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Directorate for Social, Behavioral, and Economic Sciences

DEGREES AND OCCUPATIONS IN ENGINEERING: HOW MUCH DO THEY DIVERGE?

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Of the 2.2 million employed people with an engineering degree, about 1 million reported an occupation other than engineering.

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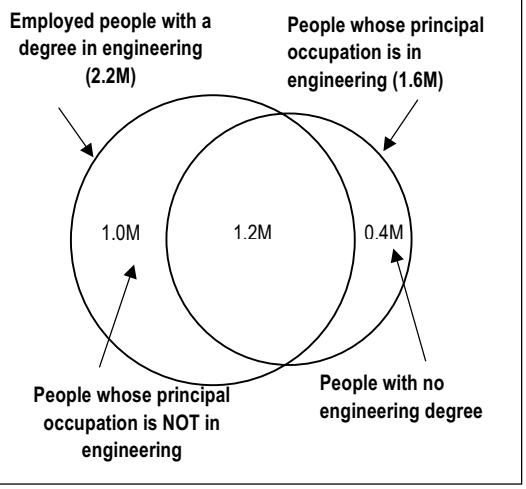
A common interest uniting educators, employers, and analysts of the U.S. labor force is the relationship between education and occupation. Recent data from the National Science Foundation illustrate some of the relationships between completion of a degree in science and engineering (S&E) at the baccalaureate or above and occupations at different points in careers.[2] This Issue Brief focuses on individuals with engineering degrees or in engineering occupations.

Degrees and Employment in Engineering

The Venn diagram in Figure 1 shows the relationships between *employed* people with at least one degree at the bachelor's level or higher in engineering, and employed people whose principal occupation is engineer. Of the 2.2 million *employed* people with an engineering degree, about 1 million report a principal occupation other than engineer.[3]

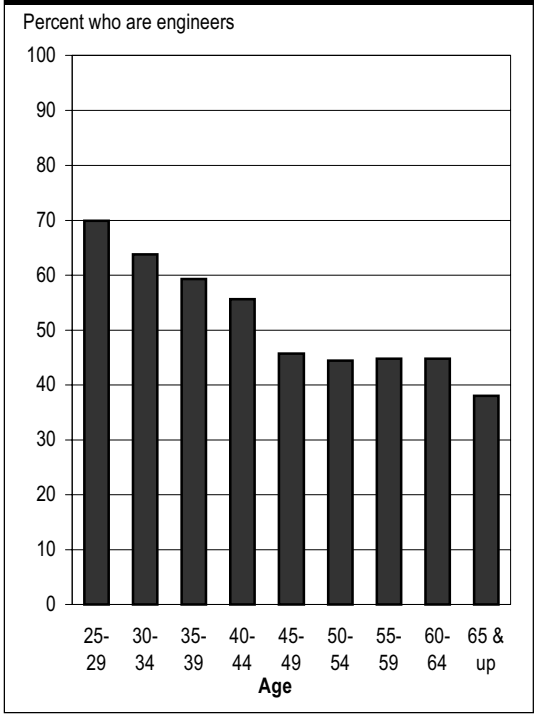
Figure 1. Engineering degrees and engineering occupations: 1995



SOURCE: National Science Foundation, Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995.

Figure 2 shows the percentage, by age, of the 2.2 million employed people with an engineering degree who also reported their principal occupation as engineer. The proportions of those with engineering educational credentials who also were practicing engineers declined steadily with age, from about 70 percent among the youngest to under 50 percent among those middle-aged or older.

Figure 2. Engineering graduates whose occupation is in engineering, 1995



SOURCE: National Science Foundation, Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995.

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[2] Details of the SESTAT data system and survey components on which this Issue Brief is based are available at <<http://srsstats.sbe.nsf.gov>>.

[3] Space limitations prohibit a full discussion of the occupations of these people. In decreasing order of magnitude, they include senior managers, sales-related occupations, computer-related occupations, technicians, and so on. More detail is provided later in this Issue Brief on senior managers.

Degree Combinations

Approximately 2.7 million people—both employed and out of the work force—have at least one degree in engineering at the baccalaureate level or higher; Table 1 categorizes these people into four groups:

- those with engineering degrees only,
- those with engineering and business degrees,
- those with engineering and science degrees, and
- those with degrees in engineering and in any other field.[4]

Table 1. Degree combinations of engineering graduates: 1995

Total		**2,616,000**
Engineering only		**2,114,000**
BS is highest degree	1,637,000	
Master's is highest degree	396,000	
Ph.D. is highest degree	80,000	
Engineering and nonengineering		**502,000**
Engineering and business	226,000	
Engineering and science	162,000	
Engineering and other	114,000	

NOTE: Combinations do not imply order. Table omits 44,000 persons with engineering degrees whose degree patterns did not fit the rules for constructing the table. Omitted were persons with: (a) degrees in more than two of the possible combinations; (b) degrees earned in "reverse" order, e.g., Ph.D. and then a master's; and (c) a degree in an unknown field or type.

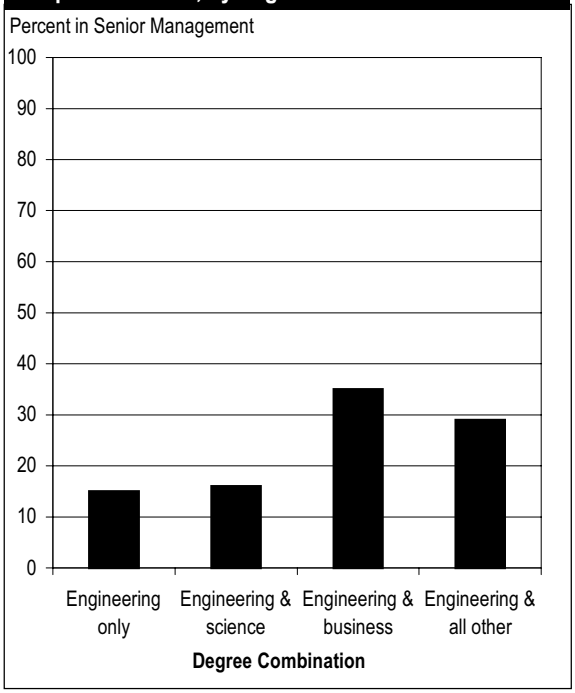
SOURCE: National Science Foundation, Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995.

People with a master's degree who have degrees in both engineering and business were twice as likely to be in senior management as people with a master's who have only engineering degrees.

The table shows that most engineering graduates have only engineering bachelor's degrees and no other degrees. It also shows that degrees held in addition to the engineering baccalaureate—regardless of the order in which they were obtained or the educational level they represent—have more often been in a *nonengineering* field than in engineering (502,000 versus 476,000).

Many combinations of degree level and field have been identified for the 2.2 million *employed* people with an engineering degree, and their relationships to occupation are analyzed in more detail in an upcoming NSF report.[5] One example will suffice to show that particular levels and mixes of degrees are associated with particular occupational outcomes during the course of careers. Figure 3 shows that among master's-level engineering graduates in the private for-profit sector (where most engineering graduates work), those who have combined their engineering degree(s) with a degree outside of S&E (footnote 4) are more likely to become senior managers at some point in their career. (Although not shown here, in the case of the engineering-business combination, virtually all business degrees were at the master's level and were the highest degree earned.) People with a

Figure 3. Likelihood of being in senior management of master's level engineering graduates in the private sector, by degree combination: 1995



NOTE: Master's degrees may be in any field, and degree combinations imply neither order of degree fields nor number of degrees earned. In this figure, social sciences are included in "other."

SOURCE: National Science Foundation, Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995.

[4] These groups, which are used only for this analysis, do not follow general NSF categorizations. For example, the social sciences are included in "other," not in science.

[5] Lawrence Burton and Linda Parker, *The Education and Employment of Engineering Graduates*. Arlington, VA: National Science Foundation, 1999, forthcoming.

master's degree who have degrees in both engineering and business were twice as likely to be in senior management as people with a master's who have only engineering degrees.

Engineers Without Degrees in Engineering

Figure 1 shows that some 400,000 engineers have one or more degrees at the baccalaureate level or higher but no degree in engineering. While people without engineering degrees are found in all engineering occupations (figure 4), the largest share is in the rapidly growing and vaguely defined occupation of computer software engineering; these engineers have degrees in all fields—including the humanities. Computer hardware engineers without engineering degrees often have degrees in the physical sciences. The cross-disciplinary occupations of biomedical engineering/bioengineering and environmental engineering have attracted people with science degrees, especially those with degrees in the life sciences. In contrast, people in more traditional engineering occupations are more likely to have earned at least one engineering degree at the baccalaureate level or higher.

Copies of reports related to the topic of this Issue Brief can be obtained from:

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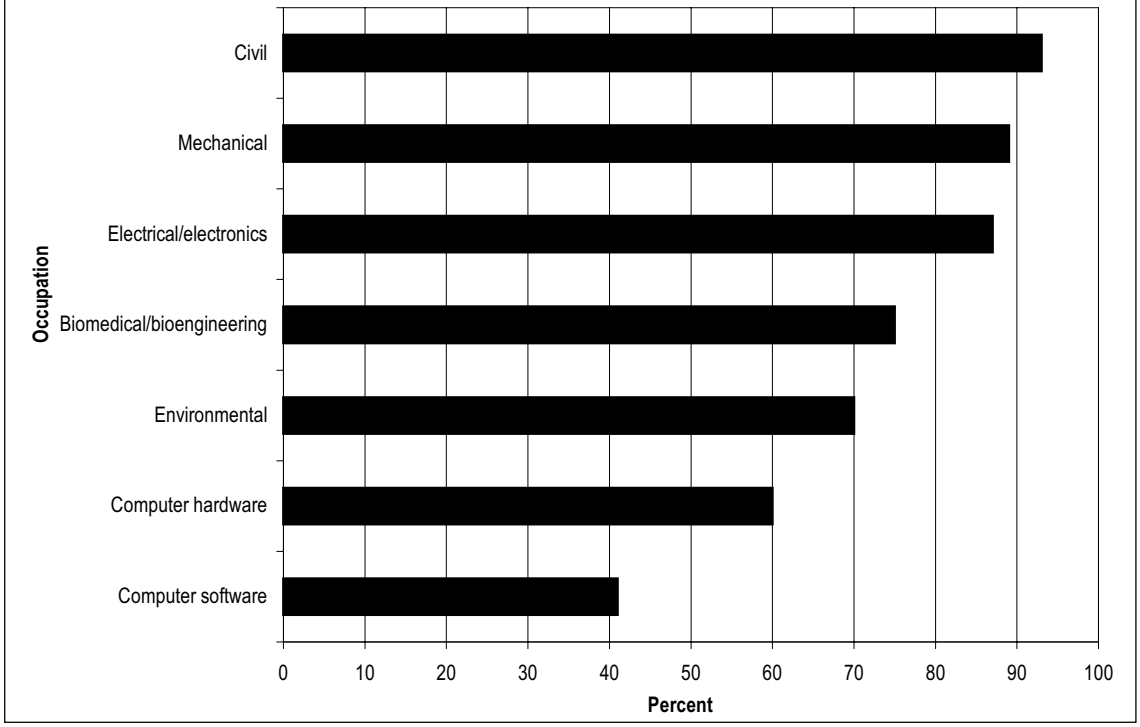
Figure 4. Selected engineering occupations, by percent with an engineering degree, 1995



SOURCE: National Science Foundation, Division of Science Resources Studies, Scientists and Engineers Statistical Data System (SESTAT), 1995.

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