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ABSTRACT

Tenure practices in science and engineering (S/E) departments in universities and 4-year colleges with tenure systems were estimated, based on a 1978-79 survey of member institutions of the Higher Education Panel of the American Council on Education. The survey findings were designed to help assess the effect of the tenure system on the number of faculty openings for new doctorates. Of the faculty openings available to recent doctorates, about 4 percent of the full-time S/E positions became vacant as the result of the failure of faculty to earn tenure or the expiration of nontenure-track openings. In addition, 2 to 3 percent of faculty positions opened due to retirement, other voluntary separations, and death. Growth in the number of faculty positions was the other major source of openings, accounting for approximately 4 percent of the full-time S/E positions. The greater the proportion of faculty who hold tenure, the smaller the number of potential openings for recent doctorates. About two-thirds of the 123,000 full-time S/E faculty at universities and 4-year colleges held tenure, another one-fourth were not tenured but in tenure-track positions, and about 1 in 14 were in nontenure-track positions. Data are also provided on tenure approval rates, reconsideration rates for those denied tenure, and pretenure probationary periods. Information is provided on tenure status and tenure decision outcomes of S/E faculty by field, institutional level, and type of institution. If the number of full-time faculty does not increase because of declining college enrollments, the tenure system may be an important source of openings for new faculty, if no major changes occur in tenure practices. (SW)

SCIENCE RESOURCES STUDIES HIGHLIGHTS

NATIONAL SCIENCE FOUNDATION WASHINGTON, D.C. 20550 NSF 81-300 FEBRUARY 23, 1981

Tenure Practices in Universities and 4-Year Colleges Affect Faculty Turnover

At the request of the National Science Foundation (NSF), the American Council on Education conducted a survey of its Higher Education Panel to obtain information on tenure practices in universities and 4-year colleges.[1] Each year the Council conducts a series of surveys of the members of the Panel, which is a representative sample drawn from over 3,000 academic institutions, to acquire information for policymaking purposes. Based on the Panel sample of 461 institutions, 74 percent of which responded, estimates have been made of tenure practices in science and engineering (S/E) departments in all universities and 4-year colleges with tenure systems.

Highlights

- Some observers believe that without an influx of recent doctoral graduates the quality of academic research may deteriorate. To a large extent, the operation of university tenure systems determines how many young people will be hired each year. The NSF survey described here provides comprehensive information on vital aspects of academic personnel practices. This information makes possible an assessment of the effect of the tenure system on the number of faculty openings for new doctorates.

- Between the 1978-79 and 1979-80 academic years, faculty openings available to recent doctorates equalled about 9 percent to 11 percent of the number of faculty positions in the earlier year. About 4 percent of full-time S/E positions become vacant as the result of the failure of faculty to earn tenure or the expiration of nontenure-track appointments. These two sources of turnover made roughly equal contributions to annual faculty openings. In addition, 2 percent to 3 percent of faculty positions opened due to retirement, voluntary separations other than retirement, and death of experienced faculty. Growth in the number of faculty positions was the other major source of openings, accounting for approximately 4 percent of the full-time S/E positions.

- The greater the proportion of faculty who hold tenure, the smaller the number of potential openings for recent doctorates. At the beginning of the 1978-79 school year, about two-thirds of the 123,000 full-time S/E faculty at universities and 4-year colleges held tenure, another one-fourth were not tenured but in tenure-track positions, and about 1 in 14 were in nontenure-track positions.

- High tenure approval proportions reduce the number of faculty openings. In 1978-79, approximately 5 percent of university and 4-year college S/E faculty were considered for tenure, of whom about three-fifths were approved. By specific field, tenure-approval proportions varied from 70 percent in engineering to 53 percent in the social sciences.

- Reconsideration of those denied tenure also tends to decrease faculty openings. About 1 in 2 of the S/E faculty denied in 1978-79 was eligible for reconsideration for tenure at some future time. Faculty at public universities received the highest proportion of deferred tenure decisions.

- Long pretenure probationary periods reduce faculty openings whereas allowance of credit for time spent in postdoctoral positions shortens probationary periods and, hence, tends to increase openings. Universities had an average pretenure probationary period for S/E faculty of approximately six years. The pretenure probationary period at public and private 4-year colleges was less by approximately one-half year. A minority of institutions allowed credit for postdoctoral experience toward the required pretenure probationary periods. About three-tenths of private universities had such arrangements and allowed, on average, one year's credit. About one-fifth of public universities and about three-tenths of public and private 4-year colleges allowed an average of two years credit.

[1] The survey collected data from chief academic officers on faculty tenure status during academic year 1978-79, the current and expected future proportions of eligible faculty approved for tenure, and the current and expected future lengths of pretenure probationary periods as well as other aspects of tenure policy. The survey results are discussed more fully in "Tenure Practices at Four-Year Colleges and Universities," *Higher Education Report No. 48*, Frank J. Atelsek and Irene L. Gomberg (Washington, D.C.: American Council on Education, 1980).

Prepared in the Supply and Education Analysis Group, Division of Science Resources Studies

Introduction

This survey on tenure practices was conducted because of widespread concern about the ability of S/E departments to hire younger faculty during a period when the size of the traditional college-age population is expected to decline.[2] Some observers believe that without an influx of recent doctoral graduates the quality of academic research may deteriorate.[3] To a large extent, the operation of university tenure systems determines how many young people will be hired each year. Before this survey was conducted, no current, comprehensive information existed on vital aspects of personnel practices such as the number of faculty reviewed for tenure, the proportion who are approved and the average terms of appointment of nontenure-tract faculty.

Proportions of Faculty with Tenure

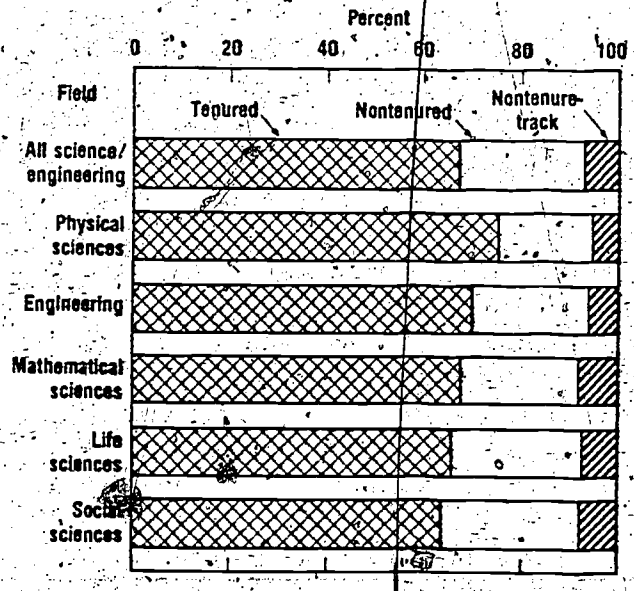
The majority of current full-time S/E faculty are tenured. This finding is important because a high proportion of faculty with tenure tends to reduce future openings for new faculty. At the beginning of the 1978-79 school year, about two-thirds held tenure and an additional one-fourth were in tenure-track positions and hence were eligible for tenure at some future time (chart 1). Individual S/E fields did not differ widely in the proportion of faculty with tenure. The physical sciences had the highest proportion (72 percent) whereas the social sciences had the lowest (63 percent).

[2] National Academy of Sciences. *Research Excellence Through the Year 2000: The Importance of Maintaining a Flow of New Faculty Into Academic Research* (Washington, D.C., 1980).

[3] For information on an earlier related study see National Science Foundation, *Young and Senior Science and Engineering Faculty: 1974: Support, Research Participation, and Tenure* (NSF 75-302) (Washington, D.C.: Supt. of Documents, U.S. Government Printing Office, 1975).

Chart 1. Full-time science/engineering faculty

All institutions, 1978-79



SOURCE: American Council on Education

Table 1. Tenure status of S/E faculty by field, institutional level, and control: 1978-79

Field	Total faculty	Tenured	Nontenured, tenure-track	Nontenure-track faculty
	All institutions			
		Percent		
Total	123,267	67	26	7
Physical sciences	21,048	76	20	5
Engineering	15,031	70	24	6
Mathematical sciences	16,569	68	24	8
Life sciences	26,599	66	27	7
Social sciences	44,022	63	30	7
	Private universities			
		Percent		
Total	13,415	64	31	5
Physical sciences	2,460	74	23	4
Engineering	2,986	69	28	3
Mathematical sciences	1,625	60	33	7
Life sciences	1,588	61	35	5
Social sciences	4,756	59	35	6
	Private 4-year colleges			
		Percent		
Total	21,184	62	33	4
Physical sciences	4,272	69	29	2
Engineering	591	65	33	2
Mathematical sciences	2,734	69	28	4
Life sciences	3,888	66	30	4
Social sciences	9,699	56	38	6
	Public universities			
		Percent		
Total	49,003	69	24	7
Physical sciences	7,459	78	17	5
Engineering	8,518	71	23	6
Mathematical sciences	5,827	67	23	10
Life sciences	13,485	65	27	8
Social sciences	13,714	68	26	7
	Public 4-year colleges			
		Percent		
Total	39,665	69	23	8
Physical sciences	6,855	78	15	7
Engineering	2,936	69	24	8
Mathematical sciences	6,383	71	21	9
Life sciences	7,638	68	25	8
Social sciences	15,853	65	26	9

Source: American Council on Education

The percentages of S/E faculty with tenure varied slightly by institutional control with public institutions having higher percentages of tenured faculty. Institutional character — university or 4-year college — had mixed effects upon the proportions with tenure for individual S/E fields, although most differences were averaged out when the five S/E fields were combined (table 1).

Of those S/E faculty who did not hold tenure at the beginning of the 1978-79 school year, over three-fourths were in tenure-track positions. Negative tenure decisions affecting these nontenured faculty, together with turnover for other reasons of those who were in tenure — and nontenure-track — positions, constituted potential sources of future S/E job openings in academia.

Nontenure-Track Faculty

Some full-time faculty are not eligible for tenure. They are usually in temporary positions that may be renewable. Turnover in these positions is currently an important source of faculty openings. Generally, these nontenure-track faculty have a varying mix of teaching and research duties but differ from other faculty in that their research is typically performed as part of a team project rather than as an individual research program.[4]

Those not in the tenure system accounted for 7 percent of all S/E faculty in 1978-79. Of all institutions, public 4-year colleges had the highest percentage of such faculty. Furthermore, in each field, public institutions had larger concentrations of faculty outside the tenure system than did private institutions. Within each type of institution, the greatest percentage of faculty not eligible for tenure was in the mathematical sciences. Physical sciences and engineering departments in private 4-year colleges had the lowest percentages of such faculty. For all institutions combined, the average expected length of employment for nontenure-track faculty was about three years (table 2); it was slightly greater at public than at private institutions and was longest (almost four years) at public universities.[5] The replacement of nontenure-track faculty at these intervals opens positions for recent doctorates. If nontenure-track faculty are replaced every three years, at current levels their turnover would equal more than 2 percent of total full-time faculty each year.

[4] National Academy of Sciences. *Report on Doctoral Research Staff in Science and Engineering in U.S. Universities* (Washington, D.C., 1979).
[5] These expected periods of employment for nontenure-track faculty apply to those hired since 1975.

Table 2. Expected average length of employment for nontenure-track S/E faculty by institution level and control: 1978-79

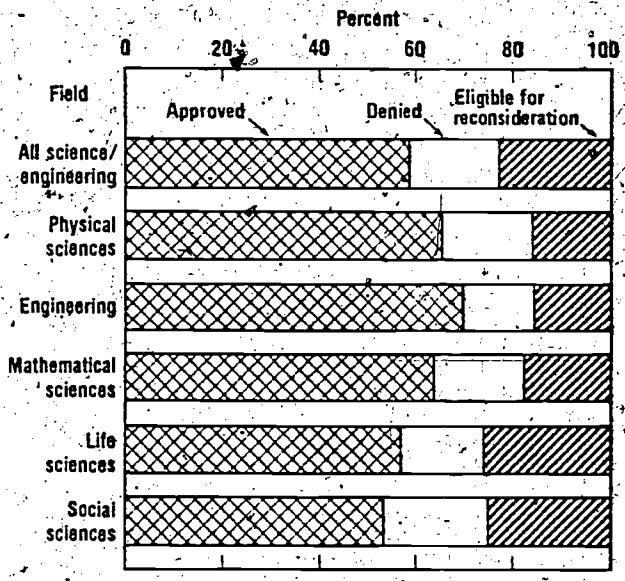
Institutional level	Years by institutional control	
	Public	Private
All institutions	3.2	2.9
University	3.7	2.8
4-year college	3.1	2.9

Source: American Council on Education

Current Tenure Decisions

In the 1978-79 school year about 5 percent of all full-time faculty, or about 6,400, were considered for tenure. Of this group, about three-fifths were approved and slightly more than one-fifth retained eligibility for reconsideration at their institutions in the future (chart 2). Thus, potential separations for failure to receive tenure amounted to less than one-fifth of those considered. This constituted about 1 percent of the approximately 123,000 full-time S/E faculty in these institutions. These separations constitute an important — though not the largest — source of job openings for more recent doctorates.

Chart 2. Tenure decision rates, science/engineering faculty
All institutions, 1978-79



SOURCE: American Council on Education

The proportions of faculty approved for tenure varied among different kinds of academic institutions. The highest overall approval proportion was in private universities, about three-fourths of those eligible, and the lowest was in private 4-year colleges, slightly less than one-half (table 3). Within each of the major S/E fields, tenure approval proportions were inversely related to the number reviewed for tenure with the highest proportions occurring in the physical sciences and engineering.

Fields in which higher future tenure approval proportions were expected are those in which the 1978-79 proportions were below average. For example, department heads in public universities expect higher tenure approval proportions in the social and life sciences which would bring these fields near the expected level of the physical

Table 3. Tenure decision outcomes for S/E faculty considered for tenure by field, institution type, and control: 1978-79

Field	All institutions			
	Total number	Approved	Denied	Eligible for reconsideration
		Percent		
Total	6,354	59	19	22
Physical sciences	782	66	18	16
Engineering	692	70	14	16
Mathematical sciences	798	64	18	18
Life sciences	1,477	57	17	26
Social sciences	2,605	53	22	25

Field	Private universities			
	Total number	Approved	Denied	Eligible for reconsideration
		Percent		
Total	497	76	19	5
Physical sciences	57	97	0	4
Engineering	141	76	21	3
Mathematical sciences	56	73	23	4
Life sciences	69	62	35	3
Social sciences	174	76	15	9

Field	Private 4-year colleges			
	Total number	Approved	Denied	Eligible for reconsideration
		Percent		
Total	1,619	47	32	21
Physical sciences	248	46	43	12
Engineering	30	87	0	13
Mathematical sciences	242	54	31	14
Life sciences	347	49	26	24
Social sciences	752	43	33	24

Field	Public universities			
	Total number	Approved	Denied	Eligible for reconsideration
		Percent		
Total	2,412	62	11	28
Physical sciences	277	74	11	16
Engineering	381	66	12	22
Mathematical sciences	241	66	5	29
Life sciences	674	59	10	31
Social sciences	839	56	10	34

Field	Public 4-year colleges			
	Total number	Approved	Denied	Eligible for reconsideration
		Percent		
Total	1,826	61	19	19
Physical sciences	200	71	2	27
Engineering	140	71	17	12
Mathematical sciences	259	69	17	14
Life sciences	387	61	18	21
Social sciences	840	55	25	19

Source: American Council on Education

sciences. Similarly, the expectations of chief academic officers such as provosts and vice presidents for academic affairs indicate decreased differences in future approval proportions between public and private institutions.

About 1 in 2 of those who were denied tenure in 1978-79 retained eligibility for reconsideration at a future time. Although the short-term effect would appear to reduce faculty turnover, in the long run the effect is negligible to the extent that deferral of tenure decisions does not alter the ultimate outcomes. S/E university faculty were somewhat more likely to be eligible for reconsideration for tenure than were their counterparts at 4-year colleges. Among universities, public institutions were much more likely to permit faculty to be reconsidered for tenure than were private institutions. In contrast, public and private 4-year colleges were almost equally as likely to permit faculty to be reconsidered. About one-eighth and one-fourth of those considered by universities and 4-year colleges, respectively, would not be reconsidered and had no possibility for tenure approval at their current institutions.

Another potential source of faculty turnover is involuntary release prior to tenure review. For all institutions, however, less than 1 percent of all faculty were involuntarily released without formal consideration for tenure, including those who resigned because of anticipated failure to receive tenure. The highest percentage of such separations occurred among faculty at private 4-year colleges. Thus, involuntary release prior to tenure review appears to be a less important cause of faculty turnover than is denial after review.[6]

Pretenure Probationary Periods

Changes in the duration of the pretenure probationary period affect the rate of faculty turnover and, hence, openings for new faculty. Assuming no changes in other factors, shorter probationary periods would imply higher turnover rates, and vice versa. In the early stages of the development of the tenure system, there was no set period of probation for faculty members awaiting tenure. In 1940 the American Association of University Professors required institutional signatories of the *Statement on Principles of Academic Freedom and Tenure* to limit the pretenure probation period to a maximum of seven years.

The current average length of the pretenure probationary period for each type of institution in each field is below seven years, namely about five to six years. Overall, private institutions have longer average pretenure probationary periods than do public institutions. There were only slight differences in the lengths of pretenure probationary periods by field.

For 7 in 10 of responding institutions, administrators at the institutional level have authority to determine the length of pretenure probationary periods. In almost all remaining cases, central administrators of the system to which the institutions belong determined how long faculty must wait for tenure review.

[6] Involuntary separations amounted to the following percentages of all 1978-79 faculty in universities and 4-year colleges combined: physical sciences, 0.4 percent; engineering, 0.4 percent; mathematical sciences, 0.5 percent; life sciences, 0.4 percent; and social sciences, 0.9 percent.

Credit for Postdoctoral Experience

Postdoctoral study following graduation has become a common practice in many S/E fields. To the extent that credit for this experience serves to shorten the pretenure probationary period, there is an increase in the rate of faculty turnover, if other factors remain equal. In most institutions, there is no provision for counting this postdoctoral experience as part of the pretenure probation period. Only 3 in 10 institutions accepted any postdoctoral experience. In these universities and colleges, an overall average of 1.9 years of postdoctoral experience was allowed as credit. The average for private universities, however, was about 1.0 year.

Summary

The survey results described in this report provide approximate rates for three causes of 1978-79 faculty turnover: expiration of contracts of nontenure-track faculty (2 percent of total full-time faculty), denial of tenure after review (1 percent), and involuntary separation prior to tenure review (less than 1 percent). Table 4 compares these to all other sources of turnover combined. The latter consist of growth in the total number of faculty between 1978-79 and 1979-80, retirements, voluntary separations other than retirements, and deaths. Although the magnitude of these other factors was not determined in this survey, a rough approximation may be derived from other sources.

Between the 1978-79 and 1979-80 academic years, full-time S/E employment in doctorate-granting institutions grew by about 4 percent.[7] Since these institutions account for three-fourths of S/E academic employment above the community college level, it is assumed that full-time S/E faculty grew by about 3 percent to 4 percent in universities and 4-year colleges combined. Information from the National Academy of Sciences (NAS) and the Teachers Insurance and Annuity Association (TIAA) suggest that retirements, voluntary separations other than retirements, and deaths each contributed less than 1 percent to turnover from the 1978-79 S/E faculty.[8] Combined these three probably accounted for 2 percent to 3 percent in losses from that year's staff. If growth is added to these figures, total new appointments not related to tenure probably accounted for 5 percent to 7 percent of the 1978-79 faculty.

The turnover rate attributable to these other causes, however, is likely to be substantially less than this range for the next few years. For example, the number of full-time faculty may not increase because of the expected decline in the size of the traditional college-age population. Therefore, assuming no major change in tenure practices over the near term, the academic sector may be particularly dependent on the tenure system as a source of openings for new faculty.

Table 4. Sources of faculty openings for recent doctorates between 1978-79 and 1979-80

	Approximate annual percentage of total 1978-79 full-time S/E faculty
Total	9-11
Expiration of contracts of nontenure-track faculty	2
Denial of tenure to nontenured faculty after tenure review	1
Involuntary separation of nontenured faculty prior to tenure review	1
Other (growth in number of faculty, retirements, voluntary separations other than retirements, and deaths)	5-7

Sources: American Council on Education and National Science Foundation

[7] Unpublished data from the annual NSF Survey of Scientific and Engineering Personnel Employed at Universities and Colleges, January 1980.

[8] For a discussion of projected retirement rates, see National Academy of Sciences, *Research Excellence Through the Year 2000*, op. cit., pp. 11-36. Death rates are from unpublished TIAA mortality tables. Estimates of other voluntary separations are based on unpublished NAS tabulations of employment mobility of S/E doctorates between 1973 and 1977.