent) among those who had graduated 25 to 34 years before.

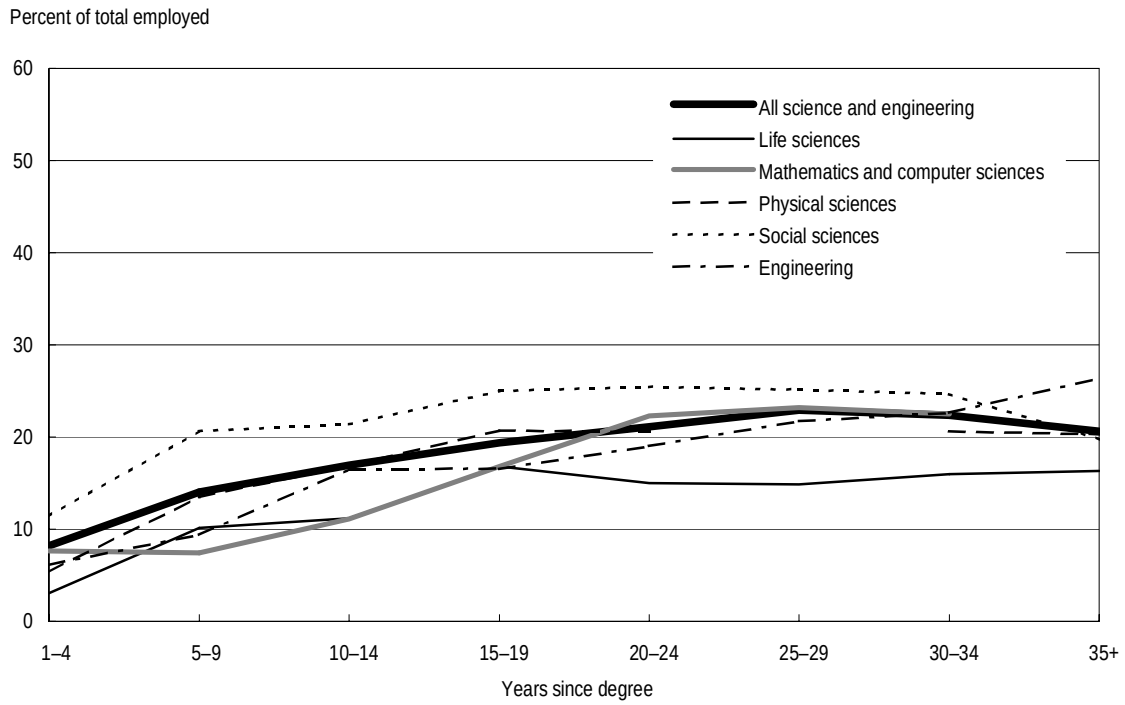
Movement into management does not necessarily mean leaving S&E work behind. The percentages of managers and of all workers with S&E bachelor's degrees who reported that their work was related to their degree were nearly the same (71 compared with 72 percent). However, a smaller proportion of managers (29 percent) than of all those with an S&E bachelor's degree (40 percent) made the stronger statement that their job was closely related to their degree, and 20 percent of managers reported R&D as a major

FIGURE 4. S&E bachelor's degree holders with R&D as a major work activity, by years since degree: 2003



SOURCE: National Science Foundation, Division of Science Resource Statistics, Scientists and Engineers Statistical Data System (SESTAT), 2003.

FIGURE 5. S&E bachelor's degree holders in management jobs, by years since degree: 2003



NOTE: Physical sciences data point at 25–29 years since degree and mathematics and computer sciences data point at 35+ years since degree were omitted due to small-sample problems related to post-stratification nonresponse adjustments.

SOURCE: National Science Foundation, Division of Science Resources Statistics, Scientists and Engineers Statistical Data System (SESTAT), 2003.

activity, compared with 37 percent of all with S&E bachelor's degrees.

Non-S&E Occupations

Workers whose jobs are not usually defined as science and engineering occupations often do S&E-related work. Among those workers whose only degree was an S&E bachelor's, 27 percent had S&E occupations. Of the remainder employed in non-S&E occupations, nearly two-thirds (63 percent) reported in 2003 that their job was related to their degree. Table 2 shows the self-report of how related individuals' non-S&E jobs were to their degrees.

Most S&E bachelor's degree holders working as S&E K–12 teachers (82 percent) reported their job to be closely related to their degree field. About half of individuals in many occupations that are related to science and engineering—health occupations, social service occupations, technicians, and S&E managers—also said their job was closely related to their degree, as did other K-12 teachers and non-S&E postsecondary teachers.

Additionally, many whose occupational titles are not necessarily technical seem to use technical knowledge for their job. For example, an estimated 400,000 sales workers with S&E bachelor's degrees reported that their job was related to their degree (50 percent); of these, nearly a third said their job was closely related to their degree, which may reflect sales of products and services that involve technology. Similarly, a majority (52 percent) of those S&E bachelor's degree holders employed as artists, editors, or writers reported that their degree was at least somewhat related to their job. These individuals may be filling the need for technical and science writing for a variety of audiences.

Conclusion

In general, whether or not they have earned additional degrees or work in an S&E occupation, people who have earned an S&E bachelor's degree report that

TABLE 2. Workers in non-S&E occupations whose sole degree is an S&E bachelor's, by relatedness of job to degree: 2003

Selected occupations	Number in occupation	Closely related (%)	Somewhat related (%)	Not related (%)
All non-S&E occupations	4,682,173	29.4	33.5	37.1
Non-S&E manager and management related	1,021,000	25.2	42.6	32.2
S&E manager	113,000	56.5	34.7	8.8
Sales occupation	809,000	15.5	34.0	50.6
S&E K–12 teacher	129,000	82.3	14.9	2.8
Other K–12 teacher	211,000	50.4	32.2	17.4
Technician, technologist, or surveyor	226,000	46.5	35.3	18.2
Health occupation	303,000	49.6	33.0	17.4
Social service occupations	203,000	57.8	31.5	10.7
Artist, editor, or writer	119,000	18.7	33.3	48.0
Non-S&E postsecondary teacher	17,000	48.3	32.5	19.3

SOURCE: National Science Foundation, Division of Science Resources Statistics, Scientists and Engineers Statistical Data System (SESTAT), 2003.

science and engineering knowledge is important to their job.

About half never earned another degree after their S&E bachelor's. Although less than a third of these S&E bachelor's recipients worked in occupations formally defined as science and engineering, S&E knowledge remained important across a much wider set of occupations. Indeed, nearly two-thirds of S&E bachelor's degree holders in non-S&E occupations reported that their field of degree was related to their job.

About half of S&E bachelor's degree recipients go on to earn other degrees. However, fewer than one in five of all S&E bachelor's recipients go on to earn advanced degrees in science and engineering. Other S&E bachelor's recipients go on to earn master's degrees in business, professional degrees in law, professional degrees in medicine, and a variety of degrees in other non-S&E fields. S&E knowledge remained important to the jobs of most S&E bachelor's holders with advanced degrees—being reported as necessary by a majority of both those with master's degrees in business and those with other non-S&E advanced degrees.

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