
Chapter 8

Nondoctorate-Granting Institutions

Highlights . . .

- ◆ Nondoctorate-granting institutions covered in the survey are research-performing institutions that do not grant doctorates. They consist of liberal arts institutions (institutions that primarily award bachelor's degrees and that grant more than half their degrees in the liberal arts) and comprehensive universities (which offer a liberal arts program along with other programs, such as engineering and business).
- ◆ The comprehensive universities accounted for 83 percent of the total S&E space among the nondoctorate-granting institutions in 1996 (23.9 million NASF), and 76 percent of the S&E space designated for research (4.4 million NASF).
- ◆ The biological sciences outside medical schools and the physical sciences accounted for half of the S&E research space in the nondoctorate-granting institutions in 1996.
- ◆ Eighteen percent of the S&E research space in the nondoctorate-granting institutions (1.1 million NASF) was considered to require major renovation or replacement .
- ◆ Comprehensive universities accounted for 89 percent (\$294.5 million) of the S&E construction dollars among the nondoctorate-granting institutions in fiscal years 1994-1995.
- ◆ Ninety-nine percent of the construction funding for comprehensive universities was provided by state and local governments in fiscal years 1994-1995.
- ◆ Nondoctorate-granting institutions reported \$772 million in capital projects that were needed but had to be deferred because sufficient funding was not available.

Background

Although the doctorate-granting institutions contain the majority of S&E research space, the nondoctorate-granting institutions play an important role in the S&E enterprise. The significance and visibility of the nondoctorate-granting institutions has increased in recent years, as educators and policy makers recognize their contributions to the production of scientists, engineers, science teachers, and mathematics teachers for our nation's elementary and secondary schools.

Following the 1994 procedure, this chapter uses the 1996 sample to provide insights into several issues regarding S&E research facilities at nondoctorate-granting institutions.

The Survey Questions

The profile of nondoctorate-granting institutions presented in this chapter is based upon all survey questions considered in previous chapters.

Data Considerations

The nondoctorate-granting institutions contribute to S&E research primarily through educating and training students to become either researchers or science and mathematics teachers in elementary and secondary schools. Although considerable research does occur at these institutions, direct research is not their primary contribution. The current NSF facilities survey, designed to collect data on the size, condition, and needs of the nation's research-performing colleges and universities, collects data from a sample of higher education institutions that report research and development (R&D) expenditures of at least \$50,000 in S&E fields.

The many colleges and universities that do not report such expenditures are not included in this survey. However, those institutions teach large numbers of students and award degrees in S&E fields to individuals who teach and conduct S&E research. Results from analyses reported in this chapter, however, cannot be generalized to undergraduate institutions that did not report R&D expenditures.

The Carnegie Classification of Institutions of Higher Education is used to distinguish between two different groups of nondoctorate-granting institutions: comprehensive universities (colleges that offer a liberal arts program along with other programs, such as engineering, business administration, and nursing); and liberal arts colleges (institutions that primarily award bachelor's degrees and that

grant more than half their degrees in the liberal arts).² The NSF facilities sample includes 54 comprehensive universities that represent 136 institutions, and 26 liberal arts colleges that represent 52 such institutions. In addition, 42 of the Historically Black Colleges and Universities (HBCUs) are classified as comprehensive universities and 16 are classified as liberal arts colleges. Unlike the 1994 report, HBCUs are included, here, with either the comprehensive or liberal arts institutions, and are not presented separately.

Since no medical schools are present among the nondoctorate-granting institutions, in the balance of this chapter, “biological sciences” are referred to without the qualifier “outside of medical schools.”

Findings

How Much S&E Research Space Did Nondoctorate-Granting Institutions Have?

In 1996, the nondoctorate-granting institutions contained 29 million NASF of S&E space. A bit less than three-quarters (73 percent) of all nondoctorate-granting institutions were comprehensive universities. The comprehensive universities accounted for 83 percent of the total S&E space among the nondoctorate-granting institutions in 1996 (23.9 million NASF), and 76 percent of the S&E space designated for research (4.4 million NASF). Table 8-1 shows that liberal arts institutions utilized a slightly larger proportion of their S&E space for research than did comprehensive universities (27 percent versus 18 percent). This may be because comprehensive universities support S&E programs and research in many fields, while liberal arts schools tend to support the research of only a few disciplines (Table 8-2).

² This report uses the 1991 classification and not the more recent 1995 classification. This earlier classification was used in the 1994 facilities report and provides some consistency with that effort.

Table 8-1. Distribution of science and engineering (S&E) space at
nondoctorate-granting institutions: 1996

	Nondoctorate-granting	Comprehensive	Liberal Arts
Total S&E space (NASF in millions)	29	23.9	5.1
S&E research space (NASF in millions)	5.8	4.4	1.4
S&E research space as a percentage of total space	20%	18%	27%

SOURCE: National Science Foundation/SRS, 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities.

In What Fields Did Non-Doctorate-Granting Institutions Have S&E Research Space?

Similar to the doctorate-granting universities, nondoctorate-granting institutions were most likely to have S&E research space in the biological sciences and in the physical sciences (Table 8-2). At least 90 percent of all nondoctorate-granting institutions had S&E research space in these two fields. Psychology and the social sciences followed; 71 percent of the nondoctorate-granting institutions had S&E research space in the former, and 63 percent in the latter. Only a third of nondoctorate-granting institutions had S&E research space in engineering, and slightly less than a fifth (19 percent) had S&E research space in the agricultural sciences.

Table 8-2. Percentage of nondoctorate-granting institutions with science and engineering (S&E) research space and the amount of S&E research space by field

Field	Nondoctorate-granting	Comprehensive	Liberal Arts
<u>Percentage with S&E research space</u>			
Biological sciences	92%	92%	92%
Physical sciences	90	90	92
Psychology	71	71	72
Social sciences	63	62	65
Mathematics	50	48	54
Computer sciences	54	56	50
Earth, atmospheric, and ocean sciences	40	38	45
Engineering	33	41	9
Agricultural sciences	19	24	5
Medical sciences, outside medical schools	26	35	0
<u>Amount of S&E research space (NASF in millions)</u>			
Biological sciences	1.5	1.0	0.5
Physical sciences	1.4	0.9	0.5
Psychology	0.4	0.3	0.2
Social sciences	0.3	0.3	0.3
Mathematics	0.1	0.1	< .1
Computer sciences	0.2	0.2	< .1
Earth, atmospheric, and ocean sciences	0.3	0.2	< .1
Engineering	0.6	0.6	< .1
Agricultural sciences	0.6	0.6	< .1
Medical sciences, outside medical schools	0.3	0.3	< .1

SOURCE: National Science Foundation/SRS, 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities.

In 1996, the biological sciences and the physical sciences accounted for half of the S&E research space in nondoctorate-granting institutions. In liberal arts colleges, each of these fields occupied .5 million NASF. Together, they accounted for 71 percent of the total 1.4 million NASF of S&E research space at these colleges. Biological and physical sciences accounted for some what less (43 percent) of S&E space in comprehensive universities. In part, this is because comprehensive universities were more likely to support research space in engineering (41 percent versus 9 percent), medical sciences outside medical schools (35 percent versus no space), and agriculture (24 percent versus 5 percent).

Did the Nondoctorate-Granting Institutions Consider the Amount of S&E Research Space to be Adequate?

In 1996, over half of the nondoctorate-granting institutions with S&E research space in the biological sciences and in the physical sciences indicated that the amount of space in those fields was inadequate to meet current research commitments. Recalling the discussion of Table 2-1, the proportions of nondoctorate-granting institutions rating space as inadequate by field did not differ dramatically from that reported by doctorate-granting institutions. Comprehensive institutions were more likely to report that S&E research space in the biological sciences was inadequate than in any other field (54 percent rated biology space as inadequate). Liberal arts colleges, on the other hand, were more likely to report that S&E research space in the social sciences was inadequate (72 percent reported that space was inadequate) (Table 8-3).

Table 8-3. Percentage of nondoctorate-granting institutions reporting inadequate amounts of science and engineering (S&E) research space in existing fields

Field	Nondoctorate-granting	Comprehensive	Liberal Arts
Biological sciences	52%	54%	45%
Physical sciences	51	48	59
Psychology	42	37	60
Social sciences	44	33	72
Mathematics	32	35	23
Computer sciences	47	45	50
Earth, atmospheric, and ocean sciences	47	42	59
Engineering	50	48	52
Agricultural sciences	35	38	NA
Medical sciences, outside medical schools	47	47	NA

SOURCE: National Science Foundation/SRS, 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities.

What Was the Condition of S&E Research Space in Nondoctorate-Granting Institutions?

Eighteen percent of the S&E research space (1.1 million NASF) was considered to require major renovation or replacement in the nondoctorate-granting institutions. Recalling Table 2-2, an identical 18 percent of space in doctorate-granting institutions was reported as requiring major renovation or replacement. Nearly equal proportions of the S&E research space in comprehensive universities and liberal arts colleges (19 and 17 percent, respectively) were reported as requiring major renovation or replacement. These percentages represent 836,000 NASF in the comprehensive universities and 238,000 in the liberal arts colleges (Table 8-4).

Table 8-4. Percentage and amount of science and engineering (S&E) research space in nondoctorate-granting institutions considered to require major renovation or replacement: 1996

	Nondoctorate-granting	Comprehensive	Liberal Arts
Percentage of space	18%	19%	17%
NASF in thousands	1,074	836	238

SOURCE: National Science Foundation/SRS, 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities.

How Much Construction and Repair of S&E Research Space Did Nondoctorate-Granting Institutions Undertake?

The nondoctorate-granting institutions spent \$330.6 million to construct S&E research space in fiscal years 1994-1995. Comprehensive universities accounted for 89 percent (\$294.5 million) of the S&E construction dollars among the nondoctorate-granting institutions (Table 8-5).

In both the comprehensive universities and the liberal arts colleges, the biological sciences dominated construction activity. For comprehensive universities, \$128.6 million of the total \$294.5 million was spent to construct S&E research space in the biological sciences. In liberal arts colleges, the biological sciences accounted for 89 percent of all construction dollars (\$32 million).

Table 8-5. Expenditures to construct science and engineering (S&E) research space in nondoctorate-granting institutions by field: 1994-1995 (dollars in millions)

Field	Nondoctorate-granting	Comprehensive	Liberal Arts
Total	\$330.6	\$294.5	\$36.1
Biological sciences	160.6	128.6	32.0
Physical sciences	96.8	93.3	3.5
Psychology	0.0	0.0	0.0
Social sciences	0.6	0.6	0.0
Mathematics	0.4	0.4	0.0
Computer sciences	0.0	0.0	0.0
Earth, atmospheric, and ocean sciences	15.2	14.5	0.7
Engineering	0.0	0.0	0.0
Agricultural sciences	4.0	4.0	0.0
Medical sciences, outside medical schools	30.3	30.3	0.0
Other sciences	22.7	22.7	0.0

SOURCE: National Science Foundation/SRS, 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities.

The comprehensive universities spent another \$93.3 million on construction in the physical sciences, while liberal arts colleges spent \$3.5 million in construction in the physical sciences.

Expenditures to repair/renovate S&E research space in the nondoctorate-granting institutions were somewhat more evenly distributed across S&E fields than were construction expenditures. However, of the \$51.1 million spent by comprehensive institutions to repair/renovate existing S&E research space, two fields absorbed more than \$10 million each in repair and renovation. Comprehensive universities spent \$14.8 million to repair/renovate S&E research space in engineering and \$11.8 million to repair/renovate S&E research space in the social sciences. Another \$9.5 million was spent on physical science research space, and \$8.2 million was spent on the biological sciences (Table 8-6).

Table 8-6. Expenditures to repair/renovate science and engineering (S&E) research space in nondoctorate-granting institutions by field: 1994-1995 (dollars in millions)

Field	Nondoctorate-granting	Comprehensive	Liberal Arts
Total	\$76.8	\$51.1	\$25.7
Biological sciences	16.4	8.2	8.2
Physical sciences	19.0	9.5	9.5
Psychology	3.4	0.0	3.4
Social sciences	14.2	11.8	2.4
Mathematics	0.7	0.0	0.7
Computer sciences	1.8	0.6	1.2
Earth, atmospheric, and ocean sciences	4.7	4.7	0.0
Engineering	15.1	14.8	0.3
Agricultural sciences	1.0	1.0	0.0
Medical sciences, outside medical schools	0.0	0.0	0.0
Other sciences	0.4	0.4	0.0

SOURCE: National Science Foundation/SRS, 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities.

The liberal arts colleges spent the most to repair/renovate S&E research space in the physical sciences (\$9.5 million). The biological sciences accounted for another \$8.2 million of the repair/renovation expenditures of liberal arts colleges in fiscal years 1994-1995.

How Did Nondoctorate-Granting Institutions Fund Construction and Repair/Renovation Projects?

The bulk of funding for construction at nondoctorate-granting institutions came from state and local governments (88 percent). Smaller proportions came from private donations (5 percent) and institutional funds (4 percent); and a small amount (2 percent) of total construction funding for S&E research space in the nondoctorate-granting institutions came from the Federal government .

Comprehensive universities funded construction quite differently than did liberal arts colleges. Almost all (99 percent) of the construction funding for comprehensive universities was provided by state and local governments in fiscal years 1994-1995. The majority of construction funding in the liberal arts colleges came from two sources, private donations (44 percent) and tax-exempt bonds (40 percent).

Table 8-7: Sources of funding to construct science and engineering (S&E) research space at nondoctorate-granting institutions: 1994-1995

Source of Funding	Nondoctorate-granting	Comprehensive	Liberal Arts
Dollar contribution (in millions) ^f			
All sources	\$330.6	\$294.5	\$36.1
Federal government	5.2	3.2	2.0
State/local government	290.5	290.5	0.0
Private donations	16.0	0.0	16.0
Institutional funds	4.4	0.8	3.6
Tax-exempt bonds	14.5	0.0	14.5
Other debt	0.0	0.0	0.0
Other sources	0.0	0.0	0.0
Relative contribution			
Federal government	2%	1%	6%
State/local government	88	99	0
Private donations	5	0	44
Institutional funds	1	0	10
Tax-exempt bonds	4	0	40
Other debt	0	0	0
Other sources	0	0	0

SOURCE: National Science Foundation/SRS, 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities.

State and local governments also provided the largest share of repair/renovation funding at nondoctorate-granting institutions (44 percent), although other sources provided substantial amounts. Private donations (22 percent), institutional funds (12 percent), and Federal government funds (11 percent) accounted for 45 percent of repair/renovation funds.

As with construction, comprehensive universities and liberal arts colleges used different sources to fund the repair/renovation of S&E research space. Comprehensive institutions relied heavily on state and local governments (64 percent), as well as the Federal government (17 percent). All of these funds accounted for little of the liberal arts colleges' repair/renovation funding (less than 1 percent altogether). Sixty-three percent of all repair/renovation funding for S&E research space in liberal arts colleges came from private donations (Table 8-8).

Table 8-8: Sources of funding to repair/renovate science and engineering (S&E) research space at nondoctorate-granting institutions: 1994-1995

Source of Funding	Nondoctorate-granting	Comprehensive	Liberal Arts
Dollar contribution (in millions) ¹			
All sources	\$76.8	\$51.1	\$25.7
Federal government	8.8	8.7	0.0
State/local government	32.6	32.6	0.0
Private donations	17.0	0.9	16.1
Institutional funds	9.5	6.6	2.9
Tax-exempt bonds	6.6	0.0	6.6
Other debt	2.3	2.3	0.0
Other sources	0.0	0.0	0.0
Relative contribution			
Federal government	11%	17%	0%
State/local government	42	64	0
Private donations	22	2	63
Institutional funds	12	13	11
Tax-exempt bonds	9	0	26
Other debt	3	4	0
Other sources	0	0	0

SOURCE: National Science Foundation/SRS, 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities.

What Were the S&E Facilities Needs of Nondoctorate-Granting Institutions?

Nondoctorate-granting institutions reported \$772 million in capital projects that were needed but had to be deferred because sufficient funding was not available. Forty-seven percent of these costs were for construction projects, while the balance (53 percent) was for repair/renovation projects. Overall, 80 percent of these deferred costs were identified in institutional plans; 88 percent of deferred construction needs and 72 percent of repair/renovation projects had been included in institutional plans (Table 8-9).

Table 8-9. Expenditures for deferred capital projects to construct or repair/renovate science and engineering (S&E) research facilities at nondoctorate-granting institutions by institution type, type of project, and whether project was included in institutional plans (dollars in millions)

Institution type	Included in Institutional Plans		Not Included in Institutional Plans		Total
	To construct new S&E research facilities	To repair/renovate existing S&E research facilities	To construct new S&E research facilities	To repair/renovate existing S&E research facilities	
Total	\$322	\$295	\$42	\$113	\$772
Comprehensive	249	195	39	93	576
Liberal Arts	73	100	3	20	196

SOURCE: National Science Foundation/SRS, 1996 Survey of Scientific and Engineering Research Facilities at Colleges and Universities.

Comprehensive institutions accounted for three-quarters of all deferred capital project costs (\$576 million divided by \$772 million). Comprehensive institutions accounted for a larger proportion of construction costs (79 percent) than repair/renovation costs (71 percent).

Liberal arts colleges had more extensive plans than comprehensive institutions. Overall, 88 percent of liberal arts colleges' deferred needs were identified in institutional plans (96 percent of construction needs and 83 percent of repair/renovation needs). By contrast, comprehensive institutions had identified 77 percent of their deferred needs in institutional plans (87 percent of construction needs and 68 percent of repair/renovation needs).