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ABSTRACT

The National Science Foundation (NSF) annually collects and analyzes data on Federal obligations to individual universities and colleges for both science/engineering (S/E) and non-S/E activities. The survey data are submitted by the 15 Federal agencies with the largest programs in support of academic S/E activities and represent the only source of statistics on Federal obligations to individual academic and nonprofit institutions. Highlights of these data are provided and discussed, accomplished by two tables (Federal obligations to universities and colleges by type of activity: FY 1978-81 and Federal obligations to the 100 universities and colleges receiving the largest amounts: FY 1981) and one graph (Federal obligations to universities and colleges by type of activity). Federal support for S/E research and development (R&D), R&D plants, and non-R&D S/E activities are considered. (Author/JN)

SCIENCE RESOURCES STUDIES HIGHLIGHTS

NATIONAL SCIENCE FOUNDATION WASHINGTON, D.C. 20550 MARCH 15, 1983 NSF 83-306

Federal Science/Engineering (S/E) Support to Universities and Colleges Rose by 6% in FY 1981; Non-S/E Support Down 25%

The National Science Foundation (NSF) annually collects and analyzes data on Federal obligations to individual universities and colleges for both science engineering (S/E) and non-S/E activities. The survey data are submitted by the 15 Federal agencies with the largest programs in support of academic S/E activities and represent the only source of statistics on Federal obligations to individual academic and nonprofit institutions. These agencies accounted for over 98 percent of all Federal obligations for academic research and development and about 95 percent of all Federal obligations to academia for all purposes. Data presented here are in current-dollar terms except where specified as constant 1972 dollars, based on the gross national product (GNP) implicit price deflator.

Highlights

• Despite a 6-percent increase in Federal academic S/E funds in current dollars, Federal obligations to universities and colleges for all S/E plus non-S/E activities combined declined by 7 percent from Fiscal Year (FY) 1980 to FY 1981 to $7.7 billion. When discounted for the effects of inflation, the decline amounted to 15 percent, much higher than the average annual 3-percent decrease in real-dollar Federal support that occurred from 1978 (the peak year) to 1980.[1] The dropoff in total funding is attributable to non-S/E programs, down from $3.5 billion in 1980 to $2.6 billion in 1981, primarily as the result of reductions in Pell Grants and Supplementary Educational Opportunity Grants (SEOG's) by the Department of Education. Pell Grants, which totaled $2.5 billion in 1981, are scheduled to decline to $1.8 billion in 1983; no funds are budgeted for the SEOG program in 1983.[2]

• Federal support for academic research and development (R&D) activities rose 6 percent in current-dollar terms from 1980 to 1981. When discounted to reflect the effects of inflation, the funding level dropped by 6 percent. In the preceding 3-year period, 1978-80, support for these activities averaged a 2-percent per year gain in real terms. The current-dollar increase of 4 percent proposed in the 1984 budget would bring the level of Federal academic R&D support up an average of 6 percent per year from 1982 to 1984.[3]

• The Department of Health and Human Services (HHS) supplied nearly one-half of all Federal academic R&D support in 1981. This agency, together with the Department of Defense (DOD), the Department of Energy (DOE), and NSF, supplied $5 out of every $6 devoted to academic R&D programs. DOD, with a 26-percent growth (15 percent in real terms) funded nearly three-fifths of the Federal academic R&D growth. From 1982 to 1984, academic R&D support from DOD is expected to grow by an average of 11 percent per year in current dollars.[4]

• Federal support for academic R&D plant totaled $44 million in 1981, a 16-percent growth over 1980 levels, following an 18-percent increase in the previous year. NSF was the source of virtually the entire 1980-81 increase which involved providing facilities for physics research at two major universities. Despite the second consecutive annual increase in funds in this category and the largest level of current-dollar support in six years, R&D plant support in 1981 represented only 13 percent of the 1965 peak level in real dollars. Academic R&D plant is scheduled to total $46 million in 1983.[5]

[1] In the absence of a reliable R&D cost index, the GNP implicit price deflator was used to convert current dollars to constant 1972 dollars. The GNP deflator can only indicate approximate changes in costs of R&D performance. The GNP inflation rate from 1980 to 1981 was 9.8 percent.

[2] Office of Management and Budget, *Appendix to the Budget of the United States Government, Fiscal Year 1983* (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office), p. I-V60.

[3] Office of Management and Budget, unpublished data, January 1983.

[4] *Ibid.*

[5] National Science Foundation, *Federal Funds for Research and Development, Fiscal Years 1981, 1982, and 1983*, Volume XXXI (Detailed Statistical Tables) (NSF 82-326) (Washington, D.C., 1983), Table C-1.

Prepared in the Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies

• Funding for "other" S/E programs grew by 5 percent in 1981 (a 5-percent decline in real terms) to $634 million. These activities include facilities and equipment for instruction; fellowships, traineeships, and training grants, general support for S/E activities, and all other S/E activities.

• The 19 university-administered federally funded research and development centers (FFRDC's) received a 3-percent increase in 1981 for S/E activities, totaling $2.2 billion. Virtually all S/E activities at these organizations were for R&D activities and R&D plant. In real terms, however, they received 6 percent less than in 1980, the first real decline in funding in three years.

Federal Support to Universities and Colleges

The 7-percent decline in Federal obligations to universities and colleges (15 percent in real dollars) from 1980 to 1981 was the result of reduced support for non-S/E activities, primarily for Pell Grants and SEOG Grants by the Department of Education's Office of Student Financial Assistance (table 1). That agency reported a total of $2.2 billion in 1981 for academic non-S/E programs, down from $2.8 billion in 1980. Pell Grants constituted approximately two-thirds of all Federal student assistance and amounts ranged from $200 to $1,670 per student; in 1981 they supported 2.6 million higher education students. The maximum size of the individual grants was reduced to $1,600 in 1983, and about 1.8 million students will receive Pell Grants averaging $800 by 1984. The SEOG's are designed to complement Pell Grants for low- and middle-income students attending higher cost academic institutions and were awarded to 645,000 students in 1981; in 1983, 440,000 students are expected to utilize SEOG's, but none in 1984.[1]

In 1981, 100 institutions accounted for 65 percent of all Federal support to universities and colleges, a slightly higher concentration than their 61-percent share in 1980. This shift resulted from the steep decline in support for non-S/E activities which are much more widely distributed than academic science support. In 1981, over five-sixths of all Federal academic R&D funds were concentrated among these leading 100 universities; less than one-third of all non-S/E support was distributed to those same institutions. Seventeen of the leading 20 recipients of Federal support were also among the top 20 R&D performers (table 2).

Howard University was the leading recipient of Federal funds among the 105 historically black colleges (HBC's) in 1981 and ranked third in total Federal support. Howard received over one-third of the $423 million total obligated to all HBC's. Total support to all HBC's, over four-fifths of which went for non-S/E activities, declined by 3 percent in 1981.

Academic S/E Activities

Federal support for academic S/E activities grew in 1981 to a new high of $5.1 billion but declined in real terms for the second consecutive year—this time by nearly 4 percent. This contrasts with a 1-percent real-dollar increase averaged over the 1978-80 period in funding for these programs.

[1] Office of Management and Budget. *Ibid., Fiscal Year 1982*, p. I-112, and *Fiscal Year 1983*, p. I-V60.

Table 1. Federal obligations to universities and colleges by type of activity: FY 1978-81

[Millions of dollars]

Type of activity	1978	1979	1980	1981
Total	$7,472	$7,604	$8,296	$7,719
Academic science/engineering	3,960	4,473	4,801	5,087
Research and development	3,386	3,874	4,158	4,409
R&D plant	34	32	38	44
Other science/engineering activities, total	539	567	605	634
Facilities and equipment for instruction	4	6	4	5
Fellowships, traineeships, and training grants	206	205	223	215
General support for science/engineering	74	92	92	93
Other science/engineering activities	255	263	287	321
Non-science/engineering	3,512	3,131	3,495	2,632

NOTE: Detail may not add to totals because of rounding.
Source: National Science Foundation

RESEARCH AND DEVELOPMENT

A 6-percent growth in Federal support for academic research and development was reported from 1980 to 1981; the $4.4 billion total allotted for academic R&D support represented over a 3-percent decline in real dollars (chart 1). According to Federal budget projections, a 4-percent increase for academic R&D activities is slated for 1984 in current dollars, a 6-percent per year growth from 1982 to 1984. Nearly nine-tenths of this support is earmarked for research alone, the development component constitutes only a fraction of all university R&D efforts. Historically, over one-half of Federal academic R&D funds have been awarded for basic research projects.

Ten of the 15 surveyed Federal agencies reported current-dollar increases for academic research and development in 1981, but only 6 agencies funded R&D programs at growth rates exceeding inflation.

Of the 626 academic institutions receiving Federal R&D support in 1981, the leading 100 institutions received 85 percent of the total. In 1963, the first year of the survey series, the leading 100 R&D performers (out of a total of 492 R&D recipients) received 90 percent of all R&D funds. The top 100 R&D performers in 1981 received 91 percent of all DOD funding, 88 percent of both DOE's and HHS' R&D total, but only 66 percent of all R&D support from the Department of Agriculture (USDA). The proportion of USDA funding was relatively low because most agricultural research is performed by land-grant institutions that are outside of the leading 100 R&D performers.

Johns Hopkins University was not only the leading recipient of all Federal academic funding but also continued as the leading recipient of R&D support. As in 1980, Massachusetts Institute of Technology (MIT) with $146 million and Stanford University with $106 million ranked second and third, respectively.

R&D PLANT

Federal support for R&D plant reached $44 million in 1981, a 16-percent current-dollar growth that followed an

Table 2. Federal obligations to the 100 universities and colleges receiving the largest amounts: FY 1981[1]

[Dollars in thousands]

Rank	Institution	Total, all activities	Research and development	R&D rank
	Total all institutions	$7,716,994	$4,409,143	
1	Johns Hopkins Univ[2]	378,608	363,429	1
2	Mass Inst of Technology	164,782	146,035	2
3	Howard Univ[3]	153,335	7,996	117
4	Univ of Washington	128,147	99,965	4
5	Stanford Univ	125,645	106,073	3
6	Univ of Wis-Madison	115,517	86,918	8
7	Univ of Cal-Los Angeles	112,650	95,210	5
8	Harvard Univ	106,361	87,830	7
9	Univ of Cal-San Diego	101,718	91,403	6
10	Univ of Minnesota	100,383	72,001	14
Total 1st 10 institutions		1,487,146	1,156,860	
11	Cornell Univ	100,345	72,671	13
12	Columbia Univ-Main Div	99,084	83,659	9
13	Univ of Michigan	94,118	73,999	11
14	Univ of Pennsylvania	93,655	76,196	10
15	Yale Univ	88,084	73,526	12
16	Univ of Cal-San Francisco	82,156	64,814	15
17	Univ of Cal-Berkeley	77,966	64,065	16
18	Pennsylvania State Univ[2]	72,603	47,099	21
19	Univ of Ill-Urbana	69,993	53,560	19
20	Ohio State Univ	68,462	42,899	26
Total 1st 20 institutions		2,353,612	1,809,308	
21	Univ of Chicago	83,565	53,992	18
22	Univ of Colorado	83,158	46,146	22
23	Washington Univ	62,557	54,170	17
24	Michigan State Univ	60,617	34,000	37
25	Univ of Southern Cal	59,597	49,221	20
26	Duke University	54,189	44,287	23
27	Univ of NC at Chapel Hill	52,815	38,447	30
28	Univ of Rochester	52,599	42,983	25
29	New York Univ	52,138	40,636	28
30	Texas A&M Univ	51,938	34,398	36
Total 1st 30 institutions		2,906,785	2,247,588	
31	Gallaudet College[3]	51,204	560	270
32	Univ of Texas at Austin	50,955	43,756	24
33	Purdue Univ	50,523	36,549	32
34	Yeshiva Univ	49,804	42,590	27
35	Univ of Pittsburgh	49,291	38,512	29
36	Univ of Arizona	47,700	38,308	33
37	Univ of Utah	47,520	38,163	31
38	Univ of Florida	46,247	30,845	43
39	Univ of Iowa	45,251	35,300	34
40	Indiana Univ	44,662	29,276	45
Total 1st 40 institutions		3,389,942	2,579,447	
41	Case Western Reserve Univ	41,429	33,744	38
42	Univ of Miami	40,803	28,956	46
43	Boston Univ	39,754	27,019	51
44	Northwestern Univ	39,541	32,446	41
45	Univ Alabama-Birmingham	39,389	29,970	44
46	Univ of Cal-Davis	38,158	31,757	42
47	Baylor Col of Medicine	37,921	35,062	35
48	Georgia Inst of Tech	37,188	33,116	39
49	California Inst of Tech	35,932	32,959	40
50	Univ of Md College Park	35,914	27,313	50
Total 1st 50 institutions		3,775,971	2,891,789	
51	Oregon State Univ	35,148	27,669	47
52	Vanderbilt Univ	33,916	27,426	49
53	Inter Am UPR-San German	33,522	0	--
54	Univ of Connecticut	33,139	22,196	55
55	Rutgers the St Univ of NJ	33,139	18,011	88
56	U Tennessee-Knoxville	32,768	19,933	62
57	Univ of Cincinnati	32,550	18,766	67
58	Louisiana State Univ	32,069	19,005	65
59	Univ of Virginia	31,740	24,333	52
60	New Mexico State Univ	31,274	11,759	94
Total 1st 60 institutions		4,105,236	3,080,887	
61	Univ of New Mexico	30,455	18,976	66
62	U Tex Hlth Sci Ctr Dallas	29,442	23,911	53
63	NC State Univ at Raleigh	29,339	16,758	73
64	Univ of Kentucky	29,157	12,875	90
65	Woods Hole Oceanographic Inst	29,097	27,633	48
66	Univ of Missouri Columbia	28,900	14,477	84
67	Colorado State Univ	28,879	21,487	57
68	Princeton Univ	28,402	23,888	54
69	Univ of Hawaii-Manoa	27,280	20,629	58
70	Univ of MD Balt Prof Sch	27,121	20,414	60
Total 1st 70 institutions		4,393,308	3,281,935	
71	Univ of Mass at Amherst	26,873	15,131	80
72	VA Polytech Inst & St Univ	26,488	16,449	75
73	Temple Univ	26,241	14,678	82
74	Univ of Georgia	26,240	17,045	72
75	Univ of Kansas	25,552	17,205	71
76	Carnegie-Mellon Univ	25,434	21,915	56
77	Univ of Cal-Irvine	25,059	20,614	59
78	Virginia Commonwith Univ	24,285	16,713	74
79	Cuny Mt Sinai Sch of Med	23,519	19,874	63
80	Suny at Stony Brook	22,377	19,602	64
Total 1st 80 institutions		4,645,376	3,461,161	
81	Univ of Ill Med Ctr Chgo	21,982	12,931	88
82	George Washington Univ	21,963	14,503	83
83	Iowa St U of Sci & Tech	21,942	10,396	102
84	Emory University	21,927	17,374	70
85	Rockefeller Univ	21,767	19,952	61
86	Wayne State Univ	21,350	12,582	92
87	Tufts Univ	20,935	15,642	78
88	Utah State Univ	20,859	15,412	79
89	Brown Univ	20,783	16,020	77
90	Suny at Buffalo	19,959	16,224	76
Total 1st 90 institutions		4,858,843	3,612,197	
91	Washington State Univ	19,599	12,896	69
92	Univ of Vt & St Agric Col	18,960	11,950	93
93	Univ of Dayton	18,672	15,049	81
94	Univ of Nebraska-Lincoln	18,557	11,108	97
95	Georgetown Univ	18,505	10,327	103
96	Univ of Tex Cancer Center	18,459	17,789	69
97	Syracuse University	18,161	10,689	98
98	Univ of Cal Santa Barbara	17,620	12,688	91
99	Oklahoma State Univ	17,206	7,028	127
100	Mississippi State Univ	16,669	6,537	133
Total 1st 100 institutions		5,041,251	3,728,258	

Amounts shown represent awards to individual institutions, excluding the R&D obligations to university-administered federally funded research and development centers (FFRDCs). Awards to the administrative offices of university systems are excluded from totals for individual institutions because that allocation of funds is unknown but those awards are included in "Total, All Institutions."

[2]Data for Johns Hopkins University include $238 million obligated to the Applied Physics Laboratory, considered an FFRDC until FY 1978.

[2]Data for Pennsylvania State University include $12 million obligated to the Applied Research Laboratory, considered an FFRDC until FY 1978.

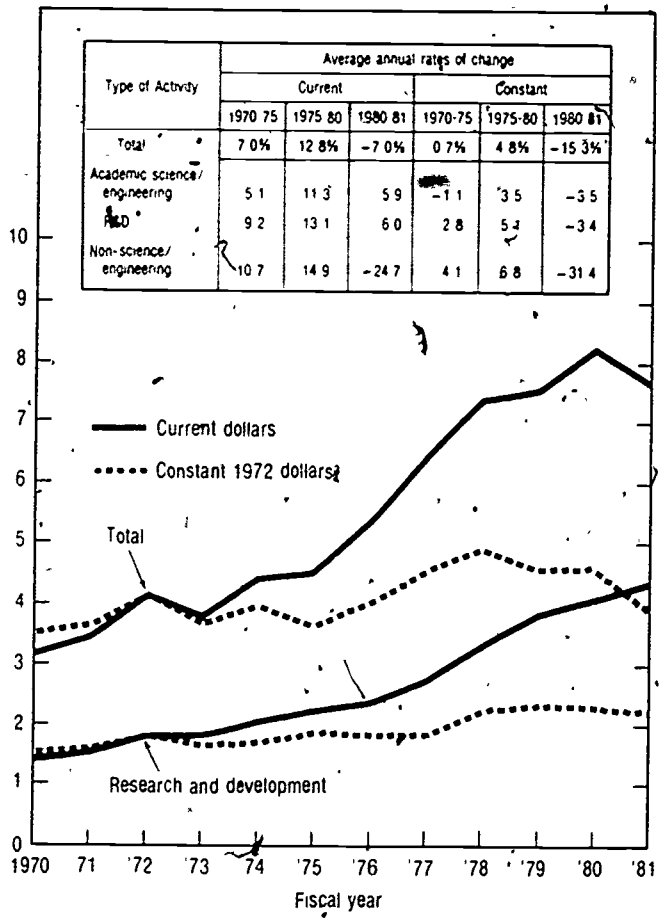
[3]Howard University and Gallaudet College receive substantial appropriations from Congress each year for general operating expenses, their relative rankings thus reflect the magnitude of their non-science/engineering programs.

SOURCE: National Science Foundation

Chart 1. Federal obligations to universities and colleges by type of activity

Billions of dollars

Type of Activity	Average annual rates of change					
	Current			Constant		
	1970 75	1975 80	1980 81	1970-75	1975-80	1980 81
Total	7 0%	12 8%	-7 0%	0 7%	4 8%	-15 3%
Academic science/ engineering	5 1	11 3	5 9	-1 1	3 5	-3 5
R&D	9 2	13 1	6 0	2 8	5 3	-3 4
Non-science/ engineering	10 7	14 9	-24 7	4 1	6 8	-31 4



[a]Based on GNP implicit price deflator
SOURCE National Science Foundation

18-percent rise in the 1979-80 period. Virtually the entire 1980-81 increase was traced to NSF support, mostly for construction of accelerator facilities. In spite of the recent influx of funds, R&D plant support in 1981 represented only 35 percent (13 percent in real dollars) of the 1965 peak level of $126 million.

Federal support for academic R&D plant are expected to reach $46 million in 1983. According to DOD, the agency plans to provide $150 million over a 5-year period to upgrade academic S/E research facilities, beginning in FY 1983.

OTHER S/E ACTIVITIES

Federal support for all S/E activities other than research and development and R&D plant increased for the fifth consecutive year, this time by 5 percent to $634 million. Support for these programs fell by 5 percent in real terms, however, making 1981 the seventh consecutive year of real-dollar decline.

Federal obligations for fellows and trainees decreased by 4 percent in 1981 (12 percent in real terms) to $215 million. The proportion of all full-time graduate students in doctorate-granting institutions that were primarily supported under Federal fellowships and traineeships amounted to 7 percent in 1981 compared to 16 percent in 1971.[7]

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The final report, *Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1981*, including statistical tables presenting the survey findings in detail, will be released later in 1983. For more information on the availability of data tapes, call (202) 634-4673.

[7] National Science Foundation, *Academic Science/Engineering Graduate Enrollment and Support, Fall 1981* (Detailed Statistical Tables) (NSF 83-305) (Washington, D.C., 1983), table A-13, and *Graduate Student Support and Manpower Resources in Graduate Science Education, Fall 1971* (NSF 73-304) (Washington D.C. Supt. of Documents, U.S. Government Printing Office, 1973), table C-10

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