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ABSTRACT

This publication presents data on research and development expenditures in fiscal year 1975 at all institutions granting doctorate or master's degrees in the sciences and engineering and all others that spend $50,000 or more for research and development. The expenditures are characterized according to source of funds, type of R & D activity, and field of science. A summary of these characteristics for expenditures in fiscal years 1964-1975 is also provided. (MH)

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nsf SCIENCE RESOURCES STUDIES HIGHLIGHTS

NATIONAL SCIENCE FOUNDATION • WASHINGTON, D. C. 20550 • MAY 4, 1976 • NSF 76-307

Academic R&D Spending Up 12 Percent in FY 1975

This publication presents preliminary data from NSF's Survey of Scientific and Engineering Expenditures at Universities and Colleges, FY 1975. The data represent responses from all institutions that grant doctorate or master's degrees in the sciences and engineering and all others that spent $50,000 or more for research and development. Estimates for nonrespondent institutions represent about 7 percent of total R&D expenditures.

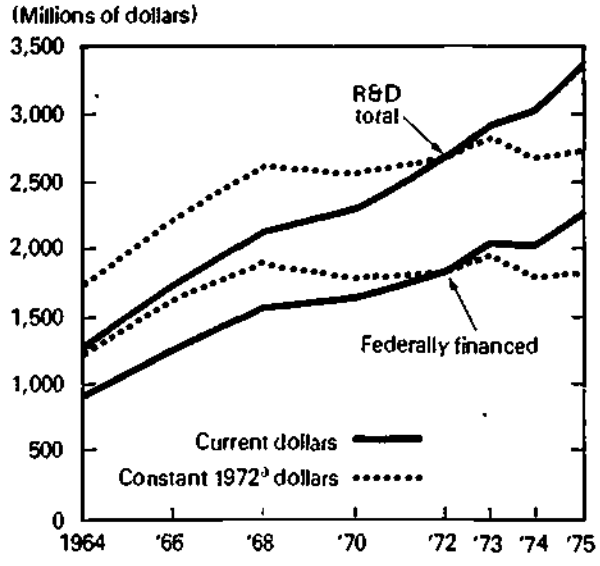
• Separately budgeted R&D expenditures in universities and colleges totaled $3.4 billion in 1975. In the 1974-75 period academic R&D spending increased 12 percent, twice the average annual growth rate experienced during the six previous years. In constant dollars, academic research and development increased 2 percent in 1975, following a 5-percent decline in 1974.

• Federally financed R&D expenditures totaled $2.3 billion in 1975, or two-thirds of all separately budgeted R&D expenditures. Federally supported R&D funds increased 13 percent in the 1974-75 period.

• The large jump in university R&D spending is primarily due to a 17-percent increase in the federally financed life sciences, reflecting the release in 1974 of more than $150 million in impounded R&D funds to the National Institutes of Health. Within the life sciences, the federally sponsored biological and medical sciences accounted for nearly one-half of the overall R&D increase.

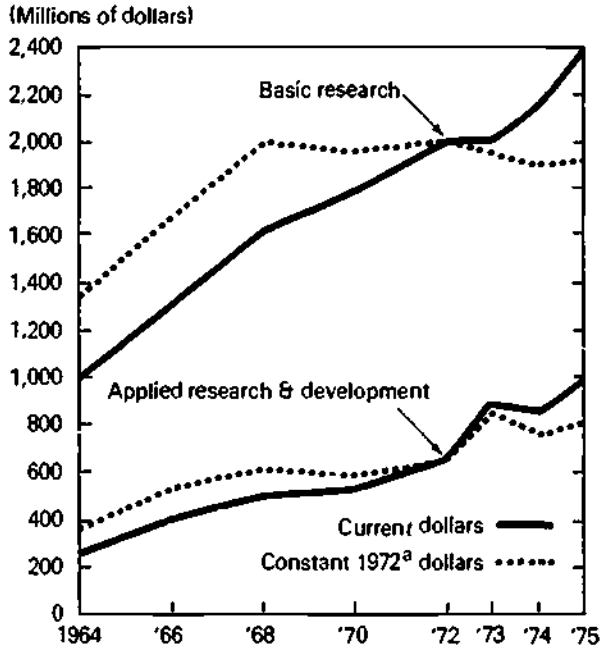
• Basic research outlays increased 11 percent and accounted for 70 percent of all academic R&D expend-

Current R&D expenditures at universities and colleges: FY 1964-75



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

Current R&D expenditures at universities and colleges, by character of work: FY 1964-75



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

(Prepared in the Universities ar ... ip. Division of Science Resources Studies.)

itures. This sector continued to perform more than one-half of all basic research in the United States. The portions of total R&D outlays accounted for by applied research and development were 25 percent and 4 percent, respectively.

• Every field of science and engineering showed an increase in R&D expenditures in 1975, at rates ranging from 16 percent in the mathematical and life sciences to 2 percent in the social sciences. Expenditures in the medical and biological sciences, which accounted for over two-fifths of all academic research and development, climbed 18 percent and 15 percent, respectively, and can be traced to the expansion of Federal support to the two fields, much of which can be attributed to the release of the impounded NIH funds. Engineering expenditures rose 10 percent.

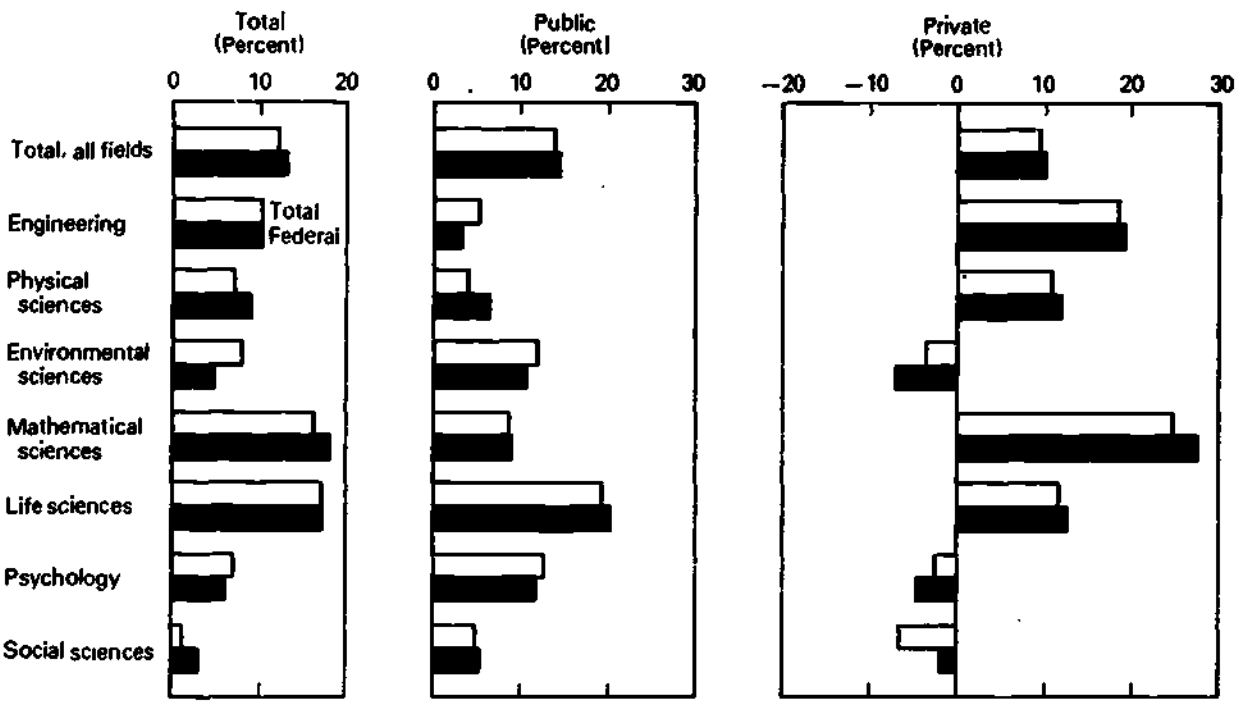
Type of Control

Public institutions reported R&D expenditures totaling $2.2 billion in 1975 up 14 percent from 1974, while private institutions reported $1.2 billion, up 9 percent. In constant dollars expenditures in public institutions rose 3 percent, while private institutions actually showed a decline of 1 percent. Two-thirds of the current dollar increase in federally financed R&D outlays was concentrated in public universities and colleges, which also employ almost two-thirds of all full-time academic scientists and engineers. This increase affected every field of science and engineering in public institutions. However, private institutions reported declines in R&D spending in the social and environmental sciences and psychology. Life sciences accounted for three-fourths of the overall increase in R&D monies in public institutions and two-thirds of the increase in private institutions.

Top R&D Performers

The top 20 academic R&D performers in 1975 accounted for 36 percent of all R&D expenditures and 40 percent of federally financed R&D outlays, compared to 41 percent and 45 percent, respectively, in 1966 when the concentration of R&D funds peaked. Nineteen of the 20 institutions increased their R&D spending in 1975. The most pronounced changes occurred at the University of California at San Francisco, where expenditures in the medical sciences increased $10 million, or 28 percent, over 1974 levels, and at Stanford University, where overall R&D expenditures in the life sciences jumped $7 million, or 31 percent. The largest academic R&D performer, the University of Wisconsin at Madison, reported large increases in federally sponsored biological and medical sciences, totaling $3 million, or 17 percent above 1974 levels. The second leading performer, Massachusetts Institute of Technology, reported an increase of $2 million, or 21 percent in these two fields.

Change in current R&D expenditures at universities and colleges, by field of science and control: FY 1974-75



SOURCE: National Science Foundation.

Twenty universities reporting the largest amounts of separately budgeted R&D expenditures: fiscal years 1974-75

[Dollars in thousands]

Institution	Total R&D			Federal R&D		
	1974	1975	Percent change, 1974-75	1974	1975	Percent change, 1974-75
Total	$1,083,211	$1,225,338	13.1	$812,867	$907,320	11 6
1 University of Wisconsin-Madison	86,088	95,436	10.9	47,339	48,217	1.9
2. Massachusetts Institute of Technology	76,993	84,668	10 0	62.455	3,599	11 4
3. University of California,San Diego	67,209	76,898	14.4	60,904	69,032	13.3
4 University of Michigan	62,880	74,553	18 6	39,867	46,671	17.1
5 University of Minnesota	60,404	69,655	15.3	35,237	41,827	18 7
6 Columbia University	56,465	68,197	20.8	45,210	50,852	12.5
7. Stanford University	$3,950	66,876	24 0	50,262	59,640	18.7
8 University of Washington	56,608	65,947	16.3	49,103	55,260	12.5
9 University of California-Berkeley	58,294	65,087	11.7	43,123	46,648	8.2
10. Harvard University	58,207	64,176	10.3	47,293	49,667	5 0
11 Cornell University	56,542	61,545	8 8	33,269	36,841	10.7
12. University of Chicago	52,581	58,766	11 8	39,126	45,096	15.3
13. University of California-Los Angeles	50,016	57,831	15,6	41,367	47,326	14 4
14 Johns Hopkins University	50,924	56,471	10.9	41,768	45,787	9 6
15. University of Illinois-Urbana	48,652	51,203	5.2	32,454	32,846	1.2
16 University of California,San Francisco	33,922	43,261	27.5	28,118	36,450	29 6
17 University of Texas-Austin	36,066	41,754	15 8	20,266	23,830	17.6
18 Yale University	36,576	41,032	12.2	31,480	35,255	12.0
19. University of Pennsylvania	46,421	41,006	-11.7	38,232	34,762	-9.1
20 New York University	34,333	40,976	19.3	25,994	31,714	22.0

SOURCE: National Science Foundation

Data from the 1975 survey indicate that doctorate-degree-granting institutions accounted for 98 percent of all academic R&D spending, and recorded a 13-percent increase from 1974. Master's-degree-granting institutions, which accounted for nearly all of the remaining academic R&D expenditures, reported a 9-percent decline in the 1974-75 period. This decline in overall R&D outlays at master's-degree-granting institutions was concentrated in the life sciences, which fell from $20 million in 1974 to $17 million in 1975. The amount of federally financed life science funds actually increased, however, from $10 million in 1974 to $12 million in 1975. The data also show that the concentration of R&D expenditures among the first 100 universities and colleges did not vary significantly between 1974 and 1975. The portion of federally supported research and development going to the 100 largest R&D performers (83 percent) has declined 4 percent since 1966.

Technical Notes

Data presented in this report represent separately budgeted expenditures for research and development performed in universities and colleges. Capital expenditures are treated separately in the survey. The data for most of the surveyed institutions cover the period from July 1, 1974 to June 30, 1975. Questionnaires were mailed on October 24, 1975 to the 540 universities and colleges which account for more than 99 percent of all academic R&D expenditures. Eighty-seven percent, or 459 institutions, had responded to the survey by February 25, 1976, the cutoff point for preliminary tabulations. Data for this report were supplied by 187 of the leading 200 R&D performers. Estimates were made for institutions that did not respond to the survey; these estimates accounted for less than 7 percent of total academic research and development. Departmental research expenditures were excluded from this report because many institutions were unable to report these data; consequently, a rate of imputation resulted which was too high for publication. Few if any institutions maintain accounts from which expenditures for departmental research can be separately identified.

One specific problem that has been under study by NSF and several institutional officials is the concept of "institutions' own funds," which is one of the sources of R&D funding listed on the questionnaire. According to survey instructions, this concept of "institutions' own funds" includes among various cost components "... unreimbursed indirect costs associated with R&D financed by outside organizations." Since these unreimbursed indirect costs are not items in the accounts maintained by institutions, they must be estimated by respondents, and the differences in these estimates among individual institutions vary substantially. In addition, some institutions do not make these estimates, and those that do, use procedures based on varying methods. These problems were revealed through several studies, conducted by NSF and a few institutional officials, about the concept of "institutions' own funds." Representative data, however, on the reporting practices of institutions in terms of "unreimbursed indirect costs" are not yet available. NSF is studying the problem with the objective of developing compatible reporting instructions.

Detailed statistical tables will be published during the summer. A final analytical report will be issued later in the year.

Summary of characteristics of separately budgeted R&D expenditures in the sciences and engineering in universities and colleges: fiscal years 1964-75[1]

(Dollars in millions)

	1964	1966	1968	1970	1972	1973	1974	1975 (prelim)
Total	$1,275	$1 715	$2 149	$2,335	$2,676	$2,940	$3,021	$3,395
(In 1972 dollars)	(1,734)	(2,228)	(2,611)	(2,568)	(2,676)	(2,815)	(2,683)	(2 730)
Source of funds:								
Federal Government	917	1,261	1,572	1,648	1,839	2,041	2,033	2,288
State and local governments	132	156	172	219	269	295	329	347
Foundations and voluntary health agencies	61	77	95	110	128	131	142	163
Industry	40	42	55	61	75	86	96	110
Institutional funds	103	147	218	243	307	318	344	399
Other sources	21	32	36	55	58	69	76	89
Type of R&D activity:								
Basic research	1,003	1,303	1,650	1,796	2,021	2,058	2,354	2,397
Applied research	232	328	404	427	546	715	740	864
Development	41	83	95	112	110	168	127	134
Field of science:								
Engineering	162	259	309	319	347	384	347	382
Physical sciences	217	287	320	307	330	334	339	363
Astronomy	16	23	24	19	22	24	24	27
Chemistry	70	88	105	102	110	114	118	122
Physics	120	159	173	162	162	171	173	183
Physical sciences, n e c	12	17	18	25	36	24	24	30
Environmental sciences	55	68	120	125	192	208	231	249
Mathematical sciences	33	42	58	72	71	75	77	89
Mathematics	NA	NA	NA	NA	NA	37	38	42
Computer sciences	NA	NA	NA	NA	NA	38	39	47
Life sciences	682	872	1,037	1,194	1,353	1,528	1,619	1,885
Agricultural	(3)	(3)	(3)	(3)	(3)	(3)	325	381
Biological	315	422	491	547	682	822	524	603
Medical	320	390	477	549	605	646	712	842
Life sciences, n e c	46	60	69	98	65	61	57	59
Psychology	32	40	59	59	70	74	75	81
Social sciences	82	109	168	169	206	252	246	249
Other sciences, n e c	14	37	77	89	107	106	86	96

[1] The 1975 data are preliminary. Estimates for nonrespondents account for less than 1 percent of the total.

[2] Based on GNP implicit price deflator.

[3] Included in biological sciences.

[4] Beginning in 1974 excludes agricultural sciences.

Note: Detail may not add to total because of rounding.

SOURCE: National Science Foundation.

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