

1968 Interagency Task Force on
Higher Education & the Administration

of Academic Science Research Programs

27

August 13, 1967

EYES ONLY

MEMORANDUM FOR

Honorable Charles L. Schultze
Director, Bureau of the Budget

In accord with our earlier discussions, this memorandum establishes under your chairmanship a Task Force on Administration of Academic Science Research Programs for 1968. The Task Force should include representatives from the Departments of Defense, Health, Education and Welfare, and Commerce, the Atomic Energy Commission, the National Science Foundation, the National Aeronautics and Space Administration, and the Office of Science and Technology, and may be broadened at your discretion. Douglass Cater and James C. Gaither will be the White House representatives on the Task Force.

May I suggest that you discuss with the heads of these agencies individuals to represent them on the Task Force. As you know, we should have the finest possible talent on this Task Force.

This special Task Force effort reflects our deep conviction that every effort must be made to improve the administration of academic science research programs. We hope to develop, with your help, a strong and imaginative program for consideration by the second session of the 90th Congress.

We would like you to conduct staff studies on the ideas and proposals listed below. It should be understood that these are merely ideas resulting from our discussions and that no decisions have been made with respect to any of them. Furthermore, you are encouraged to add any other proposal which you feel is worthy of consideration.

• Organization

- Roles, missions, resources and effectiveness of central science policy machinery (OST, Science Adviser, PSAC, ECST, NASC, Marine Science Council).

ADMINISTRATIVELY CONFIDENTIAL

-- **Alternative machinery:**

- . Department of Science
- . Department of Science and Technology
- . Council on Science and Technology
- . Consolidation of related science activities, e.g., oceanographic, environmental.

. **Planning and Budgeting**

- Review present method of sequential examination of science budgets, which produces a derived R and D total related to agency mission contents.
- Identify approaches to planning and budgeting of academic science other than pure level-of-effort and demographic standards.
- Suggest a procedure for insuring avoidance of dislocations occurring when responsible mission agencies alter support levels and reduce their research commitments. What "balance wheel" arrangement can be proposed to (a) detect such decisions and (b) compensate when necessary in a timely way.
- Review the role of OST and PEAC in the planning and budgeting process.
- Explore approaches to the development of criteria for choice in appraising alternative public investments in research and development.

. **Government-academic relationships**

- How effective has been the implementation of the directive to allocate Federal research support so as to strengthen weaker universities?

ADMINISTRATIVELY CONFIDENTIAL

- What balance should we seek between project-type support and broadly-based institutional support?
- What steps should be taken to devolve more administrative responsibility upon universities, contrasted with Government stipulations on cost-sharing, effort-reporting, and record-keeping?
- What are the advantages and disadvantages of designating a focal agency for dealing with academic institutions on problems of support for scientific research and education?
- What changes in administrative practices and funding approaches are desirable in order to assure universities of more stability of Federal research support?

We would like you to submit an interim report by October 31, 1967 and a final report by June 1, 1968. Both reports should contain a detailed outline with the following information:

1. A short statement of the legislative or administrative proposal.
2. A detailed statement of the problem giving rise to the proposal.
3. A statement of related on-going programs, including costs, the people whom the programs reach, and the inadequacies of the present programs.
4. A discussion of the proposal, with emphasis upon the pros and cons and the costs and benefits of implementation. (Of great importance here is a detailed statement of the arguments and factual material which can be advanced in support of the proposal.)
5. A statement of the alternative proposals which were considered and the reasons for rejection thereof.

ADMINISTRATIVELY CONFIDENTIAL

In addition, it would be helpful if you would prepare a summary of the report (not to exceed 10 pages) which contains the following information for each major administrative or legislative proposal:

- Salient features of the proposal.
- Brief statement of benefits of implementation.
- Brief statement of costs of implementation.

Ten copies of the report should be submitted to me and five copies to the Director of the Budget.

Joseph N. Calliano, Jr.
Special Assistant to the President

bcc: Secretaries of Defense, HEW, Commerce; Chairman, AEC;
Director, National Science Foundation and NASA, and OST.

TF Report

Rivlin Report



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
WASHINGTON, D.C. 20201

OFFICE OF THE SECRETARY

December 4, 1968

Mr. James C. Gaither
The White House
Washington, D. C.

Dear Jim,

Here are five copies of the latest draft
of the Higher Education Strategy Report.
We have sent one to Charlie Zwick.
Howe, Haworth, and Hornig also received
copies since they are on the Policy
Committee.

Sincerely,

(Mrs.) Alice M. Rivlin
Assistant Secretary for
Planning and Evaluation

Enclosures 5

A PRELIMINARY REPORT TO THE PRESIDENT

- NOT FOR QUOTATION -

考考考

TOWARDS A LONG-RANGE PLAN FOR FEDERAL FINANCIAL SUPPORT
FOR HIGHER EDUCATION

A PRELIMINARY REPORT TO THE PRESIDENT

I. THE NEED FOR A PLAN

The 1960's have been a period of tremendous growth for American colleges and universities.

Enrollment has risen rapidly. Between 1960 and 1970 it is estimated:

- Total enrollments will have more than doubled, from 3.5 million to over 7 million.
- Enrollments in two-year institutions will have increased almost three-fold.
- Graduate enrollments will have risen from 356,000 to about 800,000, and the number of doctoral degrees awarded from about 10,500 a year to about 25,000.

Expenditures for higher education have increased even faster than enrollments:

- Total expenditures on higher education will rise from \$6.6 billion in 1960 to an estimated \$20 billion in 1970.
- The proportion of GNP devoted to higher education will have risen from 1.4% to about 2.2%.

Federal programs affecting and supporting higher education have increased in number and importance. These were years of landmark legislation for higher education. The Higher Education Facilities Act of 1963 and the Higher Education Act of 1965 are among the most significant legislative accomplishments of the decade. The Higher Education Amendments of 1968 have significantly strengthened and broadened these vital laws.

Federal funds for higher education purposes increased from about \$2.5 billion in FY 1963 to almost \$6 billion in FY 1968.

- Aid for facilities and equipment increased from \$331 million to \$986 million.
- Institutional and training grants went up from \$281 million to \$678 million.
- Undergraduate student support from the Office of Education increased from \$91 million to \$494 million.
- Student support by Veterans Administration and Social Security increased from \$68 million to \$844 million.

The Federal Government has never developed an explicit strategy for the support of higher education. Federal involvement in higher education for 21% of higher education's expenditures, but its multiple programs have grown in response to specific needs of particular kinds of students or of institutions or of the Federal Government itself. As a result, it has been made to define an appropriate role for the Federal Government in the general financial strengthening of higher education.

The higher education community is increasingly concerned that the Federal Government has not designed an explicit strategy for supporting higher education. Moreover, many who are concerned with higher education believe that colleges and universities will have increasing difficulty in the future in meeting their growing needs from State, local and private sources. They believe the Federal Government must play a new role in higher education finance if colleges and universities are to continue to offer improving education to a growing student body. They are not agreed, however, on exactly what that role should be.

President Johnson in his Education Message of February 1968 recognized that it was time to begin to "shape a long-term strategy of Federal aid to higher education, a comprehensive set of goals and a precise plan of action." He therefore directed the Secretary of Health, Education, and Welfare to "begin preparing a long-range plan for the support of higher education in America."

This Report is a preliminary response to the President's request. It is an attempt to provide answers to the following questions:

What should be the objectives of Federal support for higher education?

What are the most urgent financial problems confronting the Nation in higher education?

What major alternative types of support should be considered, and what are the advantages and disadvantages of each?

What are the highest priority programs for the Federal Government to undertake and expand?

The report addresses itself to the Federal Government's role in the general strengthening of post-secondary education. It does not deal in detail with specialized types of manpower or the specific needs for particular kinds of professional training (e.g., medicine and dentistry).

Moreover, the report is not so "long-range" that it looks forward to a period in which Federal resources for higher education are unlimited. It does not ask the question: What would we do if we could do anything we wanted? Rather, it assumes that there will continue to be many competing demands on a limited Federal budget, and that it is therefore necessary to focus on the highest priority uses of these funds to meet national objectives.

The report was prepared under the direction of Alice M. Rivlin, Assistant Secretary for Planning and Evaluation of the Department of Health, Education, and Welfare. Dr. Rivlin chaired an advisory committee consisting of:

Lynn M. Bartlett, Assistant Secretary for Education, HEW
 William Carey, Assistant Director (Human Resources), DOD
 Leland J. Haworth, Director, National Science Foundation
 Donald F. Hornig, Special Assistant to the President
 Harold Howe II, Commissioner of Education, HEW
 Barnaby C. Keeney, Chairman, National Endowment for the Humanities
 Philip R. Lee, Assistant Secretary for Health & Scientific Affairs, HEW
 Robert Q. Marston, Director, National Institutes of Health.

The group met frequently for lively discussions. All members contributed ideas, advice and help with successive drafts. The report represents a consensus of this group, although individual members do not necessarily agree with all specific recommendations in detail.

Dr. Jeffrey Weiss carried the burden of the staff work for the report. He received considerable assistance from Robert Hartman, David Mundel, Michael Clurman, and Robert Berls. Mancur Olson, Deputy Assistant Secretary for Social Indicators, also made substantial contributions to the work.

The National Center for Educational Statistics provided invaluable assistance by speeding the processing of the latest data on higher education finances. Both the Educational Testing Service, Princeton, New Jersey, and the Institute for Defense Analysis, Arlington, Virginia, made important contributions through their empirical work on quality in higher education and the demand for higher education, respectively.

II. OBJECTIVES OF FEDERAL SUPPORT OF HIGHER EDUCATION

The first step in evaluating possible alternative Federal plans for aid to higher education is to ask the question: Toward what national objectives for higher education should such a plan lead? The following is a list of fundamental objectives to which any Federal plan for aid to higher education should contribute:

1. Increasing the number and proportion of educated people

The increasing technological and social complexities of our society demand a larger number of educated people. Moreover, a larger and larger proportion of Americans aspire to education beyond the high school. Although many other countries restrict opportunities for higher education to a small proportion of the population, it is in the American tradition and interest to expand the proportion of young people receiving higher education.

2. Increasing equality of opportunity for higher education

Higher education has always been an important avenue to social, intellectual, and economic advancement of individuals. The time has come for the Federal Government to guarantee that every student with the ability to pursue a higher education shall be enabled to do so regardless of his income, race, or place of residence.

3. Improving the quality of higher education

While it is difficult to define precisely what is meant by "quality" in higher education, it is clear that increasing the effectiveness and relevance of the higher education offered to students necessitates increasing the resources available to institutions to attract qualified faculty and to improve facilities, libraries, and teaching methods.

4. Preserving diversity in higher education and advancing institutional autonomy and academic freedom

Higher education institutions must be free to experiment, innovate, and set their own academic standards. Moreover, a pluralistic system of higher education (including institutions of varying size, character, support and philosophy) contributes to freedom of choice and the vitality of higher education.

5. Strengthening graduate education and institutional research and the public service capabilities of higher educational institutions

Advancing science and culture and the continuing strengthening of graduate education and research capability are of particular national importance, and deserve particular emphasis.

6. Encouraging the efficient use of resources in higher education

All of the above goals can be met more easily if resources are used efficiently and effectively, if waste is reduced, and obsolete, inefficient educational practices are eliminated.

Clearly these objectives are often conflicting. They all require scarce resources. Greater emphasis on one objective may mean less resources for others. For example, continued expansion of the higher education system to accommodate increasing numbers of students who wish to obtain a higher education may conflict with improving the quality of higher education. A program of institutional aid designed with primary emphasis on institutional autonomy might conflict with efficient use of educational resources.

A program designed to aid the most able potential college students might well conflict with equality of opportunity, since the poorest groups in society are under-represented in the highest achievement groups as measured by test scores. Similarly, the goal of advancing graduate education might imply a program giving aid mainly to our strongest universities and might conflict with the goal of raising the quality of higher education in general.

III. THE PRESENT STATE OF HIGHER EDUCATION

In order to evaluate alternative Federal approaches to meeting these objectives we need some facts about the current state of higher educational finance. This section attempts to throw some light on three relevant questions:

1. How great are the financial barriers to equality of opportunity for higher education?
2. What can be said about the financial health of higher education and the outlook for the future?
3. Are there special fiscal problems at the graduate level which require Federal attention?

OPPORTUNITY FOR HIGHER EDUCATION

In 1965-66, almost 900,000 or 35 percent of the 2.6 million high school graduates entered college in the year of high school graduation. An estimated 46 percent or 1.2 million will enter college within 5 years of graduation. Probably very few will enter after that.

Who Goes to College?

College attendance is highly conditioned by income and the other factors which may be described as the "socio-economic status" (SES) of families of high school graduates. Thus, for students in the top 20% of achievement, as measured by test scores, 82 percent of the highest SES quartile enter college in the year following high school while only 37% of the students in the lowest SES quartile will enter college. This general situation holds irrespective of the achievement level of students.

In fact, students from the highest 20% achievement group but from the lowest SES quartile have a *lower* likelihood of entering college in the year after high school graduation than students in the next-to-lowest achievement group from families in the highest SES quartile.

The effect of income and other factors that comprise the socio-economic status of families is shown in Table 1. This table indicates the estimated number and percentages of 1965-66 high school graduates who will attend college, by SES, for the two achievement groups comprising the top 40 percent in high school academic achievement.

Table 1

Who Goes to College*
(5 yrs. after H.S.)

	<u>SES</u>	<u>No. H.S. Grad. in Group</u>	<u>No. Who Enter College</u>	<u>No. Not Entering College</u>
Achievement Group One; Top 20%	1. High	203,000	192,000 (95%)	11,000 (5%)
	2.	153,000	120,000 (79%)	33,000 (21%)
	3.	122,000	82,000 (67%)	40,000 (33%)
	4. Low	<u>60,000</u>	<u>30,000 (50%)</u>	<u>30,000 (50%)</u>
	Totals	- 538,000	424,000 (79%)	114,000 (21%)
Achievement Group Two; Next 20%	1. High	130,000	109,000 (84%)	21,000 (16%)
	2.	143,000	90,000 (63%)	53,000 (37%)
	3.	148,000	78,000 (52%)	70,000 (48%)
	4. Low	<u>94,000</u>	<u>34,000 (36%)</u>	<u>60,000 (64%)</u>
	Totals	- 515,000	311,000 (60%)	204,000 (40%)
GRAND TOTAL		1,053,000	735,000 (70%)	318,000 (30%)

For both achievement groups:

	<u>SES 1 (High)</u>	<u>SES 2</u>	<u>SES 3</u>	<u>SES 4 (Low)</u>
College	90%	71%	59%	42%
No college	10%	29%	41%	58%

* These calculations are based upon data from Project Talent. Enrollment figures are for degree credit enrollment.

It is clear that there is a significant loss of academically able students who do not enter college because of the SES of their families. Students in the lowest half of the SES distribution have a significantly lower prospect of entering college than their higher income counterparts of equal achievement. Also, they are less likely to place in the top 40 percent achievement group. About 60 percent of the students in this achievement group are from families in the top half of the SES distribution.

Once a high school student enters college, income and cultural deprivation are less important than before entrance to college. While SES does have some effect on the prospects of obtaining a degree within four years, the impact is not nearly as significant as the effect of SES on college entrance.

Socio-economic factors also have considerable influence on entrance to graduate or professional school. A college freshman from the highest 20 percent achievement group and top SES quartile has a 42 percent chance of going on to a graduate or professional school. But a freshman from the *same* high achievement group, but the lowest SES quartile, has only a 20 percent chance of entrance to a graduate or professional school.

The cumulative effect of SES is strikingly illustrated by the relative prospects of students from the same top 20% achievement group, but from the lowest and highest SES quartiles, entering graduate or professional school as viewed from the third year of high school. High school juniors in the highest SES quartile have *five* times the likelihood of entering graduate or professional school as their lower income counterparts. Most of this difference is accounted for by the effect of SES on college entrance of high school graduates.

Given the impact of SES on college attendance, it is not surprising to find that the college attendance rate for nonwhites of college-going age is less than half the rate for whites. It is surprising to note that the college attendance rate for nonwhite *high school graduates* is about 80 percent of the white rate, even though nonwhite high school seniors have family incomes much lower than white seniors. Furthermore, surveys indicate that a higher proportion of nonwhites than white seniors plan to enter college, indicating that nonwhites are strongly oriented toward college as a means of upward social mobility.

The Impact of Student Aid on College Attendance

While it is clear that the SES of high school graduates affects their prospects of entering and completing college, the relative importance of financial and motivational barriers to college enrollment is unknown.

An analysis of the factors affecting the demand for higher education was undertaken to provide some insights into this important question for this Report. While the precise estimates resulting from this analysis are subject to considerable error, the analysis indicates that college enrollment

is highly responsive to changes in cost to the student. It is estimated that a \$500 scholarship offered to all high school graduates in the lowest half of the income distribution would probably increase first-year enrollment for this group by 25 percent in two years. Moreover, the proportion of students from this group attending junior colleges would drop relative to the proportion attending four-year colleges.

There is some evidence that changes in the cost of college have a greater impact upon college attendance if these changes are made known to students early in their high school careers. If there was a fundamental change in the method of financing students' education, it is likely that the long range impact of this change would be to remove some of the barriers to college attendance which we identify as "motivational" in the short-run.

Adequacy of Federal Aid for Undergraduates

Federal aid for undergraduates has expanded tremendously since 1963. The Educational Opportunity Grant program, NDEA loan program, guaranteed loan program, and work-study program now provide some aid for one out of every four undergraduates, or about 1.25 million students. Nevertheless, despite an estimated \$300 million in undergraduate scholarships now provided by non-Federal sources, Federal aid for undergraduates is far from adequate to insure access to college for all persons capable of benefiting from a college education. The present level is not even adequate to meet the needs of those students who are eligible under the rather stringent need criteria currently used to allocate funds under the existing Federal "scholarship" program--educational opportunity grants.

Within the basic structure of existing programs, the current educational opportunity grant and work study programs contain these drawbacks:

1. The planned level of funding for FY 1970 (\$320 million) is too low to meet the demand by colleges for opportunity and work-study grants.
2. The maximum amount of the opportunity grant is too low (currently \$1,000). By 1970, average tuitions will have risen about 50% since the program was first enacted.
3. Schools are not allowed to transfer funds from the work-study program to the educational opportunity grants program. Limitations on the amount of opportunity grants place some needy students at a competitive disadvantage by forcing schools to give some students work-study funds when academic considerations would have led them to use opportunity grants if funds were available.

Moreover, these programs contain a more fundamental limitation which cannot be removed without changes in their structure--they do not dramatically and clearly indicate that the Federal Government has established a policy of

removing family income as a barrier to college attendance. Under existing programs a lower income student must first apply to a specific school in order to perhaps qualify for aid, yet we know that high school performance (and graduation rates) are affected by students' perceptions of college costs while they are still in the early grades of high school.

Furthermore, the two major Federal programs for student loans, the National Defense Student Loan Program (NDSLP) and the guaranteed student loan program (GLP) have the following disadvantages:

1. The sources of funds are too volatile to provide an adequate program. In tight budgets, the NDSLP suffers. With tight money markets, the GLP cannot ensure a smooth flow of funds.
2. The terms of repayment on the loans are too rigid. Restricting repayments to 10-15 years constitutes an important bias against educational investment.
3. The collection costs and delinquency rates of these programs are unnecessarily high. The delinquency rate exceeds 10 percent on the NDSLP primarily because of the mobility of former students. For both NDSLP and GLP, institutions are faced with small loans requiring frequent billing.
4. Students are treated unequally under the GLP. This program has been unsuccessful in providing funds to lower income students, Negro students, rural students from the midwestern States, and out-of-State students. In short, the program suffers from the lack of a broad Federal perspective.

Adequacy of Graduate Student Aid

Federal funds aided about 140,000 graduate students in FY 1968, through a combination of fellowships, traineeships, and research assistantships. This amounts to 40 percent of the estimated full-time graduate enrollment in the United States. Another 10 percent of all full-time graduate students are supported by non-Federal stipends. Thus, since graduate student aid is generally given on the basis of ability rather than need, in most fields it is unlikely that a significant number of very capable college graduates fail to enroll at the graduate level because of an inadequate level of graduate student support.

Nevertheless, the number of graduate fellowships needs to be expanded quite rapidly in the 1970's if the present proportion of graduate students supported is to be maintained, because full-time graduate enrollments are expected to grow at an annual rate of 6-7% and the recent slackening in Federal research support has reduced the proportion of graduate students supported by research assistantships.

Moreover, there are significant differences among fields in the extent of graduate student support. Very able students in some fields must teach to support themselves while relatively less capable graduate students in fields with more generous levels of Federal support can pursue their studies full time. For example, the proportion of graduate students with Federal fellowships is nearly twice as high in the physical sciences as the proportion in the Arts and Humanities.

THE INSTITUTIONAL FINANCIAL PICTURE

A recent report of the Association of American Universities asserts: "American higher education is experiencing critical and widespread financial pressures." This view is widely held by university administrators. What do the statistics tell us about the nature and extent of these financial pressures?

Recent Trends in Institutional Finances

The most recent comprehensive data on higher education finances are those made available for this study by the National Center for Educational Statistics. We have examined trends in institutional finances over the six-year period 1959-60 to 1965-66 (the most recent year available).

During this six-year period institutions of higher education absorbed an enrollment increase of more than 2 million students--an average annual increase of 8.6 percent. This fact alone has clearly exerted considerable "pressure" on those responsible for raising revenues for higher education. Moreover, because of two important characteristics of higher education finance it is necessary to increase revenues over time even faster than enrollment, just to "stand still." The first characteristic is the major importance of wages and salaries in the budgets of all institutions of higher education--wages and salaries make up about 60-70 percent of institutional costs. The second characteristic is the comparatively small increases in "productivity" per employee which have occurred in higher education compared with other sectors of the economy. There do not seem to have been any major technological breakthroughs in recent years which have permitted professors to increase their effectiveness in teaching large numbers of students. Given these two characteristics, income per student must rise over time if the salaries and wages paid to the faculty and other employees of institutions of higher education are to keep pace with salary increases in other sectors of the economy. Thus, if wages generally increased by 5% annually during the period in question, and other prices increased by about 2% per year, income per student enrolled in institutions of higher education would have had to increase by about 4% annually, otherwise there would have been some reduction in faculty and/or other institutional resources per student.

The statistics indicate that, in the aggregate, institutions of higher education managed to increase their revenues per student even faster than this. For all institutions, revenues per student increased at an average annual rate of 5.5 percent during the period 1959-60 to 1965-66.

There was a marked disparity in the rates of increase in revenues per student in public and private institutions, with public institutions' revenues per student increasing 4.0 percent annually while the comparable rate of increase for privates was 8.1 percent. Therefore, the income per student gap between private and public institutions widened. Revenues per student at both public universities and public colleges increased at half the annual rate of their private counterparts.

In both public and private institutions revenues per student from tuition and fees increased somewhat faster than total revenues per student. Thus, the proportion of total institutional revenue accounted for by student charges (tuition and fees plus revenue from auxiliary enterprises) increased slightly. In 1965-66, these revenue sources supplied about 38 percent of the total revenue of public institutions, and about half the revenue of private institutions.

Per student revenue from tuition and fees increased faster at private institutions than public institutions (9.1% vs. 7.4% per annum), resulting in a widening gap in total revenues per student. Non-tuition sources of revenue in private institutions also grew rapidly. In fact, revenues per student in private institutions would have grown at the same rate as public institutions, even if the privates had not raised tuition at all.

Thus, it is the *public* institutions, rather than their private counterparts, which have experienced a relative decline in revenue per student in the recent past. Although four-year private institutions' share of total enrollments in four-year institutions declined from 45 to 38 percent from 1959 to 1966, the fraction of the total income of four-year institutions accounted for by private four-year institutions hardly declined--it went from 45 to 44 percent. Further, the relative increase in private institutions' revenue per student was not due to an increase in the proportion of graduate students in private as opposed to public institutions. The ratio of graduate students to total students increased slightly faster at the public institutions.

Another important trend during this period was the increased reliance of all types of institutions on Federal funds, and the relative decrease in endowment earnings and private gifts and grants as revenue sources. By 1965-66, Federal funds accounted for 21 percent of the total revenue of institutions of higher education. Moreover, Federal funds (mainly for research) were a particularly important source of revenue for universities. Federal funds accounted for 32 percent of the revenue of private universities in 1965-66 and 23.6 percent of the revenue of their public counterparts.

Faculty Salaries and Faculty-Student Ratios

Faculty salaries have increased somewhat faster than wages and salaries generally in recent years. From 1958 to 1968 they increased at an average annual rate of 5.0 percent. Salaries at private and public institutions increased at almost the same rate.

In contrast, the faculty-student ratio in public institutions declined from 1956 to 1966, but private institutions managed to improve their faculty-student ratios. Furthermore, although the proportion of faculty with Ph.D.'s has generally increased, there was an overall slight decline in this ratio from 1963 to 1966 as undergraduate enrollments rose very rapidly. However, this decline in the proportion of faculty with Ph.D.'s was borne entirely by public institutions.

Thus, given the disparity in revenue growth per student between public and private institutions, public institutions were able to maintain salary differentials with private institutions only by reducing their faculty resources per student.

Trends in Capital Revenues and Expenditures

In the face of a two-thirds increase in enrollments from 1959-60 to 1965-66, annual additions to plant and equipment increased from \$1.3 billion to \$3.2 billion.

The Federal share of receipts for capital expansion and modernization increased significantly from 4.4 percent in 1959-60 to 16.7 percent in 1965-66, but higher education still relies mainly upon private and State sources for the bulk of its capital receipts. Further, it is important to note that the capital expansion of two-year institutions during this period (enrollments doubled) was financed almost entirely from non-Federal capital receipts and loans.

Due to their rapid growth it was necessary for institutions of higher education to rely heavily on debt financing. Consequently, the total capital debt of higher education increased four-fold during this six-year period to a level of about \$6.2 billion. However, the interest burden of this debt still amounts to less than 2-1/2 percent of current expenditures.

Private institutions increased the book value of their physical plant per student by almost 50 percent, as compared to an increase of 12 percent for public institutions. This comparison is noteworthy because it indicates that private institutions were affluent enough relative to their public counterparts to undertake a substantial modernization of their physical plant.

Why the "Crisis"?

The statistics just presented appear to reflect a state of financial health and vigor in higher education. In a period of rapid enrollment growth, higher education institutions have been able to increase their revenue per student, pay rising faculty salaries and substantially improve their plant and equipment. Moreover, the relative position of private institutions (in terms of revenue per student and faculty-student ratios) seems definitely to have improved. Then, why all this talk about a "financial crisis," especially in private institutions?

There are probably several reasons. First, the major private and public universities are heavily dependent upon Federal research expenditures as a revenue source, and it is likely that the recent decline in the growth of Federal research expenditures is a primary cause of their concern about a "financial crisis" in higher education. During the period 1959-1966, Federal research expenditures increased at an annual rate of 14 percent in the private universities and 16 percent in the public universities. By 1965-66, this revenue source accounted for about one-quarter of the revenue of universities. Thus, the stabilizing of the level of Federal research expenditures during the Vietnam period has certainly caused sharp dislocations at institutions heavily involved in research activities.

In contrast to the major universities, many small institutions have been in financial straits for some time. For example, the traditionally Negro colleges have always been in dire financial need. By any financial measurement, these institutions fall below regional and national averages. One important factor in explaining their relative financial condition is their small size. About two-thirds of the South's traditionally Negro institutions enroll fewer than 1,000 students. A more important factor is the relatively small proportion of their income derived from tuition and fees, endowment earnings, and alumni giving. Since Negro students are generally poorer than whites, and their alumni are not as affluent, these institutions cannot improve their relative position unless they receive disproportionate support from Federal or State sources.

Outlook for the Future

Many observers who are impressed with the recent ability of higher education to increase its financial resources are nevertheless apprehensive about the future. They do not believe that revenues from non-Federal sources will continue to rise at the rates of the recent past. To replace non-Federal sources of support, they conclude that the rate of increase of Federal spending for higher education must be sharply accelerated.

First, it should be noted that the pressure on higher education to increase total revenues may slacken slightly in the future for two reasons.

(1) The rate of increase in enrollments is likely to slacken for demographic reasons. If greater efforts are made to promote equality of educational opportunity, it is anticipated that full-time equivalent enrollments will increase about 5-1/2% annually between 1966 and 1976 as compared to an annual rate of 8-1/2 percent for 1959 to 1966. (2) The rapid expansion in new doctorates awarded will provide an increase in the supply of potential faculty members in the early 1970's. Since faculty salaries are highly responsive to supply and demand conditions, this will probably reduce the upward pressure on salaries somewhat.

These trends imply that improvements in institutional resources per student can be accomplished with an annual rate of growth in *total* institutional revenue which need not match the comparable rate for 1959 to 1966 of 14% annually. An annual increase in total revenues of 11% seems more reasonable over the next decade.

The rapidity with which non-Federal sources will increase in the future is of course highly problematical. There is no obvious reason to assume that tuition will not respond as it has in the past. Several studies have shown that students and their families are willing to spend a higher proportion of their income on education as their incomes rise. Therefore, it can be anticipated that the growth in family incomes will continue to provide for a rapid rise in consumer spending on higher education.

Projections of State and local expenditures on higher education are even more uncertain. Some observers maintain that State expenditures for higher education will be diverted to other social needs, e.g., the cities. While there is certainly some merit to this argument, it should also be pointed out that the large and politically powerful middle class who are the primary beneficiaries of State subsidized low-tuition colleges and universities will continue to exert pressure for rapid increases in State expenditures for these institutions. As a result, there is no clear reason to expect a reversal of the long-term trend toward a rise in State expenditures. In fact, the most recent information on year-to-year changes in State expenditures for higher education indicates an increase of 23% from 1965 to 1966. This compares with an average annual rise of 14% from 1959 to 1966.

Summary

Thus, while it is not obvious that an *acceleration* in Federal funding for institutions of higher education is required in the near future to offset reductions in the rate of growth of other revenue sources, the role of the Federal Government as a major source of institutional revenue does necessitate that Federal funding for higher education rise at a healthy rate.

If the projected increases in enrollments occur, and if current expenditures per student continue to increase at a rate of 5-1/2 percent annually, total higher education expenditures will rise from \$15.8 billion in 1966 to about \$40 billion in 1976. A 12 percent annual increase in Federal expenditures for higher education would imply a rise in the Federal share of institutional expenditures. The Federal share would increase from 21% to 25%, or from \$3.4 billion in 1966 to \$10 billion in 1976. This latter figure not only includes the increase in Federal expenditures necessary to finance the expected increase in enrollments, but also the institutional aid required to finance an increase of one-half million in enrollments by those now denied educational opportunities.

IV. SPECIAL PROBLEMS OF GRADUATE EDUCATION

Graduate education is the culmination of the formal process of preparing individuals for teaching and for research and technical endeavor at the frontier of expanding knowledge and technological innovation. The graduate schools of the U.S. encompass a predominant portion of the intellectual forces that can assure the Nation of continuing capability to advance know-

ledge, to extend the base for technological progress, to influence the social, cultural, and economic quality of national life, and to exert intelligent and effective leadership in world affairs. Since the benefits from the acquisition of new knowledge accrue to all members of society, regardless of the State they live in, it is desirable that the Federal Government finance a much larger share of the costs of graduate education than it does any other major sector of our educational system. For this reason Federal policy, especially in recent years, has recognized the need for a "special relationship" with graduate education and research

While the Federal Government now has a broad array of legislative authority allowing it to aid this sector of the higher education system in a variety of ways, the project method of support has been the primary mechanism for financing advances in human knowledge. This method of support is designed to assure that the most gifted and qualified individuals receive support. Since most significant advances in knowledge are made by a few gifted persons, the project method of support has been a key element in the advance of American science during the past two decades.

Nevertheless, some problems may have resulted from the necessarily unbalanced pattern of support for graduate education and research. These imbalances include:

1) An imbalance in administrative and institutional arrangements

Research projects are a major source of funds for recruitment of faculty and even support of graduate students, yet they do not necessarily fit into the administrative arrangements needed for the coherent administration of a university. Since a researcher's reputation in his discipline is the main determinant of his capacity to obtain project grants, his concern for his discipline, though appropriate in itself, may expand to the point where there is little room left for loyalty to an institution.

Since professors often find that good research is rewarded with large grants and higher salaries and status, and that good teaching is not rewarded at all, it is not surprising that there are widespread complaints that teaching has suffered in comparison with research.

Furthermore, the screening of research proposals in a centralized way may mean that research support tends to favor established scientists unduly. Excellent proposals by young scholars without national reputations, might be more likely to get support if scientists could apply for more support at the university level.

2) An imbalance in the relationship among fields of study

Federal research funds for the sciences exceed by far support for nonscience fields. The humanities and social sciences no doubt sometimes benefit from Federal aid to science. Such aid may, for example, release institutional funds for non-scientific fields, or be transferred to fields for which it was not intended. But the disproportionate support for science also increases the relative attractiveness of specialization in science, and may thus "raid" humane and social science disciplines of capable people, while adding less productive scholars to the sciences. Moreover, there is evidence that some institutions use discretionary funds to "overmatch" Federal support for the sciences so that they can develop at least one first-rate graduate department. This type of behavior obviously drains non-scientific fields of support they would otherwise have.

3) An imbalance in institutional patterns

Federal research and development funds are highly concentrated in a relatively few excellent universities. In 1966, about 89 percent of total science research and development funds were concentrated in 100 universities, and 30 percent of these funds were distributed to just 10 institutions.

This system of giving aid for research to the leading scientists has certainly strengthened the outstanding institutions *vis-a-vis* those of lesser rank. This is generally desirable since these centers of excellence are national assets. But when excellence is concentrated in relatively few institutions, certain regions and centers of population may lack the centers of graduate education and research required to upgrade their social, cultural, and economic development.

There is accordingly a belief that a limited number of "second rank" universities should be strengthened through development programs.

V. MAJOR ISSUES AND ALTERNATIVES

STUDENT AID VERSUS INSTITUTIONAL AID

One major issue to be resolved is the *relative emphasis* which should be given to student aid and institutional aid in designing Federal programs for higher education in the future. The Federal Government could put major emphasis on aid to students and their families to enable them to pay the cost of going to college--whether through scholarships, loans, or tax devices. Alternatively, the Federal Government could put major emphasis on aiding institutions of higher education directly--whether through categorical programs to finance specific types of expenditures or through general block grants.

Most observers are agreed that there is a need for both types of aid. No one is suggesting that the Federal Government limit itself only to student aid or only to institutional aid. Nevertheless, major emphasis could be put on one or the other kind of aid in the future, and it is useful to look carefully at the advantages and disadvantages of each.

The choice between emphasis on student aid and emphasis on institutional aid depends partly on the weight given to different objectives for higher education. Student aid is most appropriate if a high weight is given to the objective of improving equality of opportunity for higher education. Aid to students can be pinpointed at those students from low-income families who need financial aid to attend college. While student aid alone will not correct the problem of inequality of opportunity, studies indicate that college-going among the poor is significantly influenced by the amount of student aid. A major program of student aid would of course aid some low-income students who would have gone to college anyway, but it would also significantly increase the number and proportion of low-income students getting a higher education.

An equal sum spent on institutional aid, by contrast, would have far less effect on equality of opportunity. It is true that institutional aid helps colleges and universities meet their expenses, and therefore tends, other things being equal, to ease the pressure on institutions to raise tuition. Lower tuition encourages college-going in general. However, most of the higher income students receiving indirect Federal subsidies in the form of lower tuition would attend college without the subsidy. In fact, since higher income students tend to be relatively insensitive to tuition charges in determining whether or not to attend college, the lower tuitions would result mainly in subsidies to higher income students who would be willing to pay more while giving a relatively weak incentive to lower income students.

If one is concerned that the quality of higher education is suffering because not enough resources per student are available to institutions, then direct institutional aid is the most effective way to alter the situation. Student aid channels more resources to institutions only indirectly if it enables them to raise tuition more than they otherwise would have.

The choice between emphasis on student aid and emphasis on institutional aid also depends in part on one's basic philosophy about higher education finance for the long-term future. Those who believe that we should be moving toward free higher education for all (just as we have free elementary and secondary education) might favor increased Federal institutional aid as a step in this direction. Those who believe that the beneficiaries of higher education should continue to bear part of the cost through tuition would tend to favor emphasis on student aid. In general, aid to students tends to encourage rather than substitute for non-Federal sources of funds for higher education (tuition and State and local contributions).

To sum up this discussion, in general: (1) Student aid is a more effective mechanism for promoting equality of educational opportunity; (2) Institutional aid is a more effective mechanism of channeling additional resources per student into the higher education sector of the economy.

ALTERNATIVE FORMS OF STUDENT AID

Student aid can be extended in a variety of forms. It can include grants or scholarships based on need or achievement or both; work-study grants, loans with various types of repayment provisions; and tax credits or other tax advantages for the student or his family. The relative merits and drawbacks of these various forms of student aid are discussed in this section.

Scholarships

Grants or scholarships may be awarded on the basis of need, achievement or some combination of both criteria. When ability or achievement is the sole basis for scholarship awards, subsidies are given to many students who can afford to attend the school of their choice without the subsidy. If the primary objective of the aid is to overcome financial barriers to college attendance by students from low-income families, basing the scholarship on need is a more efficient way of accomplishing the objective, since the aid can then be pinpointed at those who actually need the funds in order to go to college.

Federal scholarship programs can generally use one of two alternative forms of need criteria. The first type, used in the existing opportunity grant program, bases the amount of the award upon the financial status of the student *and* the cost of education at the specific school he attends. The amount of the award under the second type of need criterion is based exclusively upon the student's financial status. An advantage of the first criterion is that low-income students are not given more funds than they need to attend a particular institution. However, the amount of scholarship aid the student may receive is unknown to the student until he is accepted at a college. This uncertainty can prevent the student from even applying to high cost institutions. In contrast, scholarships awarded exclusively on the basis of need overcome the disadvantage of uncertainty, but some lower income students may be given more subsidy than they require to attend low cost institutions.

Work-Study Programs

Work-study programs are an alternative form of aid to students. In comparison to scholarship grants, these programs require the recipient to perform some on-campus or off-campus job in order to receive financial aid. In some ways, this program may not really be a subsidy to the work-study student at all, but rather a general subsidy to the employing organization. If the work-study student would have gotten a job anyway, at the same wage, he is not aided by the program at all. Instead the program would be providing Federal funds for the benefit of all students, because it replaces institutional funds which the institution would have spent to provide necessary services. On the other hand, if jobs would not have been available anyway, or if students receive a higher wage than without

the work-study program, or if special weight is to be attached to the learning experience of the job, then work-study programs may be of considerable benefit to the recipient student. Against these factors, however, must be weighed the possibility of poor academic performance because of time lost from studying.

Loans

Since investment in higher education requires a large outlay of funds and the gains, in terms of higher income, are not recoverable until many years in the future, a loan market is necessary to provide the required funds. A loan for education, however, is different from a loan for the purchase of a physical asset because the borrower cannot offer his future earnings as security on the loan. Unlike houses and cars, people cannot be mortgaged. Lenders will compensate for the lack of collateral on education loans by charging a higher interest rate or by not making the loan. Consequently, there will not be enough borrowing for higher education because borrowers will have to meet a stringent repayment test (higher interest rate).

Moreover, since lenders are willing to make some no-collateral educational loans to good risks or accept physical assets as security, the loan market will tend to exclude children from low-income families. These families do not have sizeable tangible assets to offer as security and lenders are likely to consider low-income borrowers poor risks.

The special nature of education loans, therefore, creates a need for the Government to correct the loan market for biases against investment in higher education. To some extent, the Federal Government has done this through the guaranteed loan program. But a guarantee is not enough for many low-income students who might be willing to borrow. Commercial banks will generally ration their credit by financing their regular and best customers, so the loan market bias against education loans to low-income students is likely to persist despite the guarantee.

The NDEA loan program does overcome this difficulty by giving loan funds directly to institutions of higher education, and insisting that need be a major criterion for extending the loan. However, this program is limited in size because it requires substantial annual appropriations by the Congress. Thus, there is a requirement for a loan program which relies upon private capital markets for funds and assures access to low-income students.

Contingent Loan Repayment Plans

Although investment in higher education yields high average increases in lifetime earnings, there is a great deal of variation in these expected additional increases. This variation in the anticipated gains from higher education will discourage some borrowers from borrowing to finance part of the cost of their education. These individuals would be more willing to borrow for higher education purposes if they could purchase insurance that reduced the risk of borrowing associated with the possibility of earning lower than average earnings.

Contingent loan plans provide a form of insurance against low earnings prospects and this insurance or risk-pooling feature is the main advantage of contingent loan plans. The *Educational Opportunity Bank (Zacharias Plan)* is an example of a contingent loan plan. Under this alternative, students would borrow funds for their college expenses and the Bank would recoup these loans through annual payments based upon a fixed percentage of the borrower's income. For example, the borrower might pledge to repay 1% of his gross income over 30 years for each \$3,000 borrowed.

In addition to the pooling feature, contingent loan plans offer another advantage over existing loan programs—the long repayment period facilitates the borrowing of large sums without imposing burdensome annual repayments. However, more conventional types of loan programs could be designed to lend funds for longer periods.

In contrast to more conventional loan plans, the many technical problems inherent in contingent loan plans offset their risk-pooling advantage at this time. These technical problems include the difficulty of estimating the terms of repayment necessary to enable the plan to operate at a pre-determined level of subsidy, and the heavy subsidies which may be required if the Bank attracts a disproportionate share of borrowers whose future income will be low.

Tax Credits

Two types of tax-credit plans, one presented in a bill by Senator Ribicoff and another presented by Senator Prouty, have received considerable discussion as aids to financing post-secondary education. Both proposals would make it possible for students to claim a tax credit based upon the cost of tuition and books, an important part of the expenses of most college students and especially so of students from low-income families. The major benefit under both plans would go to students who attend private four-year colleges. Under the Ribicoff plan the credit is against tax. Under the Prouty proposal a refund would be authorized if the credit was larger than the tax. However, because both proposals would reduce allowable deductions by the amount of other aid received, the children of poor parents who already receive scholarship aid would scarcely benefit from these proposals.

In general, the payment of tax credits to families with students in college would provide substantial subsidies to upper and middle income students. For instance, more than one-half of the tax credits under the Ribicoff plan would go to families with incomes in the highest income quartile.

Moreover, under any of the tax credit plans proposed, there would be little impact on the college attendance of any group. The aid given any income group would be small in relation to total income and the most aid would go to higher income students, whose college enrollment is not particularly sensitive to changes in costs.

Therefore, when compared with scholarship or subsidized loan plans, tax credits to families are an inefficient policy instrument for furthering higher education objectives.

ALTERNATIVE FORMS OF INSTITUTIONAL AID

Institutional aid may also take different forms. The major alternatives are: 1) formula grants; 2) categorical aid for buildings, equipment, and similar items; and 3) cost-of-education allowances tied to student aid. The relative merits and drawbacks of these forms of aid are discussed in this section.

Formula Grants

All formula grants proposed involve a formula which allots each school a sum of money based on some measure of performance or institutional inputs. Formulas have been proposed which allot funds based on research contracts landed, degrees granted, number of enrollees, current expenditures, etc.

The allocation of \$1 billion under two representative formulas is shown in Table 2. This Table illustrates two important features of formula grants. First, formulas based upon some measure of expenditures, when contrasted with formulas geared to enrollment, generally tend to favor institutions with relatively high expenditures per student (e.g. private universities). This is true even when a formula tied to enrollments gives graduate enrollments three times the weight of undergraduate enrollments, and two-year enrollments are assigned lesser weight than undergraduate enrollments. Also, by combining measures of expenditures and enrollments, it is possible to devise a variety of formulas which provide some degree of compromise between giving disproportionate aid to institutions with high expenditures per student or disproportionate aid to institutions with relatively low expenditures per student.

Proponents of formula aid have spent considerable time searching for a formula which spreads aid most "equitably" over existing institutions. The agency in charge of formula writing will probably conclude that a formula is a good device if it does not lead to a relative decline in the importance of any class of institutions. Consequently, one of the disadvantages of institutional aid by formula is that it discourages innovation and encourages the status quo. Clearly a system which tries to maintain the relative shares of different types of institutions will not be particularly adaptable to the changing needs of students and society in general.

Another drawback of aid by formula is that the formula gives rewards based upon a necessarily oversimplified measure of institutional outputs or inputs. Depending upon the measures adopted, the formula tends to encourage institutions to increase the rewarded measures of output or input. For example, subsidies based on degrees might encourage some institutions to crank out more degrees than they otherwise felt appropriate, while formulas based upon enrollments produce different pressures. For a formula to overcome this drawback, it would have to use some measure of the output of institutions which is a reasonably accurate index of the total benefits to society from higher education. With our present knowledge, no formula can be devised to fully satisfy this requirement.

Table 2.

AID BASED ON FEDERAL PROGRAM COSTING \$1 BILLION

(Estimated for 1969-1970)

Formula	ALL PUBLIC INSTITUTIONS		PUBLIC INSTITUTIONS					
	Amount of Aid (Mil.)	Aid/Budget (%)	Universities		Other 4-Year		2-Year	
			Amount of Aid (Mil.)	Aid/Budget (%)	Amount of Aid (Mil.)	Aid/Budget (%)	Amount of Aid (Mil.)	Aid/Budget (%)
Aid based on Expenditures ¹	595	8.1	352	8.1	162	8.1	81	8.1
Aid based on full-time Equivalent Enrollment ²	654	8.8	332	7.4	225	11.1	97	10.2

Formula	ALL PRIVATE INSTITUTIONS		PRIVATE INSTITUTIONS					
	Amount of Aid (Mil.)	Aid/Budget (%)	Universities		Other 4-Year		2-Year	
			Amount of Aid (Mil.)	Aid/Budget (%)	Amount of Aid (Mil.)	Aid/Budget (%)	Amount of Aid (Mil.)	Aid/Budget (%)
Aid based on Expenditures ¹	405	8.1	174	8.1	213	8.1	18	8.1
Aid based on full-time Equivalent Enrollment ²	346	7.1	140	6.5	193	7.8	13	6.7

¹ Educational and General less Organized Research.² Formula: $X = \$159$ per studenta. Undergraduate at 4-year college = X times F.T.F.b. Graduate at 4-year college = $3X$ times F.T.F.c. Student at 2-year college = $2/3X$ times F.T.F.

Moreover, the political necessity for a formula which does not discriminate against any class of institutions indicates another problem with formula grants. The aid cannot be targeted at particular schools to improve their relative position. For instance, general formula aid will not help developing institutions.

On the other hand, formula aid is an administratively effective mechanism for giving colleges and universities large sums of money. Further, the absence of discretion by the responsible Federal agency would undoubtedly enhance institutional autonomy and freedom and allow institutions maximum discretion in how to spend their revenues (except that their choices, as indicated above, may be distorted by the reward structure of the formula).

An additional advantage of formula aid, as opposed to categorical aid for facilities or equipment, is that aid by formula may be less subject to sharp reductions in funding during periods of fiscal stringency.

Categorical Aid

Today, the Federal Government has a sizeable list of programs which give aid to institutions so that they can purchase particular items (e.g. books, equipment, computers, dormitories, classrooms, networks for knowledge). These categorical aid programs should be distinguished from categorical aid programs related to *broad purposes*, such as the OE developing institutions program or the NSF institutional grants program.

One disadvantage of categorical aid tied to a particular type of institutional input (e.g. computers) is it gives institutions an incentive to purchase more of that item than they would have purchased if the aid were given in a more fungible form (e.g. formula grants). Federal aid for construction, for example, may induce some overspending on buildings or reduce incentives to use buildings more efficiently. It may distort institutional spending patterns away from what the institution itself would regard as optimum if given the funds to spend freely.

To the extent that there is no overspending (i.e., categorical aid tied to the purchase of particular items is spent on items which would have been purchased anyway) categorical aid is simply an administratively costly method of dispensing fungible institutional aid.

A further drawback of categorical aid programs tied to facilities and other institutional items is that they are often cut back sharply during periods of fiscal stringency.

Some proponents of categorical aid tied to physical items have argued that this form of aid is advantageous because Federal administrators can channel the aid to expanding institutions. If this is the program objective, however, cost-of-education allowances tied to Federal student aid or formula aid related to increases in enrollments would accomplish the same objective without the distortions caused by categorical aid related to particular items.

A major advantage of aid tied to particular categories of expenditures is its political acceptability by the Congress. Since this is a considerable advantage, some of the drawbacks of this type of institutional aid could be lessened through efforts to consolidate categorical aid programs tied to particular items and to broaden the definition of the categories (e.g. facilities rather than dormitories, library purposes rather than books, and equipment rather than computers).

Cost-of-Education Allowance

A cost-of-education allowance is the sum of money paid to an institution to help pay the cost of educating a student receiving Federal student aid. For example, the National Defense Education Act graduate fellowships are accompanied by a cost-of-education allowance payable to the institution in which the graduate fellow is enrolled.

This form of institutional aid has many of the same advantages of formula grants. It is easy to administer and institutions can use the aid for whatever purposes they deem appropriate.

Cost-of-education allowances are generally intended to reimburse institutions for the *additional* cost they incur in helping to further some national purpose. Part of the rationale for graduate fellowships has been the national interest in increasing the number of very highly educated people, especially scientists and potential college teachers. Graduate fellowships help to induce highly talented people to continue their education, but the cost of providing graduate education far exceeds the tuition charged by the institution to the graduate student. The cost-of-education allowance helps to compensate the institution for the additional cost of taking on the education of the fellowship holder. Similarly, since equality of educational opportunity is a national goal and society generally benefits from its attainment, one could argue that the taxpayers in a particular State should not bear the burden of the additional costs public institutions absorb when they educate students who would not enroll without Federal student aid.

If cost-of-education allowances are set high enough they can serve as an incentive for institutions to fulfill national objectives by enrolling highly qualified graduate students or needy undergraduate students.

The fact that cost-of-education allowances reward institutions for accomplishing broad national purposes can have political drawbacks because some institutions are better suited to achieve these purposes than others. Institutions with first rank graduate schools benefit disproportionately from graduate cost-of-education allowances. In similar fashion, if cost-of-education allowances were tied to Federal scholarships awarded on the basis of family income limitations, a disproportionate amount of aid would go to public institutions. About two out of every three students with family incomes in the lower half of the income distribution are enrolled in public institutions. Further, statistical analysis indicates that public institutions might absorb an even greater share of a rise in enrollments due to expanded Federal student

aid to lower income students. From the point of view of private institutions, however, expanded student aid makes it easier for them to raise tuitions, and this aid also releases institutional funds now used to provide assistance to lower income students.

VI. PRIORITIES AND RECOMMENDATIONS

Federal aid to higher education in the future should emphasize two major national commitments:

- it should promote *equality of opportunity* by ensuring that all students with ability can pay for higher education and that institutions are ready to receive them.
- it should strengthen *graduate education and research* by providing support for graduate students and developing institutional capacity for graduate teaching and research at a limited (but not too limited) number of centers of excellence.

Higher education has always been an important avenue to the economic, intellectual and social advancement of individuals. Further, providing equality of educational opportunity is a primary means of advancing, strengthening, and preserving our democratic society. Since the benefits to society from the promotion of equality of educational opportunity transcend State boundaries, and because concentrations of low-income students are found in States with low fiscal capacity, State support of higher education has been insufficient to attain equal opportunity. Moreover, the traditional mode of State subsidy--low tuitions for all--does not efficiently pinpoint aid on those who need it most. Consequently, unless the Federal Government pursues a strategy for financing higher education which gives a high priority to this objective, large numbers of capable young people will not receive the higher education they would have obtained had they come from families of higher socio-economic status. The loss to the Nation will not only be the lost productivity of able student dropouts and the reduced morale of youngsters who know they have not been given an equal opportunity, but also foregoing of the single most effective way to reduce the present disparities in income among ethnic and geographic groups. *Thus, the Federal Government should adopt as its explicit long-range goal the removal of financial barriers so that four years of post-secondary education is guaranteed to all persons capable of benefiting from it.*

The case for Federal support of research and graduate education is also compelling. Since the ultimate benefits of basic research accrue to the entire society, local and State governments, or businesses, cannot be expected to provide a sufficient level of support, and the Federal Government must play a dominant role. The Federal Government must also support many types of applied research and development because they are related to

defense, health, education, and other public problems. Thus, since research and graduate education are complementary activities, private institutions and State and local governments cannot be expected to provide sufficient support for graduate education. Moreover, the professionals trained by the graduate schools are highly mobile, and often leave the State in which they received their graduate education. Since States and particular institutions are subject to this "brain drain," and the Federal Government is not, Federal support of graduate research and training is appropriate.

Recommendations

1. An expanded educational opportunity grant program for needy students combined with a cost-of-education allowance

This proposal would amend HEA Title IV-A, the Educational Opportunity Grant Program, to provide for a broader program of assistance to needy students combined with institutional aid in the form of a cost-of-education allowance.

All needy full-time students in good standing would receive a Federal grant ranging from \$200 to \$1,500. The size of the grant would be based solely on family income. Students would be eligible for a maximum of four academic years, unless they are enrolled in a degree program which normally requires more than four academic years for a baccalaureate degree. Students may attend any post-secondary educational institution as defined in the Higher Education Amendments of 1968.

In order to receive a grant, the student would file the necessary forms with the appropriate public or private nonprofit agencies designated by the Commissioner of Education. These agencies would then estimate the size of the award and notify the student. The student during his senior year in the normal admissions process would choose an institution to attend. The institution would then bill the Office of Education for the student's opportunity grant. The Commissioner would dispense the award through that institution.

The cost-of-education allowance would be 35 percent of all individual Federal grants. The institution's allotment for each term would be based upon the total amount of Federal grants received by its students during that term. No proprietary institution would be eligible for a cost-of-education allowance.

Since the added cost of education per student and the number of students induced to enroll because of the Federal grant can only be estimated roughly, the recommended amount of institutional aid represents an informed guess as to the amount required to ease the financial burden imposed upon institutions by the expanded Federal opportunity grant program.

If this program became operational in FY 1972, its total cost for that year would be about \$2.7 billion. Approximately \$2.0 billion would be given to students and \$700 million to institutions. By FY 1976, the total cost of the opportunity grant aid would rise to \$3.1 billion and the institutional aid would amount to about \$1.1 billion. These cost estimates assume a 20 percent liberalization of benefits by FY 1976.

In FY 1972, about one-half of the estimated number of students enrolled full-time, or 2.4 million students, would be aided by this grant program. The full impact of this program on enrollments will not occur until it is operational for several years, because a major effect will be upon the aspirations, expectations, and performance of students in the tenth and earlier grades at the time the program is enacted. By FY 1976, the grant program could induce a 800,000 rise in full-time enrollment above the 5.9 million anticipated. However, some decline in part-time enrollment would be expected as many students will shift to full-time attendance.

2. The National Student Loan Bank (NSLB)

To remedy the deficiencies in the present Federal programs for student loans the NSLB is proposed. The NSLB would be a *non-profit private corporation* established by the U. S. Government. The NSLB would issue its own securities to raise capital for student loans and would make loans at fixed interest rates. It would replace the guaranteed loan program. The NSLB would have the following features:

- a) The Bank would provide up to \$2,000 per year to any eligible undergraduate student and \$3,000 per year to any eligible graduate student (or medical, dental, etc.). Maximum indebtedness for any student would be \$15,000. Eligibility would be based solely on enrollment in an institution of higher education.
- b) Interest during enrollment would be paid by the Federal Government. Repayment rates would be set in such a way that there would be no subsidy during the repayment period.
- c) The NSLB would contract with educational or financial institutions to dispense forms, provide guidance and counseling, "package programs," and act as Federal agents in the initiation of loans. Institutions would be reimbursed for all administrative expenses incurred.
- d) Federal loans might be repayable through the Internal Revenue System. Even without this feature the NSLB would have relatively favorable collection costs when compared to banks under the present guaranteed loan program.

e) The NSLB would devise methods of repayment that allow for various terms extending up to 30 years. Provision would be made for rising repayments over time (in keeping with income) or constant annual payment, at the option of the borrower.

f) Loan cancellations would be made for death, disability, or bankruptcy, as at present. In addition, a feature might be added which would allow for a limited form of pooling or mutualization of risk. For any year in which a borrower's income falls below certain specified levels, an increasing portion of the loan payment for that year would be cancelled. This feature could be designed to affect 5-10% of the borrowers.

3. The new programs of special services for disadvantaged students should be fully funded.

This would expand funding for *Talent Search*, *Upward Bound*, and the new program of special services for students in college.

4. The flexible programs of institutional development grants, administered by the National Science Foundation, the National Institutes of Health, and the Office of Education should be extended to the National Foundation for the Arts and the Humanities, and each of these programs should be funded at a substantial level.

These programs should emphasize the development of new centers of excellence and new areas of study, taking cognizance of the needs of States and metropolitan areas that are not now adequately served by graduate programs.

5. The cost-of-education allowances for Federal graduate fellowships should be raised to \$5,000.

Today, the cost-of-education allowances attached to Federal fellowships are much less than the actual cost of graduate education. This change would increase the funds available to support graduate education in institutions carrying the burden of educating federally financed students. Further, it is suggested that this figure be reviewed periodically so that it can be adjusted upwards as the cost of graduate education rises.

6. NDEA graduate fellowships should be expanded to support 30,000 students by 1975

Such a program, which would triple the present number of students supported, would still represent Federal support

of only 10 percent of the estimated full-time graduate student body in 1975.

The imbalance between the sciences and humanities, and in the relationship between teaching and research, could be ameliorated by expanding NDEA fellowships, especially in non-scientific fields, and free many students from the need to be research and teaching assistants.

7. A "sustaining grant" equal to a percentage of Federal research awards should be given to institutions of higher education.

Institutions could use these funds to support research of *their* choosing, or for teaching purposes. The amount of money a university received in this way would be determined primarily by the level of research support rendered on the basis of quality competition. Consequently, centers of excellence would continue to receive strong Federal support.

Institutions should be encouraged to use a portion of these funds to provide support for young investigators not yet well enough recognized to compete successfully for individual project grants.

8. Over the next several years categorical aid programs related to specific items should be consolidated whenever possible and the definition of categories should be broadened.

Specifically, a broadened categorical program or block grant program is recommended which would provide funds to institutions for any or all of the following purposes:

- Construction, renovation, and rental of any type of facility.
- Establishment and improvement of library resources.
- Acquisition of instructional equipment.
- Funds for planning and evaluation of the functions and operations of the institution.

This program should have a liberal Federal share of at least 50%, an adequate maintenance of effort provision, and should replace a series of existing categorical programs in the Office of Education, National Science Foundation, and HUD.

*should be
based on plan*

*probability of 10%
- 10% of
total of
grant program
million
overhead
for writing, this
= 10% of total
quality of
total grant
is living
- not high
priority
- To make
sense, and
have to be
\$50 million
50%
Total income
be 0.12
not
175 million*

9. The Developing Institutions Program (Title III--Higher Education Act of 1965) should be fully funded in FY 1970 and beyond.

The \$70 million authorized for FY 1970 would provide for more than a doubling of Federal aid to developing institutions. Together with some limitations on the number of institutions served by this program, this increase in funding would give developing institutions about \$200 per enrollee.

10. A new project-grant program to support experiments to improve the quality of undergraduate teaching and to devise new instructional programs should be established in the Office of Education.

Funds could be sought for any program or project which, in the judgment of the institution, gives reasonable assurance of substantial improvement in the quality of undergraduate teaching. Applications would be reviewed at the Federal level by panels of nationally-recognized leaders in the field of undergraduate teaching and appropriately selected student representatives.

The funding implications of these recommendations are indicated in Table 3. By FY 1976, these recommendations *alone* imply an increase in Federal funding of \$5.8 billion.

These recommendations will certainly not by themselves meet or fulfill all of the objectives of a Federal strategy for financing higher education. But together with *fuller funding for other high priority existing Federal programs*, these priority items would provide progress toward all of these objectives, while dramatically improving equality of opportunity for higher education.

In the concluding section, the relationship between these objectives and the recommendations is reviewed.

Table 3.

Estimated Increase in Federal Funding to FY 1976 to
Implement Recommended Programs
 (in millions)

<u>Program</u>	<u>Funding Increase</u>
Grants to Students	\$2,935
Cost-of-Education Allowance (Undergraduate)	1,085
Student Loan Program	300
Developing Institutions	125
Special Services for Disadvantaged	100
Institutional Development Grants	300
Expanded NDEA Fellowships and Cost-of-Education Allowances	475
Sustaining Grants.....	430
Project Grants for Teaching Innovations	<u>50</u>
TOTAL	\$5.8 billion

1. Increasing Equality of Opportunity for Higher Education

The proposed expanded opportunity grant program and National Student Loan Bank would, in conjunction with other Federal, State, and institutional programs, remove financial barriers to education for capable students. Further, the cost-of-education allowance will provide some incentive for institutions to accept disadvantaged students, while the expanded program of special services will inform high school students about the availability of student aid, help prepare them for college, and promote new efforts by colleges to provide the additional educational services required by some of these students.

2. Improving the Quality of Higher Education

The various high priority programs for institutional support would provide a significant amount of *new* financial assistance to institutions of higher education. If the recommended program were adopted, about \$2.5 billion in *new* funds might be made available to institutions by 1976.

In addition to this direct aid, the new Federal scholarship and loan programs would facilitate increases in revenues from student charges. Moreover, our studies indicate the single most important determinant of institutional quality (by any output measure) is the quality of the student body. The student aid program would enable more able students to attend institutions of higher education and would therefore improve the quality of their student bodies by providing somewhat more competition for a limited (but expanding) number of spaces.

3. Increasing the Number and Proportion of Educated People

The expanded scholarship, loan, and fellowship programs will stimulate enrollments at all levels, while the additional institutional aid will help finance this expansion.

4. Preserving Diversity in Higher Education and Advancing Institutional Autonomy and Academic Freedom

The recommended program promotes this objective in four significant ways:

- (a) it provides institutional assistance that can be used for any purpose and recommends that institutions be given more autonomy with respect to how they can spend funds provided through categorical aid programs;
- (b) the block grants for research support would give institutions more fiscal flexibility and thus promote autonomy;

- (c) the expanded student aid and cost-of-education allowances will help maintain diversity by enabling private colleges to continue to increase revenue from tuition without excluding middle and low-income students.
- (d) the emphasis on student aid will increase the prospects that State and local governments and students and their families will continue to provide a major portion of the financial support for higher education. A continuance of this arrangement will ensure that no single source of aid (e.g. the Federal Government) will predominate.

5. Strengthening Graduate Education and Institutional Research and the Public Service Capabilities of Higher Education Institutions

Together with a continued *expansion* of research support, the recommended additions would help to correct some of the imbalances caused by the project grant method. Further, the greatly expanded cost-of-education allowances and institutional development grants will provide flexible funds to improve graduate education.

While this Report has not dealt with qualitative questions concerning which specific fields of graduate education, or what types of public service programs should receive additional support, these additional funds will give graduate institutions some additional flexibility so that they can determine how *they* can best respond to changing developments in our society.

6. Encouraging the Efficient Use of Resources in Higher Education

The consolidation of categorical aid programs related to particular items, and a broadening of the definition of categories worthy of support, would promote the effective use of resources in higher education by insuring that the Federal Government does not provide incentives for the inefficient use of institutional funds. Funds for planning and evaluation provided in our categorical aid proposals should enable institutions to make more effective use of their revenues.

Further, the emphasis on student aid combined with cost-of-education allowances and the proposed NSLB *might* provide some incentives for the effective use of resources by institutions, because institutions will presumably be more responsive to student needs (and thereby more effective) if they must compete for students who have the financial flexibility to choose among a greater number of institutions.

Academic Science

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY
WASHINGTON, D.C. 20506

Garth
→

October 22, 1968

MEMORANDUM FOR

Mr. Joseph Califano
The White House

SUBJECT: Report of Task Force on Academic Science

Attached are five copies of the final report of the Task Force set up in response to your memorandum of August 18, 1967 to Mr. Schultze as modified by your memorandum of October 11, 1967 to me (copy attached).

Ten copies have been sent to the Bureau of the Budget.

Ivan L. Bennett, Jr.
Ivan L. Bennett, Jr.
Deputy Director

attachments

October 11, 1967

MEMORANDUM FOR Honorable Ivan Bennett
 Deputy Director
 Office of Science and Technology

In accord with our earlier conversations, this will confirm that you will replace Director Schulz as Chairman of the Task Force on Administration of Academic Science Research Programs. A copy of the memorandum establishing that Task Force and setting forth items which should be considered is attached.

In lieu of the interim report requested in that memorandum, please submit a report on the work of the Panel on Research and Graduate Education established by the Task Force on Education under your chairmanship.

The Task Force should then go on to consider the other items mentioned in the attached memorandum, specifically focusing on:

- Long-range budgetary and program issues related to academic science.
- Improvements in the administration of Federal academic science research programs.

The report on this second phase of operation should be submitted by June 1, 1968.

Joseph A. Califano, Jr.
Special Assistant to the President

Attn: Mr. [unclear]

cc: Director Schultze

JAC:JCG:caw

ADMINISTRATIVELY CONFIDENTIAL

EYES ONLY

REPORT OF THE TASK FORCE ON
THE ADMINISTRATION OF FEDERAL
PROGRAM OF ACADEMIC SCIENCE

October, 1968

ADMINISTRATIVELY CONFIDENTIAL

TABLE OF CONTENTS

	<u>Page</u>
SUMMARY	iii
I. DEFINITIONS	1
II. FOUR SOURCES OF IMMEDIATE CONCERN	4
III. THE EXPANDING FEDERAL ROLE IN FINANCING HIGHER EDUCATION	6
IV. ACADEMIC SCIENCE AS AN INTEGRAL COMPONENT OF HIGHER EDUCATION	12
V. HISTORICAL NOTE: WHERE WE ARE AND HOW WE GOT HERE	14
A. <u>Development of Federal Programs of Support for Academic Science</u>	14
B. <u>Present Situation and Immediate Prospects</u>	20
1. In the Context of Academic Science	20
2. In the Context of Higher Education	23
C. <u>Needs and Problems</u>	25
1. More Money for Academic Science	25
2. More Than Money	26
3. New Policy and New Structure for Academic Science	27
4. New Means of Reconciling Goals for Academic Science and Higher Education	29

	<u>Page</u>
VI. RECOMMENDATIONS	31
A. <u>Establish More Stable Funding for Academic Science</u>	31
1. Prepare a Three-Year "Indicative Plan" for Federal Support of Academic Science	31
2. Increase the Budget of the National Science Foundation for Fiscal Year 1970	32
B. <u>Continue and Strengthen the Existing System of Pluralistic Support</u>	34
1. Role of the Mission-Oriented Agencies	34
2. Enhance the Flexibility of Federal Support of Colleges and Universities	34
3. Establish NSF as a Prime Source of Federal Funds for Academic Science	36
C. <u>Improve the Administration of Federal Academic Science Programs</u>	36
1. Reduce Administrative Inconsistencies	36
2. Establish Sound Policy Guides	37
3. Cushion the Shock of Unexpected Restriction of Funds	37
4. Central Administrative Responsibility of BOB	38
D. <u>Improve the Organization of the Executive Office for Science and Education</u>	39
1. <u>Alternative A.</u> Establish a Statutory Council of Advisers on Education and Science	39
2. <u>Alternative B.</u> Broaden and Strengthen OST	41
E. <u>Consider the Establishment of a New Cabinet Department of Higher Education and Science</u>	43

SUMMARY

Developments over the past five years make advisable a series of changes in the administration of academic science.

- In 1968, the Federal Government provided \$2.3 billion for academic science and \$2.1 billion to colleges and universities for support of colleges and universities totally. The non-science component is not only growing rapidly but is also increasingly interwoven with academic science programs, thus creating an important new interface between Federal programs for academic science and for general support of higher education.
- Although state, local, and private funding of both general expenses and academic science of colleges and universities will continue to expand, the Federal Government's role in both areas is becoming more significant, and this will generate important questions of policy and of organizational capabilities to define and answer questions of policy.
- Federal support for academic science has leveled off sharply, resulting in serious short-run underfinancing (particularly for NSF), and cutbacks in research in universities. Unpredictability and instability of funding are incompatible with long-range national goals, and with missions of Federal agencies, which depend on academic science.

- An accretion of Federal rules and practices among the several supporting agencies has created administrative machinery that is needlessly complicated and expensive both for the Federal Government and universities.

To deal with these questions, the Task Force makes the following recommendations:

A. Establish More Stable Funding for Academic Science

- BOB and OST should prepare, in consultation with the agencies, a new "three-year indicative plan" for Federal financing of academic science. This would tend to (1) increase the predictability of funding, (2) ensure more careful considerations of the total effect of agency budgets on academic science, (3) provide better guidelines for agencies, and (4) provide a better vehicle for communicating with Congress.
- The budget of the National Science Foundation for fiscal year 1970 should as a minimum be set at a level sufficient to maintain activity in academic science at the 1968 level but allowing for increases in real cost.

- Serious consideration should be given to persuading the relevant Congressional committees that NSF - *should be* should be placed on a two-year authorization and appropriation cycle.

B. Continue and Strengthen the Existing System of Pluralistic Support

- The existing system under which mission-oriented agencies finance academic research which is related to and a part of their missions is sound and should be continued.
- To compensate for the rigidities and imbalances which the existing system imposes upon both the universities and the Federal agencies, additional institutional support for academic science should be provided in the budgets of NSF and NIH.
- Over the long range, NSF should be established as a prime source (at least a third) of Federal funds for academic science.

C. Improve the Administration of Federal Academic Science Programs

- Issue a Presidential directive (memorandum, letter, or Executive Order) emphasizing the responsibility of BOB to reduce administrative inconsistencies, to

establish sound administrative guides, and develop measures to minimize the short-run effects of reductions in funds for academic science on colleges and universities.

D. Improve the Organization of the Executive Office for Science and Education

- There is now no focus of responsibility in the Executive Branch for long-range policy strategy and for short-range problem solving for academic science, and no place in the Executive Branch where issues involving the interrelationships between education and science and technology can be discussed and resolved effectively on a continuing institutionalized basis.
- Leadership and coordination in these areas can be effective only if exercised in the Executive Office.
- The Task Force therefore recommends the establishment by statute of a new Council of Advisers on Education and Science to provide a continuing institutionalized strong point in the Executive Office to help the President with matters involving education, science and technology, and their interrelationships.

-- In view of the complexities introduced by placing all higher education within the purview of such a Council, the Task Force suggests as a less comprehensive, but more coherent and probably more feasible alternative the establishment of a statutory Council of Science Advisers which would have all of the current functions of OST, plus a strong focus on the interrelationships between science and technology, and higher education. A less effective but acceptable alternative would be to add responsibility for the science-education interface to the responsibilities of OST by Executive Order.

E. Consider the Establishment of a New Cabinet Department of Higher Education and Science

-- The Task Force reached the conclusion that the growth and increasing complexity of Federal programs for education, science and technology will eventually require a new Cabinet department, and a large-scale shift of functions. The Task Force believes that this problem is of such significance and urgency that it should be given further serious study. However, the problems involved go so far beyond the terms of reference of the Task Force that it makes no recommendation for a new department.

I. DEFINITIONS

Academic Science includes the research in the physical, biological, engineering, and social sciences carried out in the nation's universities and colleges and related educational programs, predominantly at the graduate and professional level. Some of this research can be classified as basic * and some as applied. ** A small proportion can properly be termed technological development. ***

The determination of the exact proportion of each of these subclasses of scientific investigation contained within the total mix of academic science is largely a semantic problem and is unimportant. The main point is that, as a result of more than two decades of experience, academic science has come to encompass a varied array of scientific activities, concentrated in the basic sector, that can be carried out willingly, appropriately, and effectively in institutions of higher learning. At present, some 10% of federal

-
- * Systematic, intensive study directed toward fuller understanding of the subject under consideration in which the primary aim of the investigator is an increase in scientific knowledge without regard to any utility of the knowledge gained.
 - ** Systematic, intensive study directed toward fuller understanding of the subject under consideration in which the primary aim of the investigator is practical use or application of the scientific knowledge gained.
 - *** Systematic use of scientific knowledge for the production of useful materials, devices, systems, or methods, including design and development or prototypes processes. Quality control and routine product testing are not included.

expenditures for R and D go to support academic science and 6% of the nation's total funding of R and D goes to colleges and universities proper (excluding federal contract research centers).

It is worth noting that academic science is responsible for nearly 1/2 of the nation's basic research, the most innovative segment of our overall scientific effort, often referred to as its "cutting edge." Generally speaking, however, the nature, methodologies, and objectives of academic research are not qualitatively different from those of research performed in many non-profit institutes, in municipal, state, and federal laboratories, or in industrial laboratories. It is not any peculiarity of scientific content that prompts consideration of academic science as an entity. Rather, it is the association of this portion of the nation's research endeavor with institutions of higher learning and its resulting effects, direct and indirect, upon higher education which create problems of particular concern to the federal government.

Graduate education is the culmination of the formal process of preparing individuals for teaching and for research and technical endeavor at the frontier of expanding knowledge and technological innovation. The graduate schools of the U. S. have come to encompass a predominant portion of the intellectual forces that can assure the nation of continuing capability to advance knowledge, to extend the base for technological progress, to influence the social cultural, and economic quality of national life, and to exert intelligent and effective leadership in world affairs.

Graduate education programs are far more expensive for universities than are undergraduate programs. Because they are so dependent upon federal funds, they are the first to be affected by limitation of resources from the national government.

Training to the Ph. D. level no longer suffices to launch every scientist upon his career as a fully qualified researcher or teacher. Postdoctoral training is becoming a critical component of graduate education. This level is not yet fully embedded in the academic structure and it is now clear that budgetary strictures strike hardest at this important new area of advanced education.

II. FOUR SOURCES OF IMMEDIATE CONCERN

At this stage in the evolution of federal programs of support for research in the universities and colleges, four aspects of the situation give rise to problems:

- Federal funds now support more than 75% of all academic research. The vast majority of this money (\$1.235 billion of a total of \$1.455 billion in FY 1967) is provided by the various "mission agencies"* as project or program grants or contracts for research in specific fields by individual faculty members or faculty groups of an institution. Each agency supports research in those areas (including mission-related basic research) judged to be relevant to the accomplishment of its overall mission. Judgments of relevance have been properly broad, and most basic research is supported by such agencies as NIH, NASA, DOD and AEC. However, tightening

* This total is distributed among major agencies as follows:

<u>Agency</u>	<u>Per Cent</u>
Total	100
HEW	48
DOD	17
NSF	15
NASA	7
AEC	6
Other ^{1/}	14

^{1/} USDA, Commerce, HUD, Interior, Labor, State, DOT, AID and VA.

of budgets is tending to lead to reassessment and stricter definition of "relevancy" both by the agencies and by Congress. Only about 15% (\$220 million of a total of \$1.455 billion in FY 1967) of support comes from NSF, the one agency authorized to support the advancement of knowledge in all fields of science, without regard to relevance to the missions of federal agencies such as DOD, AEC, PHS, or Agriculture. The financial inability of NSF to play a more significant role in funding university research at a time when mission agency funds are dwindling and the range of their support among fields is narrowing poses severe problems in maintaining a balanced national development of the various branches of science for the future.

- The growth of support for science from multiple federal sources has posed increasing difficulties upon the nation's institutions of higher learning in planning for all of their functions and activities.
- Institutions of higher learning are hard pressed to sustain all of their activities in the face of rising enrollments, increasing difficulties in securing additional funds from public and private sources, resistance to increasing tuition, demands that they undertake additional important service activities for localities, states and the nation, and rising costs.
- Academic research is so intimately entwined with graduate and professional education in science and engineering that it is virtually impossible to consider federal support of research or federal support of graduate and professional education in isolation from each other because any significant change in one is immediately reflected in the other.

III. THE EXPANDING FEDERAL ROLE IN FINANCING HIGHER EDUCATION

Federal funds for research have become an important component of the overall financing of higher education (with the significance of the funds varying widely from institution to institution), and because the graduate and professional schools are the source of the scientific and technical manpower so essential to the entire nation as well as to federal programs.

Total national expenditures for higher education have increased by more than 60% over the past five years--from \$11.2 billion to \$18.3 billion.

Federal funds for higher education doubled over this period--from \$2.2 to \$2.4 billion (Table II). The proportion of total expenditures accounted for by federal funds more than tripled--from 7 to 24%--between 1939-40 and 1967-68 (Table I). By 1980 the Federal Government may be supplying as much as 40% of the total cost of higher education in the United States.

TABLE I

Source of Funds for Undergraduate and Graduate
Education in the U. S.

Source of Funding	1939-40	1967-68	1979-80
Total	100%	100%	100%
Institution (including Tuition)	43	39	27
Donation and Endowment	19	11	8
Public Funds	38	50	65
Federal	(7)	(24)	(40)
State and local	(31)	(26)	(25)

Source: Office of Education, DHEW, 1979-80 figures from American Council on Education.

(Note: Figures on sources of income for higher education differ according to sources. The Office of Education figures used here have been challenged, but the general trends that are important to this discussion exist no matter what statistical source is used.)

Over the past five years, both the science and non-science components of federal funds to colleges and universities have risen substantially, but the non-science component has increased most rapidly. While federal academic science funds were clearly the predominant source of federal money for higher education in 1963-64, by 1967-68 the non-science funds were almost equal to the science funds (Table II).

TABLE II

Relative Increases in Funds for Undergraduate and
Graduate Education in the United States
1963-64 and 1967-68
(in billions)

<u>Source</u>	<u>1963-64</u>	<u>1967-68</u>	<u>Percentage Change</u>
Total	<u>\$11.2</u>	<u>\$18.3</u>	<u>+63</u>
Federal share	3.2	4.4	+37
Academic science	(2.0)	(2.3)	(+15)
Non-science	(1.2)	(2.1)	(+75)
Other	8.0	13.9	+74

Source: Office of Education

The major trends in financing of higher education are clear. The total cost of higher education is rising rapidly. The component covered by government (federal, state and local) is increasing. The federal academic science component is rising less rapidly than was true over the past decade, but funds for academic science are now about 15% of the total funds spent for higher education. Academic science funds are more than all other federal

expenditures for higher education. However, non-science federal expenditures are rising rapidly, and will soon exceed the science expenditures. In terms of national policy the federal academic science expenditures must be considered in the light of their general effects on colleges and universities as well as in terms of their effects in the realm of science.

The primary product of institutions of higher is highly educated people. The nation will continue to need, and the citizenry will continue to demand, an increasing flow of people trained to the undergraduate and graduate levels. More specifically, the economy depends upon a steadily expanding supply of scientists and engineers who are produced in the graduate and professional schools. In 1930, there were six scientists and engineers for every 100 workers. Now there are 21 scientists and engineers for every 100 workers. By the end of the next decade, the demand for scientists and engineers will increase by 50 to 100 per cent in different fields, and an even higher proportion of the work force will be composed of scientists and engineers.

The Federal Government is the most important single user of scientific and engineering talent, and its needs will remain high under any likely set of future circumstances. Over a decade, federal employment of scientists and engineers has risen from 88,000 to 143,000 (Table III).

TABLE III

Scientists and Engineers in the Federal
Government, 1954 to 1964
(in thousands)

Group	1954	1964
<u>Scientific</u>	<u>41</u>	<u>68</u>
Physical	13	26
Math. & Statistics	3	6
Biological	16	25
Social	3	6
Other	5	5
<u>Engineering</u>	<u>47</u>	<u>74</u>
<u>Total</u>	<u>88</u>	<u>142</u>

Source: NSF Report to UNESCO on U. S. Science Policy, 1968.

These tabulations of the broad trends and status of the financing of higher education, the federal component, the academic science portion and the needs of the nation for highly trained people make clear the general significance of federal funds for academic science to universities. They make clear the fact that the volume of funds for academic science, the stability of funding and the terms and conditions under which the funds are

available have important repercussions on colleges and universities--even those which are not critically dependent on these funds. In particular, it is evident that unless there is a pervasive continuing effort to avoid impeding, disrupting or unbalancing the process of graduate and professional education for science and technology in the nation's universities, serious problems could be created for the future.

Although the existing system has served the nation well, as will be shown in the following paragraphs, there are signs that existing pressures, emphasis or new national goals and emerging attitudes towards science are generating problems requiring modification of the system and consideration of major changes to adapt most productively to the needs of the next decade.

IV. ACADEMIC SCIENCE AS AN INTEGRAL COMPONENT OF HIGHER EDUCATION

The recent legislation which accounts for the sharp increase in non-science federal funds to universities represents the first steps in the emergence of a new policy--the responsibility of the Federal Government for underwriting the support of universities, including their educational and service as well as their research functions. The Task Force found that it was able to frame logical proposals for the administration of federal programs of academic science only by explicitly assuming that the federal responsibility thus far expressed in legislation and appropriations will be extended to general federal underpinning for higher education.

We were led to this assumption as the discussions in the Task Force made it increasingly evident that there is real danger that measures designed to strengthen and stabilize academic research and graduate education in science which neglect to consider all other functions of the universities will create further bias and imbalance within the higher educational system.

We have attempted to center our recommendations on the subject assigned to us, the administration of federal programs of academic science. They have been formulated, however, in the context of the future development of higher education in general and the contributions that science and technology can and must make to the achievement of the nation's social and economic goals. Accordingly, we have construed "administration" broadly

and have considered how the executive branch might be structured so that the acute problems that exist now--and that will become more pressing--can be dealt with more effectively.

V. HISTORICAL NOTE: WHERE WE ARE AND HOW WE GOT HERE

A. Development of Federal Programs of Support for Academic Science

Soon after World War II, it became clear that pursuit of national objectives in health, agriculture, atomic energy, and defense would require an expanding effort in science, a principal resource for which was the nation's universities. Federal action during the past two decades has featured the development of many programs designed to utilize and to enlarge this capability.

The country has benefitted enormously from this close association of university capability and national purposes:

- The vigor and excellence of American science have placed the U. S. in the vanguard of scientific and technological advance. It is now the envy of and emulative model for the world.
- Science has been brought into a sensitive and responsive relationship to urgent public needs and national goals.
- The entire framework of research and graduate education in science has been strengthened and broadened, and the nation's resources of scientific manpower have been substantially increased and enhanced.
- The process of undergraduate education has also benefitted through the enrichment of the academic environment, the quality of teaching, and the improved content of curricula that have resulted from these developments.
- The pluralistic system of Federal support for academic research has evolved and served the nation well. The principle of pluralism is basically sound and must be sustained. It must now be modified and supplemented along the lines suggested later in this report.

Federal mission agencies have increasingly called on universities to perform research. Until 1966, the annual growth in Federal funds for this purpose was nothing less than spectacular, averaging 22.7 percent per year between 1956 and 1966, (see Table IV). It is hardly surprising that universities have reached a point of great dependence upon Federal funds for research. While it was obvious to all that this high annual rate of expansion of funds for academic research could not continue indefinitely, the abruptness of the change in FY 1967 and the subsequent drop to levels below those needed even to maintain the existing effort have created unforeseen difficulties for many universities.

TABLE IV

Federal Funds for Research and Development at
Universities*

<u>Fiscal Year</u>	<u>Total Federal Funds** (millions of dollars)</u>	<u>Percent increase from previous years</u>
1955	144	
1956	176	22
1957	224	27
1958	288	28
1959	367	27
1960	459	25
1961	585	27
1962	755	29
1963	900	17
1964	1,077	20
1965	1,194	11
1966	1,350	17
1967	1,455	6
1968	1,481	1.7
1969--currently estimated at approximately the 1968 level+-2.0 percent		

*Does not include Federal Contract Research Centers and AEC Educational Research Centers.

** (For Footnote 2 - See next page.)

Certain salient aspects of the existing system of support are relevant to the further evolution of national policy and action:

- The dominant national urgencies were first perceived in areas demanding progress in the physical and biomedical sciences. Thus the flow of Federal science funds for research and graduate education has been almost exclusively directed to the natural sciences with only limited and latterly recognition of the needs for and utility of expanding intellectual effort in the social sciences.
- The Federal funds for purposes other than science (see Table II) have been increasing steadily and rapidly over the past five years. The science funds tend to be highly concentrated and the non-science funds tend to be widely dispersed, so that the shifts in funding are not compensatory for individual institutions. However, in terms of the entire system it is evident that a basic shift in the balance between Federal funds for science and for broader purposes has been taking place. The most significant area of recent growth has been for support of institutions and students in areas other than science--general university and college support and support for the arts and humanities.
- Federal support for research expanded rapidly as an indispensable means of achieving national goals. No other sources of funds were able, or could have properly been asked, to foot this bill. As a consequence, a growing proportion of academic research is absolutely dependent upon Federal money. There is no realistic prospect that this situation will change. Private funds are extremely important, but they will not bear the bulk of the cost. State and local funds are also important, particularly in providing basic support for many colleges and universities. But this burden, plus the other demands on their limited resources, will prevent them from assuming the burden of support for academic science that has evolved as a Federal responsibility.

** Figures for 1955-67 taken from NSF Federal Funds for Research, Development and Other Scientific Activities, Vol. XVII, scheduled for publication in November, 1968.

- Federal science funds for research and for graduate education now come predominantly through mission agencies whose primary responsibilities are for accomplishment of national purposes in which support for academic science is defined in terms of the tasks of the Federal agency. Thus, the bulk of support for academic science is provided as a derivative and partial activity, largely through devices directed toward discrete and limited segments of university activity (research projects, special training programs, etc).
- All of the Federal agencies which support science in universities have been concerned with the effects of their activities on colleges and universities, and they have taken concrete measures to provide broad institutional support on the sound ground that they will depend for years to come on the strength of colleges and universities. However, these commendable initiatives must be limited in the last analysis to the field for which the Federal agency has responsibility - defense, health, space etc., and in the case of NSF for science totally. Even NSF can not provide funds not related to science and science education.
- When NSF was established in 1950, the National Science Board and the Director were assigned responsibility for (a) supporting basic research and scientific education so as to assure the continued health and vitality of the country's scientific resources and to serve the general welfare and interest and (b) developing and encouraging national policy for science and research. While the National Science Foundation Act has been described as "a commitment by the Federal government to support. . . the sciences not for the specific sake of the accomplishment of practical missions"* and as "a decisive turning point in the Federal government's relationships to higher education,* NSF, for a variety of reasons, has been unable to fulfill its intended role. During the years when mission agency budgets for academic science were growing

rapidly, NSF's broad objectives were inadequately supported by Congress, the executive branch, and the scientific community, except for a slight post-Sputnik flurry. Consequently, the abrupt drop in the rate of growth of mission agency budgets in FY 1967 found NSF without the means to offset the uneven effects of the curtailment of funds from the multiple agency sources of major support for academic science. The reduction in NSF's budget for FY 1969 imposed by Congress was the severest suffered by any of the agencies which finance academic science, the already overworked and underpaid "physician" became the sickest "patient" of all; the vestigial hope that NSF might somehow cushion the impact of budgetary stringencies upon the universities disappeared. The only agency which Congress had established for the specific purpose of assuring the integrity of academic science was effectively prevented by Congress from fulfilling its function on the first occasion in history when the agency had become truly essential for the support of academic science.

- The pattern of diffuse and subordinate attention to the overall needs of science, scientific education, and the universities as institutions is also reflected in Congress. Responsibility for the several Federal agencies whose programs furnish the principal support for academic science is divided among many committees and subcommittees in both the House and the Senate. This complicates the task of directing attention to the problems of basic academic functions of the universities in a context distinct from their use in mission programs or the research interests of individual faculty members. The difficulty is compounded by the current mood of Congress -- a substantial degree of skepticism and disenchantment as to the national benefits to be derived from science, particularly basic science.

-- While budgets were expanding, steps were taken which had the effect of providing in a rudimentary way support for graduate education as such. Provision of support on such a rapidly rising curve, for such diverse purposes, and with the degree of freedom that was necessary and proper inevitably involved underpinning to some degree and in some fashion the process of graduate education itself. When budgets began to contract, it became painfully evident in many universities that Federal funds had indeed permeated the financial structure of the entire institution and that the reductions would result not only in a shrinkage in support of research of interest to the Federal government but also in general financial stringencies for the educational process.

B. Present Situation and Immediate Prospects

1. In the Context of Academic Science

As a system for supporting academic science, the sets of devices used by the various Federal agencies have been productive and flexible. This was particularly true during the period of rapidly increasing budgets. But as the rate of increase has slackened and as mandatory cutbacks in expenditure threaten to reduce support, some limitations of the system that were not evident during the earlier period become very clear.

- Means for ensuring stability of support for academic science within individual institutions have proved to be inadequate; means for assisting universities to deal with fluctuating levels of support are inadequate.
- For several reasons, the effects of leveling or decreasing Federal research budgets will not be distributed uniformly among universities, and among parts of universities. The characteristics of the group of universities which will as a whole be hardest hit seem clear:

(a) Those with low reserves, shaky state appropriations or slender current endowment income.

(b) Those which have relatively new programs of research and graduate education.

(c) Those which receive a high proportion of their total research support from one or two Federal agencies at this time, particularly NSF

(d) Those which have made heavy commitments of their own funds in expectation of receiving Federal funds which will not in fact be available.

- Over the years, an accretion of onerous administrative requirements has tended to multiply red tape, unduly complicate relations between universities and Federal agencies and increase the costs of operating the system. We are convinced that Federal funds for science can be administered more simply, and that accountability for proper use of public funds can be simultaneously enhanced.
- The tightness of Federal funds for academic science has made more urgent an increase in the capacity of colleges and universities to set policy and make decisions of two types. The first is to establish general institutional goals which place academic research soundly in the context of the total array of functions of the institution. The second is to reach a sound balance between two important goals that are difficult to reconcile--on the one hand maintenance of economy, efficiency, accountability and order, and on the other hand maintenance of the important values of academic freedom for schools, departments and individuals. This is primarily a problem for the institutions themselves, but their task can be made easier by proper Federal policy.
- The capacity of institutions to adapt has already been reduced by the preceding lean years and continued lack of growth in Federal support of academic science research will affect programs of higher quality and scientists of higher competence. Maintenance of the existing level of support of current projects and established investigation will be at the expense of support of new investigators.*

* "New starts" required to finance the research of younger investigators are particularly hard hit when budgets are cut, or even when the rate of increase decreases. This is because most agencies commit funds for a number of years in order to provide stable support. Accordingly, only a fraction of the funds in any year is available for new starts. Cuts in budgets can practically eliminate new starts, since to re-program any appreciable portion of funds already committed involves dismantling ongoing programs. Some agencies are deliberately setting aside funds to support new investigators and new ideas, but this requires cutting off support already committed to other worthwhile research.

- The desirability of using federal research funds to strengthen the total academic science system of the nation by helping new centers to develop has been widely recognized. This was a central theme of the President's memorandum of September 13, 1965, to heads of departments and agencies on Strengthening Academic Capability for Science Throughout the Country, and his statement to the Cabinet of September 14, 1965. However, it has become clear that the existing system is not an adequate means, even when funds for academic science were growing, of developing new centers of high quality for academic science. The approach to be effective must be more broadly based if there is to be a substantial expansion of the number of institutions which are first-rate centers for academic science. When funds for academic science are limited, very little can be done to expand the system.
- The responsibility of the National Science Foundation "for augmenting the research capabilities of academic institutions in all fields of science through the support of basic research and research facilities and through measures for improving the quality of education in the sciences", reaffirmed by President Johnson in 1965, has not been matched by Congressional willingness to make sufficient resources available for this "balancing" responsibility, the magnitude of which is defined, in large measure, by the demands of the other agencies upon the universities. NSF will be unable to carry out its responsibilities without sizeable budget increases.
- A major effect of the existing system for support of academic science has been to increase the need for highly qualified faculty. Much of this expansion of graduate education has been initiated independently but in the expectation that the Federal Government will continue its support for two key segments of the enterprise -- provision of research funds and of support for advanced students. This expectation was recognized in President Johnson's education message to the Congress, The Fifth Freedom, on February 5, 1968:

"As never before, we look to the colleges and universities--to their faculties; laboratories; research institutes and study centers--for help with every problem of our society and with the efforts we are making toward peace in the world...

"First, we should increase the Federal payment available to help graduate schools meet the cost of educating a student who has earned a Federal Fellowship. At present, Federal Fellowship programs are actually deepending the debt of the graduate schools because this payment is too low.

"Second, we should launch a new program to strengthen those graduate schools with clear potential for higher quality. With enrollments growing, we must begin to enlarge the capacity of graduate schools. This program will underwrite efforts to strengthen faculties, improve courses, and foster excellence in a wide range of fields.

"Third, I urge the Congress to increase government-sponsored research in our universities. The knowledge gained through this research truly is power--power to heal the sick, educate the young, defend the nation, and improve the quality of life for our citizens."

2. In the Context of Higher Education

We shift now to a new problem--the relationship between the existing system of Federal support for academic science and the emerging Federal programs for broader support of higher education. To a substantial degree, as we have pointed out, the system for support of academic science

has in fact been adapted over the years to take account of the needs of institutions. However, we are now seeing that a system designed fundamentally to meet the needs of Federal agencies for science and technology is not an adequate means of meeting the emerging responsibilities of the Federal Government for support of higher education. Many of the questions now raised with respect to the adequacy of the existing Federal system for support of academic science are really directed to the more fundamental question of the nature of the responsibilities of the Federal Government for the support of universities, and particularly for support of graduate education.

The constrained Federal academic science budgets of the past three years have hastened recognition of the fact that the present structure is unresponsive to emerging demands that the old system serve new and different purposes--support of higher education. The agencies which compose the network supporting academic science serve essentially as separate conduits for funds to support research, training, or institutional development but, in concert, they do not function as a system responsive to the needs of universities in general because they have not been intended or designed to constitute such a system.

The "pause" resulting from prevailing budgetary constraints and those in prospect for the immediate future has afforded an excellent opportunity for a precise assessment of the strengths and weaknesses of

the existing system which will be crucial to designing a superior system for the long run. Present circumstances can expose and force choices relating to policy and purpose and to means and structure which were not clearly seen by either government or universities while budgets were still increasing.

It is the conviction of the Task Force that forging a new and more logical relationship between Federal support for academic science and the emerging Federal role in support of higher education totally is a major task for the next decade. We are certain that this process will require major changes in approach, in the structure of the executive branch and in legislation over a wide front. In our judgment this policy area is more significant and less well defined than the policy questions relating to academic science as a discrete problem. Our recommendations constitute a first step towards a solution of the broader problem.

C. Needs and Problems

1. More Money for Academic Science

While the 20% per year increases in federal funds for academic science cannot be reasonably expected in the future, it is important to point out that substantial additional funding for academic science will be required from year to year if academic science and the universities are to fulfill their roles in performing research for the mission agencies and in producing the skilled manpower which the nation requires. Furthermore, there is a need for an immediate increase in resources available to the universities if the disruption and disarray created by the abrupt cutbacks now being experienced are to be ameliorated. For the long run, this is a question that can be resolved only if there are sustained increases in funds for academic science for all major federal agencies at a reasonable, moderate rate. For the immediate future, the problems generated by particularly sharp reductions in expenditures by the National Science Foundation are most acute. The responsibility of the National Science Foundation "for augmenting the research capabilities of academic institutions in all fields of science through the support of basic research and research facilities and through measures for improving the quality of education in the sciences," reaffirmed by President Johnson in 1965, has not been matched by Congressional willingness to make sufficient resources available for this "balancing" responsibility, the magnitude of which is defined, in large measure, by the demands of the other agencies

upon the universities. Even with its new authority, NSF will be unable to perform the function without sizeable budget increases. Indeed, for FY 1969, the depth of the cut in NSF expenditures brings into question the good faith of the government of the United States.

2. More Than Money

Additional funding alone, however, within the existing pattern and under existing policies will merely postpone rather than solve the problems of administration of Federal academic science research programs. In the course of our discussions, many problems, major and minor, were identified within the system that has evolved for federal support of academic science. These include (not in order of importance):

- a. Inconsistencies among agencies in policies, procedures, and practices in day-to-day dealings with institutions. These are major sources of dissatisfaction and irritation and have come to have an important "symbolic" significance.
- b. Basic differences in philosophy as to the proportion of the cost of academic research projects that should be borne by the Federal Government when it finances a project. (The "cost sharing" problem.)
- c. The problems raised by the pressure on many mission agencies to narrow the range of their support of academic research as a result of continuing budgetary constraints or changes in their mission needs.
- d. The problem that these actions by the mission agencies cause NSF in trying to "fill the vacuum."
- e. The need for agencies to allow universities the maximum flexibility in administering limited funds.

- f. The repeatedly recognized need for sustained, flexible, long-run institutional support to minimize the disruptions produced by fluctuations in project support.

3. New Policy and New Structure for Academic Science

The existing policy structure for academic science in Federal Government can best be described as a loose network lacking a prime mover and without a strong center for long-range planning or evaluation. The resources for academic science in any given year are decided pluralistically, in a variety of mission contexts, and the result aggregate is largely an after-the-fact outcome. Present support is fractionated and there is no really effective focus of responsibility. Agencies have introduced several programs calculated to cope with the problem as they visualize it but they are not effectively meshed and they do not respond adequately to the national need to assure that institutional capability in science will be sustained in the long range.

In sum, there is a need for a better focus of organizational responsibility and a system for fuller, prospective, "horizontal" consideration of the budgetary requirements of academic science among the programs of the many agencies which are involved in utilizing the resources of the universities. There is also a critical need to establish better communication with Congress on all of the major points made in this report.

Finally, there is a need for a better system for examining and setting ultimate goals. These have been well stated by Don K. Price*:

"We have to learn how to support an educational and scientific establishment including private as well as public institutions, without either destroying its freedom or leaving it in a position of privileged irresponsibility. We have to learn how to fit the research interests of free scientists into a pattern of public policy and to take account of the need for balanced national development while building up our existing centers of high scientific quality. And we need, equally obviously, to devote our knowledge to the service of human welfare, as effectively as it has been enlisted in the service of national defense."

The Task Force believes that now is the time for a change in organizational responsibility for academic science because:

- even partial steps toward greater recognition of the value of academic science to the nation would send out a signal of considerable importance.
- the timing is right, coming as it does during a period of marking time in support of science, criticism of the government for lukewarm interest, and attendant disarray in government-university relationships.
- conventional inertia within the existing governmental structure, based on doctrines concerning roles, missions, and jurisdictions, makes it exceedingly difficult to graft new responsibilities for planning, evaluation, and communication onto the present machinery.

* Page 38 in Orland, H. (ed). Science Policy and the University, Brookings Institution, Washington, D. C., 1968

4. New Means of Reconciling Goals for Academic Science and Higher Education

The existing arrangements for evolving strategies for academic science or for appraising the interaction of the natural sciences with the humanities and social sciences are inadequate. The present arrangement displays only ad hoc organization for communication and consultation within the federal components of the system and externally with academic institutions and their intermediaries. Under the theory that has prevailed until now, advance consultation among agencies to adjust proposed actions that will affect higher education and academic science should be effective. The Task Force is convinced that consultation of this sort will be less and less effective in producing significant alterations in the prospective situation, and particularly in coping with the large-scale problem of securing a good fit between federal programs for academic science and other programs affecting universities, particularly at the graduate level. There is much interagency consultation on major actions affecting academic science, but even in this area effective action is limited. Effective and timely results are hard to derive from interagency consultation because the power of decision is dispersed among many points and levels in the large agencies. Finally, the mission agencies have statutory authority to modify their programs in the interest of strengthening academic science only within very narrow limits.

When the broader question of reconciling goals, emphasis, purpose and relations between various programs for academic science and for more general support of higher education is considered, it becomes evident that the machinery is even more rudimentary. Two weak interagency committees, the Federal Interagency Committee on Education and the Committee on Academic Science and Engineering of the Federal Council for Science and Technology, provide the only institutionalized means of dealing with these questions.

The climate has changed rapidly and now includes: budgeting constraints; rising costs of performing research, multiplying problems at the interface of academic science and higher education in general; pressures for equalization in distribution of limited funds for academic science and institutional support; increasing institutional needs for assurance in long-term planning; and frustration and friction arising from inadequate government-university communications.

It is time to strengthen the federal organization for planning, balancing, and communication between the function of supporting academic science and the emerging federal function of general support for higher education. Therefore, any structural remedy must go beyond a concern for academic science alone and place research and education in a unified perspective.

VI. RECOMMENDATIONS

A. Establish More Stable Funding for Academic Science

Inability to establish a persuasive case for moderate continuing increases in funds for academic science is an urgent, central problem. This is one major source of the current difficulties. Planning for academic science in the Executive Branch must be more coherent, the product must be more forceful and persuasive, and efforts to convince Congress of the value of academic science must be more effective.

1. Prepare a Three-Year "Indicative Plan" for Federal Support of Academic Science

Plans for Federal support for academic science could be considered more deliberately, plans laid more judiciously, and the product presented more logically and persuasively to the Congress and the public if the main characteristics of Federal support for academic science (funding, methods of support, major areas of emphasis, etc.) were laid out for three years in advance. Such a plan should provide policy guidance on the growth and directions of support and on the changing mix among agencies and among the various forms of support.

The plan should include minimal projections for funding by all agencies which now support academic research. It should be agreed by the agencies and, hopefully, it can be used to indicate to Congress that integrated budgeting is indeed taking place. The plan could be made public as an "indicative" planning document for the universities. If projections are

conservative, representing a sort of federal guarantee, false hopes for the future should be replaced by realistic programming within the universities. Any change would probably be an add-on and the plan could be extended year by year,

The plan would provide an opportunity to restate the rationale for federal support of academic science and provide a vehicle for better informing the Congress and the public.

OST capabilities to deal with this planning should be strengthened by the establishment of an academic science policy coordinating staff. The NSF should be given formal responsibility for providing factual and analytical back-up. Each major agency should prepare a three-year indicative plan for support of academic science as a guide to its actions and as part of a wider plan.

BoB and OST should, in consultation with the major agencies concerned, prepare a three-year indicative plan for federal support of academic science for the fiscal year 1971 budget and every year thereafter.

The establishment of this planning process should be explicitly noted in the President's budget message for fiscal year 1970.

2. Increase the Budget of the National Science Foundation for Fiscal Year 1970

Both to deal with an acute emergency and as a first step in carrying out a long-range policy, the budget of NSF for FY 1970 should be increased.*

*Steps to increase the expenditure level of NSF for FY '69 so that it can honor existing commitments to academic institutions are under serious consideration.

Specifically, the proposed administration budget for NSF for FY 1970 should include an increase in obligational authority sufficient to enable the Foundation to compensate for the cumulative effects of budgetary constraints among the agencies which fund parts of academic science. The amount budgeted for NSF should as a minimum be sufficient to maintain activity in academic science at its present level without any expansion of the overall enterprise but allowing for increases in real cost. These funds could be dispensed through institutional grants that give the colleges and universities greater flexibility in meeting their individual needs. NSF is already making such grants, so the authority and administrative structure are ample for an expansion of the existing puny program.

If it is decided to implement this recommendation to increase NSF funds for FY 1969 and/or FY 1970, the announcement should make it clear that this arrangement to enable NSF to act as a "gap-filler" is not intended to relegate NSF to this role permanently but that it is the first step, and the only one now feasible toward the long-range goal of equipping NSF to play the role for which it was originally established. There should also be some reference to the future when total federal support for academic science will again begin to expand but at more modest rates than those prevailing before 1967.

Serious consideration should be given to persuading the relevant Congressional committees that NSF should be placed on a two-year authorization and appropriation cycle.

- Alternatives considered include doing nothing but the situation is serious enough that it cannot be allowed to continue as it is now going. For 1969, possible request of additional authority to increase expenditures for some of the mission agencies was also considered but was discarded because the NSF situation is particularly acute, and because general increases are not practicable.

B. Continue and Strengthen the Existing System of Pluralistic Support

1. Role of the Mission-Oriented Agencies

The mission-oriented agencies should continue to finance academic research which is related to and a part of their missions. To the extent consistent with its mission, each of these agencies should use its authority and funds to strengthen academic institutions whenever this can be done without interfering with its primary responsibilities. The mission-oriented agencies should also continue to support the advanced training of people required for their missions.

- The alternative of centralizing all or most support for academic science and advanced training in the sciences was considered and rejected because a decentralized system: (1) links support of science to national goals; (2) disperses and thereby strengthens support; (3) provides an essential underpinning for applied research, development, and testing; and (4) increases in the agencies and in Congress sensitivity to the uses of science and technology in anticipating, creating, and solving important public problems. These values outweigh the gains to be expected from centralized administration and funding.

2. Enhance the Flexibility of Federal Support of Colleges and Universities

Essentially every study concerned with institutional "flexibility" in recent years has concluded that there is need for increasing the amount of

money given to the institution to balance the effect of expanded project support.

Therefore, in order to gain full advantage from the values of the project system of research support while minimizing the inflexibility that can accompany heavy reliance on project support, additional funds should be made available on an institutional basis for research-related activities which they select. Such activities might include:

- provision of support for research that cannot yet be funded externally,
- provision of central research facilities not otherwise provided for support of new investigators,
- provision of a financial shock absorber when grants, contracts, training grants, or fellowships are unexpectedly curtailed or terminated.

Such support is already provided by NSF for the total science activities of institutions, but the funds provided are grossly inadequate to fulfill the functions that are suggested here. NIH makes similar grants, restricted to the biomedical research sector, but available funds have never reached the levels authorized by Congress. The enlargement of this type of support would involve boosting the NSF and NIH budgets since legislative authority for institutional support already exists.

On the other hand, the task force does not believe that the general underpinning for university finances should be provided via the route of science and technology, as provided in the so-called Miller bill. The task force is convinced that no single formula can be used to accomplish all federal

objectives in these institutions. Formulas for such grants are under consideration by the HEW Committee on Higher Education Strategy, which is working on the long-range plan called for by the President in his education message of February 5, 1968.

The task force emphasizes that the key to successful use of institutional funding to alleviate imbalances created by project-grants is the formula employed and urges careful study before action is recommended in the broad area of general support of higher education.

3. Establish NSF as a Prime Source of Federal Funds for Academic Science

As a long-range objective, NSF should provide the stable primary base of federal support for academic science as the agency acquires the capacity to secure markedly higher and stable budgets. The mission-oriented agencies should continue to support academic science, but they should not be expected to provide broadly based support for academic science without regard to the limits set by their missions.

NSF should not be regarded as a "gap-filler" or "balance wheel" but as the strong point in the Federal Government concerned with the strengthening of academic science, and as a major source (not less than a third of the total) of federal funds for academic science.

C. Improve the Administration of Federal Academic Science Programs

1. Reduce Administrative Inconsistencies

Much of the heat associated with academic science problems still comes from inconsistencies among federal agencies in policies, procedures,

and practices with respect to contract and grant administration including such matters as proposal content and format, terms and conditions of agreements, property and equipment title and records requirements, and technical, financial, and administrative reporting.

At little or no cost, elimination or steps to eliminate inconsistencies (not to establish rigid standardization) would do a great deal to restore the academic community's confidence that the government understands and is concerned with the problems faced by the universities.

2. Establish Sound Policy Guides

In such areas as cost sharing and charging of faculty salaries to federal research grants and contracts, the establishment of generally accepted, consistent philosophy as to the proper roles, rights, and obligations of universities and the Federal Government is the key to resolutions of difficulties.

3. Cushion the Shock of Unexpected Restriction of Funds

All agencies should be instructed to take steps to minimize sudden termination of grants and contract support through arrangements to phase out support over a reasonable period of time. The "step-funding" approach of the type used by NASA and the DoD Project Themis (a three-year grant with two years' initial funding on a 1-2/3 - 1/3 basis) is an example of such an arrangement. The precise devices that are needed and practicable will depend upon the circumstances facing each agency. This is difficult to achieve immediately without more NOA and, of course, it is not a protection against expenditure cuts. It is improbable, however, that agencies will again be in

a position to incur obligations for academic science to an extent that an expenditure cut will catch them in a situation where they cannot meet existing commitments although new starts might be affected.

4. Central Administrative Responsibility of BoB

The key to dealing effectively with these administrative problems is the establishment of a capable organization with resources to permit adequate continuing work on the problem and authority to make its decisions stick.

Responsibility for further progress should rest with the Bureau of the Budget, which should provide resources for continuing improvement of the important "nuts and bolts" aspects of government-university relations in science.

The significance of improved administration of academic science should be emphasized by the simultaneous issuance of an appropriate Presidential directive--memorandum or letter. This should direct the agencies to cooperate with BoB in establishing uniform and consistent administrative practices to the greatest degree permitted by law, to simplify their grant and contract procedures for academic science, to adapt their regular procurement rules and procedures to the special requirements of R & D, and to assist colleges and universities with the establishment of these procedures. BoB already has responsibility for administrative management, emphasis on the urgency of the matter through issuance of a Presidential directive would increase the probability of effective action.

-- The alternative of placing responsibility in a new agency ("a GSA for academic science") was considered and

discarded because the function is not broad enough or significant enough to warrant establishment of a new agency. The alternative of placing the function in OST was discarded because OST does not have the responsibility, management staff and experience possessed by BOB, and because assumption of this responsibility by OST would reduce its capacity to perform its primary functions.

D. Improve the Organization of the Executive Office for Science and Education

Because of the gravity and urgency of the policy questions relating to education and science described earlier in this report, and because there is now no point in the executive branch where these issues can be discussed and resolved effectively on a continuing institutionalized basis, the Task Force has come to the conclusion that a new, permanent grouping of functions in the executive branch is needed. The Task Force is further of the opinion that leadership and coordination of the departments and the establishment of policy for functions properly performed in a number of agencies can be effectively undertaken only in the Executive Office. Accordingly, the Task Force has narrowed its recommendations to the following:

1. Alternative A. Establish a Statutory Council of Advisers on Education and Science

A Council of Advisers on Education and Science should be established by legislation. The members should be full-time Presidential appointees, as contrasted with part-time advisers (as in the case of PSAC) or representatives of departments and agencies (as in the case of the Space Council).

The central function of this group would be to provide a continuing institutional strong point in the Executive Office--a point which does not now exist--to help the President with policy matters involving education, science and technology, and their interrelationships. A central concern of the Council would be with the kinds of complex problems relating to both education (particularly graduate education) and science (particularly academic science) noted earlier in this report.

An important role for the Council would be to meet the urgent needs of Congress for an understanding of the facts and the position of the administration on national goals in science, technology, and education. It would report to various committees of Congress on the progress being made by both public and private bodies, and thereby contribute to the understanding in Congress which has thus far been largely absent. Although the Council would not be responsible for carrying out programs, its relationship to the President, to the Bureau of the Budget, to Cabinet-level officers, and to Congress would be such that its influence would be substantial.

In more specific terms, it would be concerned with the problems that now concern OST, plus the central policy issues faced by the Federal Government with respect to education. It would advise with respect to support of institutions and support of students. On the science side, the new Council would be concerned with examination of the interactions of science with social development, international relations, technological advance and economic

growth. It would study the mix of national investment in research, identify gaps, and evolve long-range science policy goals. A central concern of the Council would be the integration of policies with respect to support of graduate education and science.

PSAC would be retained. Whether FCST would be needed and how functions might be performed by a different mechanism is a detail that can be considered later.

So far as operating methods are concerned, the Council would be available to provide staff advice to the President and the Bureau of the Budget. It would replace OST, whose staff might become the Council staff while the Director of OST might be a member or Chairman of the Council.

-- A sub-alternative seriously considered was a limitation of the role of the Council to graduate education and to academic science. This smaller package is more coherent, but lacks breadth. The final conclusion was that the full scope of problems in education and science should be encompassed, particularly if legislation is sought. However, if on political or other grounds the narrower definition seems preferable, such a Council would still represent an advance. Extension of functions could be informal and later ratified by legislation if this seemed desirable.

2. Alternative B. Broaden and Strengthen OST

The charter of the Office of Science and Technology should be redrafted to encompass policy towards graduate education as well as policy for science and technology. The change might be ratified by general legislation (as contrasted with a reorganization plan) to expose the issues to debate and

to secure positive Congressional action. One persuasive reason for seeking legislation is that the debates in Congress would assist in generating Congressional understanding and support, and a feeling that OST is adequately responsive to Congress while remaining responsible to the President. On the other hand, there is the possibility that legislation might result in an unwanted set of functions and an awkward administrative structure. If it is decided that legislation is not desirable, the necessary broadening of functions could be brought about by Presidential action.

As between a new statutory Council and a revision of the charter of OST (either by Presidential action or legislation), the Task Force recommends that a Council be established by law, although either alternative would result in marked improvement of the capability of the Executive Office to serve the President and to help Congress. The reasons for preferring the statutory Council are these:

- Science and education are now as significant to the national welfare as economic development, and the federal role in these areas is expanding and becoming more complex. It is important that Congress ratify this estimate.
- A new statutory Council would avoid the strong coloration of science and technology that would follow from putting the combined functions in OST.
- The Council form would provide for the expression of varying philosophies by persons with dissimilar backgrounds.
- Establishment of a Council by law would expose issues to broad public debate and would ratify the operation in the eyes of Congress.

E. Consider the Establishment of a New Cabinet Department of Higher Education and Science

The Task Force considered the establishment of a new Cabinet Department of Higher Education and Science as a means of dealing with many of the problems cited earlier in this report. As a general principle, it is desirable to place as many of the functions of the Executive Branch as possible in operating departments and agencies in order to keep the responsibilities of the Presidency within manageable bounds. However, in this case, the Task Force was unable to define the functions of a new department in a manner that would provide a broad, coherent set of tasks while keeping to a minimum the interfaces and points of overlap with other agencies.

While the functions of higher education and science are in many respects coherent, such a grouping would present obvious questions and problems:

- Should the Federal Government be organized so that responsibility for higher education is separated from other education?
- Should responsibility for science be separated from responsibility for technology?
- Might it not be advisable to consider establishing a broad Department of Education, and a separate Department of Science?
- Should the education function be split off from the health and welfare functions, involving a significant shift in the philosophy underlying the existing Department of Health, Education, and Welfare?

In the judgment of the Task Force, the next practical steps involve changes short of the establishment of a new Cabinet department. It is in fact possible that the establishment of the proposed statutory Council on Education and Science would serve adequately for the foreseeable future the functions of a new department, and that the key functions are those that can be performed effectively only as part of the Presidency. For all of these reasons, issues involved in establishing a new department should be studied intensively, and the Task Force has prepared alternative suggestions as part of the base for such a study (Tab A).

TAB H

Some Alternatives for Consideration in Connection with
a Cabinet Department of Higher Education and Academic Science

While the Task Force does not recommend establishment of a Department of Education and Research, it does recommend that the pros and cons of such a step be seriously considered. The discussion below is intended to suggest some plausible alternatives, and the issues raised by each.

Alternative I: Minimum Grouping

The central functions of the Department of Education and Research would be those performed by NSF, OE and the National Foundation for the Arts and Humanities. We should consider together education and research; science, social science, humanities. These organizations, their statutory authority, funds, and personnel would be transferred to the new department.

The argument for placing the NFAH in the Department is that the problem is not simply one of science or education.* It involves all disciplines at all levels:

- Science is only one important part of education.
- Science will be most creative in a broad environment. Left to itself or supported disproportionately, it may be destructive of human society and disruptive of educational institutions. Its results must be formed by contact with the humanities and social sciences.

* The plan would include that part of the Federal effort in the arts that relates to education and research under the humanities. The balance of the Federal effort in the arts would be reorganized into an independent office including the National Endowment for the Arts, the Kennedy Center, and other appropriate agencies.

The organization of a Department of this scope below the Secretary and Under Secretary would consist of Assistant Secretaries for general education, for research, and for broad disciplines. This last Assistant Secretary would be the staff and coordinating officer. Under him, science, social science, humanities and arts would come as disciplines. He would work with the National Science Board and the Arts and Humanities Councils. He and each of the Councils would be required to make reports to the President and the Congress.

Under the Assistant Secretary for Education (General) would come the activities of the Office of Education.

Under the Assistant Secretary for Science would come the National Science Foundation.

Alternative II: Expanded Group

In addition to NSF, OE and NFAH, include Federal Laboratories which are not closely linked to performance of the central statutory responsibilities of existing agencies. This would include the Bureau of Standards (NBS) as a minimum, and as a maximum would include not only the Bureau but those laboratory activities relating to study of the environment (ESSA).

The arguments for placing laboratory operations in the Department are:

- Operation of laboratories gives those who operate grant and contract programs a feel for the needs of scientists.
- NBS and ESSA have important functions which cannot develop adequately within the Department of Commerce.

The arguments against inclusion of these organizations are:

- The functions of NSF and OE alone constitute adequate scope for a Department, and the addition of other organizations and functions would complicate the task of organizing and operating the Department.
- The inclusion of ESSA in the new Department would forestall a re-grouping of research functions in a department centered around investigation of the environment.

Alternative III: Maximum Group

A maximum option would be creation of a Department of Education and Research consisting of the OE, NSF, NFAH and the proposed Social Science Foundation, relevant life science programs of NIH and the VA research program.

Arguments for such a maximum reorganization proposals are:

- It would correct the fragmentation of education and academic science responsibilities that now exists.
- It would emphasize the commitment of the Federal Government to education and science.
- It would make possible, for the first time, comprehensive policy planning, goal-setting, program evaluation, and administration for both education and academic science.
- It would establish an undeniably strong central focus in Government, at the Cabinet level, for science cum education.

Arguments against such a maximum reorganization are:

- The strengths of separate identities (NSF, VA, NFAH, NIH) would be diminished excessively.
- It would be too large and diverse to be administered well.
- Political constituencies (medical, veterans) would fuse to block any chance of enactment.
- It includes so much (NIH, VA) that it is unwieldy and excludes too much research components of DOD, AEC and NASA that it is not actually comprehensive.

In the judgment of the Task Force, these arguments against a maximum group are weighty and attention should be centered on the further development of Alternatives I and II, above.

The Task Force also considered placing responsibilities for manpower training--OEO programs, Department of Labor programs, rehabilitation from HEW and veterans training programs in the new Department, but decided not to make such a recommendation. In addition to the contra arguments presented above, the Task Force was of the opinion that responsibilities for training segments of the labor force would further diffuse and complicate the work of the Department, and remove training activities from their base of political support.

Followup

October 11, 1967

MEMORANDUM FOR Honorable Ivan Bennett
 Deputy Director
 Office of Science and Technology

In accord with our earlier conversations, this will confirm that you will replace Director Schultze as Chairman of the Task Force on Administration of Academic Science Research Programs. A copy of the memorandum establishing that Task Force and setting forth items which should be considered is attached.

In lieu of the interim report requested in that memorandum, please submit a report on the work of the Panel on Research and Graduate Education established by the Task Force on Education under your chairmanship.

The Task Force should then go on to consider the other items mentioned in the attached memorandum, specifically focusing on:

- Long-range budgetary and program issues related to academic science.
- Improvements in the administration of Federal academic science research programs.

The report on this second phase of operation should be submitted by June 1, 1968.

Joseph A. Califano, Jr.
Special Assistant to the President

Attachment

cc: Director Schultze

JAC:JCG:caw

BOB
Analysis

UNITED STATES GOVERNMENT

Executive Office of the President
Bureau of the Budget

Memorandum

TO : The Director

DATE: October 25, 1968

FROM : Economics, Science and Technology
(Hugh F. Loweth) *Loweth*SUBJECT: Analysis of Report of Task Force on Administration of
Academic Science

This task force was initiated by the White House last fall (1967). Since the short term budgetary concerns of the task force would have overlapped with the work of last fall's Task Force on Education and its Panel on Research and Graduate Education (chaired by Dr. Bennett of OST) it was agreed by Mr. Califano that the Task Force on Administration of Academic Science (also chaired by Dr. Bennett) should focus on

- long range budgetary and program issues and on
- improvements in the administration of academic science programs

and report by June 1, 1968. The report has just been completed.

The only recommendation of any significant immediate impact is that calling for more money in the NSF 1970 budget to buttress support of academic research.

Recommendations

A. Establish more stable funding for academic science.

- BOB and OST should prepare a three year indicative plan for Federal support of academic science beginning with the FY 1971 budget. The establishment of the planning process should be explicitly noted in the Presidential Budget Message for 1970.

Comment: The idea behind this is that the academic community should be given some assurance of the minimum level of Federal support over a period of years. This may also be meaningful - according to the TF - in indicating to Congress that integrated budgeting is taking place.

Budgetary impact. None per se.

Next steps: Consider whether to mention in Budget Message. In view of the present state of and current reaction to the level of Federal support of academic science, any statement in the 1970 Budget Message about the importance of an "indicative plan" might appear a little inconsistent.

- Increase the 1970 NSF budget to provide overall Federal support for academic research at least at the 1968 level allowing for cost increases--with emphasis on institution-wide grants to give colleges and universities greater flexibility in dealing with their research needs... Also for 1969 raise the NSF expenditure ceiling by \$25M.

Comment: This relates to determining what the total level of Federal support of academic research should be, how much the mission agencies are providing and determining to what extent the NSF should make up for the differences.

Budget impact: Would require $\pm$ \$100 over the \$400M target given by the Bureau to NSF--based on present staff estimates of mission agency support of academic research. (Bureau target NOA for NSF of \$400M would provide some \$255M in NSF support for academic research--about the same as 1969).

Next steps: Wait until Director's Review on NSF (November 25) for final consideration of recommendation.

B. Continue and strengthen the existing system of pluralistic support.

- Mission agencies should continue to finance academic research related to their missions.

Comment: Represents no change in current policy.

Budget impact: None

Next steps: None

- Enhance the flexibility of Federal support of colleges and universities.

Comment: This means making additional funds available on an institutional basis for research and related activities selected by institutions. This relates to further boosting the kind of support recommended above to be provided by the NSF in 1970 and also boosting similar support under the NIH.

Budget impact: None immediately and uncertain in the future. Such funds might in part be in lieu of growth in project support.

Next steps: None for 1970.

- Establish NSF as prime source of Federal funds for academic science.

Comments: Instead of NSF being a "balance wheel" it should become the major source of Federal support (NSF now provides less than 15 percent of Federal academic research funds).

Budget impact: None, immediately. Would involve in the long run transfer of some support from the mission agencies to NSF.

Next steps: None in 1970.

C. Improve the administration of Federal academic science programs.

Comment: This involves a series of recommendations calling for the BOB to reduce inconsistencies in agency policies and procedures, establish overall policy guides, cushion the shock of unexpected restriction of funds through promoting such devices as step funding, etc.

Budget impact: None

Next steps: None immediately.

D. Improve the organization of the Executive Office for science and education.

- Alternative A. Establish a statutory Council of Advisers on Education and Science.
- Alternative B. Broaden and strengthen OST.

Comment: These recommendations relate to the need for developing longer range policies toward support of academic science and the need to integrate policies for science and higher education.

Budget impact: No significant impact.

Next steps. None immediately. Should await new administration and consideration of broader organizational issues involving Executive Office.

E. Consider the establishment of a new cabinet department of Higher Education and Science.

Comment: This recommendation also relates to the need for a closer coupling between science and higher education.

Budget impact: None immediately.

Next steps: Presumably will be held over to the new administration and considered in the light of broader organizational concerns.

(Fiscal years; in millions of dollars)

Descriptive title of legislative or budget proposal	Adminis- tering agency	Action required *	1969 Base		Proposed Task Force add-on over 1969 base				
			BA	BO	1970		1972		
					BA	BO			
Increase NSF 1970 Budget to assure adequate minimum Federal support of academic science	NSF	C	*195	*200	‡100	‡20	‡110	‡100	**
<u>Total</u> NSF			(400)	(463)					
* Portion of 1969 funds available for academic science (research)									
* Portion of total NSF increase attributable to academic science (research)									

* Specify whether required action is (A) new legislation, (B) legislation which simply increases the dollar authorization, or (C) budget increase without any legislative changes.

Proposed Task Force add-on over 1969 base				1970 Budget add-on over 1969 base				Comments
1970		1972		Agency request		BOB recom- mendation		
BO				BA	BO	BA	BO	
±20	±110	±100	**125	**40	-0-	10		Task Force made no dollar recommendation. Add on, if any depends on what mission agencies provide.
			(238)	(87)	(0)	(17)		

legislation which simply extends the program or increases
legislative changes.