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ABSTRACT

This report is one of a series of papers on policy alternatives commissioned by the California Legislature's Joint Committee on the Master Plan for Higher Education. Most of the papers are directed toward synthesis and analysis of existing information and perspectives on the role of research in California. Topics cover the categories of research and development, current research policy, assessment of research, segmental research aspirations, research policy in other states, emerging federal policy, policy alternatives, and conclusions. (MJM)

THE ROLE OF RESEARCH IN CALIFORNIA HIGHER EDUCATION

Lewis B. Mayhew

PREPARED FOR
JOINT COMMITTEE ON THE MASTER PLAN FOR HIGHER EDUCATION
CALIFORNIA LEGISLATURE

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FOR HIGHER EDUCATION

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This is one of a series of policy alternative papers commissioned by the California Legislature's Joint Committee on the Master Plan for Higher Education.

The primary purpose of these papers is to give legislators an overview of a given policy area. Most of the papers are directed toward synthesis and analysis of existing information and perspectives rather than the gathering of new data. The authors were asked to raise and explore prominent issues and to suggest alternatives available to the Legislature in dealing with those issues.

The Joint Committee has not restricted its consultants to discussions and recommendations in those areas which fall exclusively within the scope of legislative responsibility. The authors were encouraged to direct comments to individual institutions, segmental offices, state agencies - or wherever seemed appropriate. It is hoped that these papers will stimulate public, segmental and institutional discussion of the critical issues in postsecondary education.

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FOREWORD

This report is one of two policy alternative papers* prepared at the request of the California Legislature's Joint Committee on the Master Plan for Higher Education. The papers are intended to be complimentary. They were written against a background of detailed studies of graduate and professional education and state, regional and institutional long-range planning conducted by the author from 1966 to 1972. In connection with those studies, information from a number of sources was obtained. During 1966 and 1967, visits were made to one hundred and fifty-six developed and developing universities to discover at firsthand plans for graduate and professional education to 1980. In addition, the same institutions were asked to fill out rather detailed questionnaires focused on the same subject. That effort resulted in a report by Lewis B. Mayhew and Robert A. Chapman entitled Expansion of Graduate and Professional Education, 1966-1980 (Stanford: Academy for Educational Development, 1967). An extension of that study was undertaken at the request of the Carnegie Commission on Higher Education. It was conducted through questionnairing all advanced degree-granting institutions in the country and resulted in the publication

*The other paper is entitled "Graduate Education in California"

of a report by Lewis B. Mayhew entitled Graduate and Professional Education 1980 (New York: McGraw-Hill, 1970). As outgrowths of those efforts, two additional studies were undertaken at the request of the Southern Regional Education Board, which resulted in the publication of two research monographs: One, Lewis B. Mayhew, Changing Practices in Education for the Professions (Atlanta: Southern Regional Education Board, 1971); and the other, Lewis B. Mayhew, Reform in Graduate Education (Atlanta: Southern Regional Education Board, 1972). A further study was made through questionnaires, interviews and analysis of all statewide planning reports to determine what plans for graduate and professional education were anticipated in each of the fifty states. Because of the preeminence of California in the expansion of graduate and professional education, a substantial proportion of the just-cited reports derive directly from recent California experience. In addition to these works of the author, relevant material was also obtained from three doctoral students working under the direction of the principal author. Fred Nelson conducted a detailed study of the relationship between public and private higher education in California, giving specific attention to emerging plans. Keith Binford compared how educational decisions were made in California with a sample of the rest of the states in the nation. Jerome Walker conducted an intensive study of the operation of California's Master Plan, in an effort to anticipate likely changes.

These studies quite naturally contributed to a definite point of view on the part of the author - a point of view which is reflected in the two policy alternative papers. Overly simplified, the previous studies revealed that there had been an over-expansion of graduate education, and that if institutional plans were realized, the nation's universities would produce a serious oversupply of graduate-trained individuals. Plans for this excessive expansion also called for radical increases in the amount of research that university faculties would undertake, and a concomitant reduction in teaching responsibilities. Almost half of the 150 institutions examined revealed plans to reduce faculty teaching loads to one course a term or semester - with the expectation that funds for the inevitable increase in faculty size would be provided by state government.

Such plans appeared to be quite unrealistic for several reasons. Many of the institutions planning radical expansion of graduate education and research possessed neither experience nor potential for the anticipated new mission. Many states in which substantial increases in graduate education and research were anticipated had historically demonstrated an inability to support even modest higher educational efforts. Hence it appeared improbable that a state such as North Carolina could realistically support major graduate education and research expansion in all of its public institutions. Most plans for expansion

seemed to assume an exponential increase in financial support for both graduate education and research into the foreseeable future. But local, state, and federal governments were constrained to use limited resources for serious social problems other than education. A comparison of anticipated output of advanced degree recipients with anticipated employment possibilities also suggested that the need for college faculty members and other highly trained people had been considerably overemphasized. If university plans of the late 1960s were actually realized, the nation would be producing about 70,000 doctoral degree holders a year by 1980; but, by 1980 not more than 20,000 new degree holders would be needed in the traditional roles which they had previously occupied. Thus, the author is convinced that some retrenchment in graduate education and existing forms of research seems appropriate. Further, the author is convinced that significant changes in the nature of graduate education and research are essential, particularly if such critical problems as urban decay, environmental blight and poverty are to be solved.

Policy alternative papers dealing with such complex matters as graduate education and research are particularly difficult to prepare. Most of the issues involved in both subjects cannot be resolved through presenting hard evidence which proves conclusively that one alternative is preferable to another. There are strongly held opinions and closely reasoned arguments, and some statistical evi-

dence as to trends. However, in the final analysis, questions such as should or should not university research be encouraged, rest on value presuppositions. It happens that in the United States, especially since World War II, much research effort has been concentrated in universities. However, other alternatives were available to the United States to meet its research requirements. For example, the creation of independent research institutes and other options have been taken by such industrialized nations as Japan, France, and Germany. All of this means that these alternative papers must present arguments based on opinions, trends, historical antecedents and analogies, and that other interpretations and conclusions than those suggested are clearly possible.

The uncertainty of precise resolution of the issues considered in the two alternative papers dictated the methodology employed in the study. Clearly no formal hypotheses could be posited and established, nor could there be any experimental testing of conclusions. Rather the task was to explore generally the domain of opinion and practice with respect to university-based research and graduate education and to formulate ideas regarding possible directions. As a first step recently published literature was examined, including Strickland, Sponsored Research in American Universities and Colleges (Washington: American Council on Education, 1967); Paul L. Dressel and Donald R. Come, Impact of Federal Support of Science (Washington: National

Science Foundation, Contracts No. NSF-C-506, 1969); Harold Orlans, Science Policy and the University (Washington: The Brookings Institution, 1968); and Alvin M. Weinberg, Reflections on Big Science (Cambridge: The M.I.T. Press, 1967). Especially helpful in this review was a full review of all of the reports and sponsored research studies published by the Carnegie Commission on Higher Education. Most of those had some relevance for the subject but a few bore directly on the issues to be considered. These were: Dael Wolfe, The Home of Science; Earl F. Cheit, The New Depression in Higher Education; Harold Orlans, The Non-Profit Research Institute; and Harold L. Hodgkinson, Institutions in Transition, and the Commission Report The More Effective Uses of Resources. All of these are published by McGraw-Hill and collectively form a substantial background for the two alternative papers.

A second technique to be used was to discuss with or correspond with scholars in other parts of the country who were dealing with the same issues in various states. Among those were Kenneth Anderson, examining research and graduate education in Kansas; Paul L. Dressel, examining the same matters in Michigan; John Millett, who had written exhaustively about the subjects as they pertain to Ohio; and Lester G. Anderson, doing the same for Pennsylvania. In all, some thirty scholars were contacted either in person or through correspondence to obtain information for these papers. Next, letters were sent to the heads of state sys-

tems of higher education in the more populous states - such as New York - requesting master plans, policy statements and opinions about possible new directions. Almost a hundred percent response was obtained. Similar letters were sent to the heads of the three regional compacts and the Education Commission of the States. To obtain information about California, letters were sent to the chancellors of all branches of the University of California and the presidents of the larger state universities, requesting plans, reports, policy statements and opinions. While the information received varied from campus to campus, several campuses provided rich and substantial information (notably University of California, Berkeley; University of California, Los Angeles; and California State University, San Jose). After digesting this information, visits were made to the central offices of the University of California and the California State University and Colleges, as well as to several campuses within each system. Generally, in a day of interviewing, conversations were held with principal administrative officers and individuals who seemed to possess relevant information. As an item of serendipity, during late June and July the author conducted a seminar on higher education policy for representatives of some twenty-five different institutions throughout the nation. To gain benefit from the collective experience represented in the seminar, the issues facing California were posed and discussed comparatively with issues faced in other

states. The next and last device was, of course, to reflect on this welter of information and to compose the two reports. Ideally, the reports, when drafted, should have been submitted to a panel of experts for criticism. However, time limitations prevented this step from being taken. Hence, what results in the form of the two alternative papers are the author's own thoughts, based on the kinds of experiences described in this introduction.

It should be clearly pointed out that the two subjects of the papers are highly controversial and stimulate strong feelings on the part of people holding radically different viewpoints. Thus, commentary on the subjects is likely to be controversial although the author has made a serious attempt to present all sides of the issues being analyzed. It is hoped that these papers contribute to essential wide-ranging discussion on the part of many constituencies, for it is only out of such discussions that sensible state policy can emerge.

INTRODUCTION

In a sense the principal option open to the California Legislature is whether or not tc amend two provisions of Division 16.5 of the Education Code, and if to be amended, in what direction. The two provisions are: ". . . that the University of California is the primary state-supported academic agency for research," and that within the California State University and Colleges "faculty research is authorized to the extent that it is consistent with the primary function of the CSUC and the facilities provided for that function." But a more fundamental question is involved, which is to what extent is the theory - upon which the California Master Plan is based - that diversity shall be obtained through a segmented system of education, still valid? If it is, how may the principle be made more operative? And if not, what alternative principle should be adopted? From these issues derive a number of other possible options, but the specific decisions about them depend upon the posture taken concerning segmented education with defined role and scope for each segment.

The concept of educational division of labor is premised on the assumption that different people require different educational experiences and that these may be most effectively and efficiently supplied through different sorts of institutions, each stressing work for which it is uniquely fitted. Thus community colleges, not excluding lower division preparation for some students wishing to transfer to

a four-year institution, are designed to provide technical-vocational and sub-professional preparation and to offer a wide variety of non-degree courses for the adults of the community. The State University and Colleges, rooted in a strong tradition of teacher preparation, offers Bachelor's degree work in the Arts and Sciences and vocational and professional work for which the Master's degree is the appropriate terminal preparation. While the University of California is not expected to divest itself of all concerns for Bachelor's degree programs in the Arts and Sciences, it is expected to concentrate the bulk of its efforts on advanced graduate training, preparation for the major professions such as law and medicine, and to conduct research (not only in the traditional fields defined by its land-grant status, but in all emerging fields as well).

Other states have not followed this pattern, and part of the problem facing the Legislature is to determine whether other patterns might be more appropriate. Michigan maintains three major universities and a number of regional universities, each possessing some distinctiveness but with no specific limitation placed on the function of any one. In Ohio, the state elected to support the Ohio State University and the University of Cincinnati until they achieved status as comprehensive universities, and then to allow the regional universities to evolve according to their strengths until they, too, might achieve comprehensive university status. These and other states such as Florida, Louisiana, Kansas

and Indiana seem to have adopted competition as public policy on the grounds that encouraging reasonable competition between institutions is an important way to secure educational excellence. Comparative evidence to support the superiority of any one state's posture over any other is difficult to discover, because educational effectiveness is so affected by region, relative wealth, traditions, and the like. However, M. M. Chambers observes that there is no persuasive evidence that either California or Michigan has been more effective than the other in extending educational opportunity to its citizens, produced better graduate education and research through its senior institutions, or made more economical use of resources in support of higher education. Yet California has maintained a structured system of higher education while in Michigan, until quite recently, an almost unstructured and uncoordinated non-system of higher education has prevailed.

Within California there are clearly marginal degrees of satisfaction with segmented education as well as varying interpretations as to the full meaning of the concept. Leaders in both the community colleges and the California State University and Colleges believe that the principle of segmented education is sound but should be rigorously enforced. Thus, the community college position holds that community colleges should assume the bulk of the burden for lower division education but with the caveat that state resources should replace considerably the local resources which support the system. In the State University and Colleges system, the

view prevails that those institutions should be distinctively concerned with undergraduate and graduate education up to the Master's degree and that they should logically graduate the large majority of students who receive Bachelor's degrees. Such a role would leave the University of California free to concentrate on advanced professional and graduate work and on research supported both by the state and by other sources as well. Thus CSUC leaders in the system office believe that the University of California's policy of developing and maintaining comprehensive universities - each with a full complement of undergraduate students - is in violation of the spirit of the California Master Plan. Officials from UC, however, argue that the presence of undergraduate students is beneficial to the intellectual tone of each campus and provides a well-trained and logical pool of candidates for advanced graduate and professional education.

CATEGORIES OF RESEARCH

Such a seemingly simple, but actually complex issue must be resolved - but only in the context of a deep analysis of the nature of undergraduate education, graduate and professional education, and research. It seems wise to turn first to the matter of research not only because of cost factors but because the nature of university research is so generally misunderstood. Research is widely listed as one of the three over-arching purposes of higher education - along with teaching and public service. And research is generally hailed as an essential correlate of successful college and university teaching. Yet research is rarely treated in any analytical, evaluative or even normative way in the literature of higher education.

Course-Related Research

Within California institutions of higher education various categories of research are carried on but in differing degrees in the different segments. The first of these is research and scholarship necessary for professors to prepare their courses and to bring fresh insights to the attention of their students. It is the belief in the value of this research which allows faculty members to spend 6, 12, or 15 hours a week in formal teaching, a workload which seems light when compared to other occupations - for example, medicine. The reasoning is that other time will be spent in acquiring the new knowledge which will make teaching a vital act and learning a vital experience. Of course,

there is no good way of determining just how much time faculty members spend on this sort of activity or how effectively. Several national surveys (for example, an unpublished survey at the University of South Florida, 1971) asking college and university professors how they spend their time suggest that a total weekly workload of 53 to 60 hours is the rule regardless of type of institution surveyed, and that the amount of time spent in formal classroom contact with students ranged from 6 to 12 hours on the average. This would seem to allow for considerable time spent in course-related research. And faculty members testify that class preparation is a time-consuming activity, but the continuing stereotype of professors using yellowed notes suggest that for at least some professors research and scholarship in connection with teaching is not a vital activity. However, from the standpoint of policy there seems little room to question the theory that this kind of research is essential and should be encouraged at all levels.

Graduate Student Research

The second category of research is that conducted to prepare graduate students. The rationale is that the essence of graduate education is preparation for research and scholarship and that the only valid preparation is the actual conduct, under guidance, of research and scholarly projects. In theory, an ideal exemplification of this kind of activity would be a professor who has identified a research domain, subdivides it and requires each graduate student to work on one of the subdivisions, always under close supervision. And in practice this seems sometimes to be true, especially

in some of the science and technical applied fields. But there also is the strong impression that for perhaps the majority of all graduate students in all fields, the student selects his own project, gains approval from his advisor or a committee, conducts the study and then submits the results for approval first by his advisor and then by a committee through the device of an oral examination. It is revealing that none of the documents concerning research[1] prepared by the University of California, the California State University and Colleges or the Coordinating Council for Higher Education indicate the extent to which this idealized team approach is used. Rather there are generalized arguments that research and graduate teaching are inextricably related. Once again it is difficult to dispute the theory. Evidence abounds that highly successful research workers had early and sustained contact with a senior research worker as they concentrated on problems of mutual concern. But there is an issue as to how such ideal situations can be contrived and supported for all or most graduate students in California institutions. Officials of CSUC contend that the heavy mandated teaching load does not allow sufficient time for planning and managing joint research efforts, and that restricted budgets do not allow the requisite resources for equipment and other essential services. UC seems to assume that this kind of research-oriented instruction takes

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[1] For example: Charles Hitch, The Research Mission of the University of California, May 1, 1972; Louis T. Benezet, Faculty Research in the California State Colleges, Oct. 1, 1968.

place regularly, with time provided through the relatively light formal classroom contact load.

Intramural Research

A third category of research, although clearly not mutually exclusive from the first two, is basic or applied research supported by state or indigenous institutional funds. This category is most clearly exemplified by the approximately 40 million dollars of state-appropriated money which the University of California uses each year to support research in agriculture and on a few problems especially indigenous to the state. It is also exemplified by research projects supported directly each year by the University of California with its own funds obtained through endowment or from overhead funds derived from contract research. At the State University and Colleges the situation is different. No state funds are appropriated specifically for research although some use of college or university facilities is tolerated. In addition, the volume of overhead funds from contract research is limited because the magnititude of such funding is limited. Various study groups[2] have noted this seeming deficiency and the CSUC Board of Trustees has repeatedly requested an amount of approximately 5 million dollars a year to support research

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[2] For example, Benezet, op. cit.

projects. Thus far, the State Department of Finance has not seen fit to support such an appropriation nor has there been a tendency to modify budget procedures to allow state universities and colleges to redeploy resources to support research.

In other states, notably Florida, for each fulltime faculty position, a campus may budget a fraction of a research position as well as fractions of counseling, administrative, and service positions; and campus administrators are free to allocate these in different ways. This particular matter poses one of the most vexing of policy issues, for it raises the critical question of the relationship of education to research. If research is essential for a vital education program, as some evidence presented by the University of California suggests (a survey of undergraduate students provides impressive evidence that the presence of research and doctoral activity in an institution is positively correlated with a favorable total educational experience of the undergraduate students in the institution),[3] then the argument can be advanced that research on CSUC campuses should be sponsored and supported - if for no other reason than to enrich the intellectual tone of those campuses. On the other hand, if widespread research efforts lead faculty members away from concerns of

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[3] Charles J. Hitch, The Research Mission of the University of California, May 1, 1972.

teaching and of students - as is sometimes charged and even granted by university officials (the gains in graduate instruction and research at the University of California during the 1960s were essentially achieved at some cost to undergraduate instruction) - then a more restricted position regarding support of research seems warranted.

Extramural Research

A fourth category of research, which currently consumes the greatest portion of funds at the University of California is contract or sponsored research supported by funds extramural to the state or the institutions. In this category, either some external agency wishes research done for which a college or university is especially well qualified and contracts for its accomplishment, or else an outside agency provides funds for the institution to conduct research which it believes to be important. At the University of California, something on the order of 150 - 175 million dollars is expended each year for this kind of research, while the California State University and Colleges in 1967 received approximately 5 million dollars from outside sources to support research. The list of accomplishments from this kind of research has been impressive, ranging as it does from advances in atomic beam surgery and in the understanding of cancer viruses (at the University of California) to studies of inner school education and ecological factors

in Death Valley (at the State University and Colleges).

The research accomplishments in this category at the University of California have undoubtedly contributed to the prestige of that institution and its evaluation as the strongest overall university in the country. But there has also been complaint that while outside funds have supported this research, there has still been a substantial drain on the state as the University of California has appointed teaching assistants to replace tenured faculty who have concentrated on sponsored or contract research. There has also been serious complaint that a heavy research emphasis does draw faculty attention away from the needs of students, and there has at least been the charge that heavy research emphasis not only at the University of California but at other research universities such as Stanford, Chicago, and Harvard, contributed substantially to the causes of student unrest during the late 1960s.

The proper resolution of this quandary proves to be one of the most difficult policy issues to be resolved. There are those who marshall impressive argument that universities should divest themselves of large, externally supported research efforts in favor of separate independent research institutes such as Oak Ridge Atomic Energy Institute. But others argue first that the die is cast - that the American society has decided that universities are the most appropriate places for the conduct of research - and secondly, that a heavy research emphasis supported by outside funds helps universities do better those things for which they exist.

These categories of research are not mutually exclusive and are intended to be descriptive only. With respect to the overall policy issue of whether or not university research is valuable and whether or not it should be encouraged, it makes little difference whether the research is funded as support for teaching, graduate education, or as project research. There was a time when American colleges did not support research, and aspiring scholars sought a variety of other patrons to support their work. However, during the late nineteenth century, collegiate institutions became the favorite home for research through a continuation of the efforts of a determined group of scientists, the availability of large amounts of money in the fortunes of wealthy men, a generalized dissatisfaction with collegiate education, and the fact that no other haven for research made itself available. Once the university as the home of research became a reality, those interested in doing research then developed numerous mechanisms - each with a rationale or a rationalization to insure steady financial support. In a sense, departmental research related to instruction, research as training for graduate work, or organized research (regardless of source of funding) are really different instruments for accomplishing the same things - supporting research which scholars wish to do. Thus, in the following analysis, for the most part research will be used as a generic term.

DEVELOPMENT OF CURRENT RESEARCH POLICY

The evolution of research and research policy in California since World War II has been highly correlated with national tendencies. Before World War II, universities conducted large-scale research in a few fields such as agriculture, medicine, and engineering. For the most part, however, faculty members who did research did it on their own time and with relatively little outside assistance, and in spite of quite heavy teaching loads. The successful World War II experience of cooperation between the federal government and universities in research leading to such things as radar, the atomic bomb, and the proximity fuse created a climate conducive to rapid expansion of university-based research. New federal agencies such as the National Science Foundation were created to sponsor and support research, and foundations and businesses began to allocate large sums for university research purposes.

This sudden shift produced a climate characterized by faculty preoccupation with research, enlarged institutional aspirations regarding research, and a generalized feeling within higher education that research was the most significant and rewarding activity possible for a university professor. However, the new climate also produced some abuses (e.g., faculty members shirking institutional duties), considerable increase in the cost of higher education, and public and student backlash of such things as research supported by the Department of Defense. There is probably no systematic

way to reconcile such divergent viewpoints. But the intensity of the differences which divide people is well revealed in several expressed opinions. Gerard Piel contends that ". . . the principal casualty of the Federal grant system, . . . is the undergraduate . . . The burgeoning of contract grant research has downgraded the teaching function in all of these universities - with but a few notable exceptions - especially in the sciences, and including even graduate education." While Lee Dubridge argues that "Heavy teaching loads without research opportunities lead not to good teaching but to bad . . . No university I know will condone a gross neglect of teaching by any faculty member . . . Today some of the finest research scholars are doing outstanding teaching."[1]

Research policy in California has been set by a variety of forces and provisions. The Master Plan for Higher Education has designated the University of California as the primary agent for research and still allows the California State University and Colleges to conduct research consistent with that segment's educational missions. These seemingly clear-cut assignments have led to some confusion and the CSUC system has argued that research related to teaching properly should include a wide variety of substantive research efforts. The University of California seems to have sought, at least covertly, to maintain a limited definition of the research role for state universities and colleges. Arthur G. Coons,

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[1] Cited in Daniel S. Greenberg, The Politics of Pure Science (New York: The New American Library, 1967).

who was instrumental in producing the Master Plan, remarks that ". . . the University of California has tended to be on the defensive, and at times even earned the reputation of being more against State College desires, if not openly then covertly, than the situation demanded."[2]

But research policy has also been affected by federal policies and by policies set by local campuses. At the end of World War II, the federal government, in order to maintain the impetus for research developed so successfully during the war, opted to support research in non-governmental agencies, including universities, rather than create many research institutions itself. This decision, coupled with latent traditions in American universities and eventually with substantial infusions of federal money, created conditions in which UC could exploit its mandate to do research and the state colleges could seek to enlarge their research role. A broad interpretation of research, coupled with the availability of funds, led officials of most UC campuses to use research potential as a criterion for faculty appointment, research producitivity as a criterion for professional advancement and to aspire to be comprehensive campuses polarized around research (in the sense that Berkeley, U.C.L.A., San Francisco Medical Center and, to a lesser extent, Davis were). In a 1968 survey of graduate and professional edu-

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[2] Arthur G. Coons, Crises in California Higher Education (Los Angeles: The Ward Ritchie Press, 1968, p. 155).

cation, the author interviewed the chancellors of most campuses of the University of California and discovered that each proposed to stress research - hopefully, however, without hurting undergraduate education too severely.[3] Within the State University and Colleges, individual campuses also contributed to research policy by encouraging faculty to seek outside support, by using research productivity as an important (although not the sole) criterion for promotion, and by working constantly to overcome the limitations on research seemingly imposed by the Master Plan.

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[3] Lewis B. Mayhew, Graduate and Professional Education 1980 (New York: McGraw-Hill, 1970).

ASSESSMENT OF RESEARCH

Nationally

Ultimately, policy decisions about research for the State of California should depend on careful cost-benefit analysis of research both within the state and within the nation. But this is difficult except in a few isolated but dramatic incidents in which a particular research finding has led to great practical benefits. There are, of course, advocates of pure or basic research who reject all need for ultimate applicability of the results of research. For them it is enough to say that the quest for truth is man's highest virtue and that no further justification than the researcher's thrill of discovery is needed for scientific inquiry. However, such purists seem now in the minority as most members of the scientific community recognize that a comfortable research policy will require demonstrable gains for the public good.

On the positive side are the facts that since the end of World War II, university-based research has altered life in the United States and the world in radical ways. Pesticides have made the green revolution possible. Basic work in immunology has not only restricted the spread of contagious disease but made the transplant of human organs a reality. From the transistor has come not only a revolution in communications but the exploration of space. Advanced studies in genetics have not only changed agriculture radically but have provided promise of ultimately changing potential human disorders even before birth. However, this rosy picture must be tempered by other evidence. During

most of the post-World War II period, the Department of Defense has been a major supporter of basic university research. Yet, when Operation Hindsight attempted to trace the research origins of twenty major defense systems, it discovered that the contributions from basic research, much of it conducted in universities, were quite small and of little importance.[1]

Similarly, there is conflicting testimony regarding the impact of post-World War II research on American universities. There is one argument that contends that the post-World War II expansion was a straight extrapolation of trends established in the late nineteenth century.[2] This position implies that a major research emphasis has allowed universities to fulfill their proper destinies and that without research, both education and service would suffer. While there may have been a few abuses and a few examples in which a research emphasis has added seriously to the cost of universities, the benefits far outshadow the costs. Specifically, it is argued that the contemporary emphasis on university research has made American institutions the pacesetters for the world - a position once occupied by the German universities. It is contended that research has enriched teaching as well as produced a cadre of doctoral research workers who will be able to staff an ever larger and more productive research

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1 Cited in Daniel S. Greenberg, The Politics of Pure Science (New York: The New American Library, 1967).

2 Dael Wolfe, The Home of Science (New York: McGraw-Hill, 1972).

effort in the future. The quest on the part of developing institutions to enter the research fields has produced an ever-expanding number of centers of research excellence - a feat no other nation has been able to duplicate. The rise of such institutions as Michigan State University, Pennsylvania State University or the State University of New York at Stony Brook was made possible in large measure because of expanding research activities which allowed these institutions to recruit outstanding faculty members. Federal support of research, far from controlling institutional direction, has, as a rule, given institutions the financial latitude to do better those things for which universities were intended.

However, another view is possible and can be documented. The national preoccupation with research and the rewards associated with it have tempted many institutions to seek excellence in research and graduate education for which they had neither the traditions nor resources. Presidents of developing institutions in the late 1960s confidently expected their faculties to shift from a position of overall devoting 5%-10% of their time to research to one in which they would devote 33% to 50% of their time to research. This, were it to happen, would first place a serious demand on institutions for additional faculty just to staff courses, but would require such additional financial support from the states and federal government as to seriously dislocate other social priorities.

Paul L. Dressel and his associates, after carefully examining the impact of federal support on Michigan institu-

tions, reached the conclusion that outside support of research through contracts and sponsorhip has seriously curtailed the abilities of presidents and boards of trustees to govern their institutions. In Michigan at least, the emphasis placed on research produced an exodus from teaching and a disinterest in undergraduate education. Also, the availability of research funds encouraged faculty members and institutions to aspire to inappropriate roles, leading among other things to demands that states support more comprehensive research-oriented universities than state resources could reasonably tolerate. A case in point is the State of North Carolina in which, by designating most public institutions as part of two university systems, quite weak institutions were led to aspire to be centers of research excellence.

Relatedly, as the research emphasis evolved during the 1950s and 1960s, partly as a result of the federal policy of subsidizing large-scale research installations, institutions came to be involved with managing large scientific centers having only a remote relationship with the rest of the university. Big science is a natural outgrowth of a preoccupation with research. It has been argued by Alvin Weinberg that the degree to which a university embraces large project research efforts, such as the linear accelerator at Stanford, the less able it is to conduct its educational mission. Says Weinberg:

> My own view is that the universities' central purpose - education, coupled with Small Science - is compromised if the university becomes undistinguish-

> able from the federal laboratory; and that the federal laboratory's ability to mobilize sharply and decisively around the most urgent national problems declines if the laboratory becomes undistinguishable from the federal grant university. Each must retain its own characteristics; each must maintain its identity and integrity.[3]

California

To gauge the impact of increasing emphasis on research during the post-World War II period in California is no easier than to assess impact nationally. Economists are just now developing analytical tools which could aid in that process. Thus recourse must be had to testimony, informed opinion, and items of induction evidence. The California Master Plan gave a mandate to the University of California to be the "primary state-supported institution for research," and the University has sought diligently to perform that role excellently. It has attracted a distinguished faculty and large amounts of outside financial support. It has received recognition as perhaps the nation's most outstanding university. And in the eyes of the leaders of the University, it has ". . . contributed notably to mankind's general fund of knowledge, and specifically to the solution of social problems, depending upon application of that knowledge." The research posture of the University of California has also affected the kind of faculty assigned, for research and publication are judged as essential for promotion, salary increases or advancement to tenured positions.

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[3] Alvin M. Weinberg, Reflections on Big Science. (Cambridge, Massachusetts: The MIT Press, 1967, 173).

The State University and Colleges has also been affected by the overall climate of emphasis on research. Some of the institutions have attracted some extramural support, especially in the sciences, although obviously not at the level of the University of California. And others are actively seeking outside funds. Faculty members, particularly in several of the larger universities such as San Francisco, San Jose or San Diego, have chafed under the restraint of being restricted to research related to the teaching mission of the institution, and have sought repeatedly to obtain a broader definition of allowable research. This desire for greater research responsibility was one of the powerful forces behind the quest of several of the state colleges for permission to grant the doctoral degree, and may have been involved in the finally successful drive to gain designation of some of the campuses as universities.

Perhaps something of the impact of the research climate on the California State University and Colleges can be sensed through considering the aspirations of several state colleges in 1968.

At Sacramento State, faculty engage in little research (average of 10 to 20% of their time) although this could increase to 33% by 1980. Federal foundation grants comprise and will continue to comprise the major source of support - but increased state support is expected. Faculty loads which, on the graduate level, will drop from 12 to 9 credit hours, will permit more time for research; but the effect of increasing pressure to do research will

raise total faculty responsibility.[4]

At San Francisco State a similar situation existed but with the expectation of the several deans that faculty involvement in research would rise to 25% by 1980 from an estimated 10% in 1968.

Such hopes expressed in 1968 could not be so confidently expressed in 1972, as is indicated by a series of questions posed by the Dean of Graduate Studies and Research in 1971 at California State University, San Jose. These clearly reveal an interest in research but considerable uncertainty as to the viability of a major research thrust.

Faculty and Student Research[5]

> Title V currently authorizes research in the State Colleges to the extent that such activity is consistent with our principal functions, undergraduate instruction and graduate instruction through the Master's level. With continuing discussions of joint and independent doctoral programs, the possibility of university status, the sharp curtailment of sabbatical leaves and creative research leaves due to limited legislative appropriations, and the general lack of State support for research:
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> 1. To what extent should research, creative, and scholarly endeavors be essential criteria for retention, promotion, and tenure if these activities cannot be supported by means of faculty released time, fiscal resources, and administrative support?

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4 These are the opinions of key administrative officials who were serving at Sacramento State in 1968.

5 Report of the Graduate Dean, San Jose State College, 1971.

2. To what extent should school deans and other college administration commit a portion of their budgeted funds in support of research and research-oriented activities in their respective areas?

3. Should staff time be diverted to support instructionally related research and research-related activities, and to support the development of such activities such as, for example, the establishment of school research coordinators and departmental research coordinators? If staff time should be used in this manner, how much time should be allocated and how can its use be best justified?

4. In the face of falling appropriations for sabbatical and creative/research leaves, how can institutional resources best be used to provide additional opportunities for faculty members to engage in research, and instructional development projects requiring at least one full semester for completion?

5. To what extent should the sabbatical leaves criteria be revised to give a higher priority to research and research-related sabbatical leaves?

6. In what ways can the amount of non-state funds annually appropriated for the on-campus Faculty Research Grants Program be increased?

7. By what means can the institution's capabilities to assist faculty and students in preparing proposals and obtaining grants be enhanced by providing additional personnel and operating support to campus offices responsible for these activities?

The impact of research on the level of the states' economy has generally been assumed to be great and beneficial. The extensive industrial development along the San Francisco Peninsula is frequently linked causally to the research orientation of Stanford, and the growth of the aero-

space industry in California is also linked to the research capacity of California institutions. The report on faculty research in the state colleges published in 1968 made a number of telling observations.[6] California leads all states in the employment of scientists. Almost half of the nation's Nobel winners live in California. From 1961 to 1965 the state acquired 38.5% of all federal and R & D funds. The heavy investment in quality higher education in California has been critical in enhancing technological and scientific development within the state.

However, careful search of relevant literature reveals little more than assertion that the economic benefits for a state from higher education and research are great. Empirical evidence is lacking except for some correlational sorts such as the Boston Route 128 or San Francisco peninsula cases. There is, for example, no evidence that university-produced research contributes more to the economy than say corporation-maintained research and development activities. Indeed, since such research may be more applied than would be generally true in universities, immediate economic yield may be greater from corporate efforts than from university efforts. Moreover, increased expenditures for research are obviously directed toward specific institutions and the economic gains may be considerable for the area surrounding the institution but not spread much beyond.

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[6] Louis T. Benezet, Faculty Research in California State Colleges, 1968.

One plausible hypothesis is that increased university research is more a product of an expanding state economy rather than a cause. The expansion of universities in Florida is a case in point. Once the two-pronged base to Florida economy (citrus and tourism) was expanded through the introduction of industry - using ligh materials to produce smaller, more transportable goods - the state could then afford new universities. Even this, however, is tenuous; thus the best advice is to question claims that expanding university research does modify the economy, and to attempt to determine through more careful economic research what the facts actually are.

Three of the most vexing issues which are central to a decision about university research are: (1) how a research emphasis affects education, especially undergraduate education; (2) the effect heavy research emphasis has on costs; and (3) how research affects several academic values such as academic freedom, responsibility, accountability, and professors' relationships and loyalties to the institution.

Once again the situation is mixed regardless of the category of research. The University of California position is that research enriches teaching, that whatever disengagement of research scholars from undergraduate teaching has taken place can be quickly rectified, and (citing data from the Carnegie Commission on Higher Education) that undergraduate students on research-oriented campuses appear more satisfied with their education than do students on other sorts

of campuses.[7] The study of faculty research in the State University and Colleges reaches a similar conclusion but does so almost in direct contradiction to the evidence it summarizes. It argues that research is indeed a necessary part of the connections between discovery and knowledge and the teaching function and that a group of institutions such as the California State University and Colleges could fulfill a useful leadership role by emphasizing the relationship.[8] The report further recommends that research at state universities and colleges should be fostered under an expanded definition of allowable research, both to eliminate the second class citizenship feelings of CSUC faculty members and to enhance their effectiveness as teachers.

Yet the summaries of argument for and against heavy involvement in research seem to favor the proposition that research does adversely affect teaching and education. On the one side it is argued that research whether supported by a department or separate grant, has drawn the best minds away from teaching. A professor presumed to spend about a third of his salaried time on research is just as prone to overemphasize that activity as is the professor who receives outside support for his research. Even when faculty members teach, they resist out-of-class contacts with students because they interfere with research and consultation. Since so much

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[7] Charles Hitch, op. cit.

[8] Louis Benezet, op. cit.

research has been related to defense and defense industries, students have come to question the morality of faculty and thus resist their pedagogical efforts. Outside funding of star research workers has allowed them to ignore or reject institutional educational goals. And the educational effectiveness of research-oriented universities is called into question by studies of graduates of liberal arts colleges who achieve far better on a number of measures than do graduates of most research-oriented universities. To counter this, proponents of research point to an overall enhancement of the quality of life because of research (scarcely directly relevant to teaching.) Even if research has contributed to student unrest, it is not the only element in the equation. Besides, research assures that students receive fresh knowledge; and some studies suggest that the most respected teachers are also highly respected and productive research scholars. (Here it should be indicated that only one study, that conducted at Tuft's University, clearly supports this contention. "Whether we like it or not, successful research is the most important determinant of professional status. Young faculty recruited to a state college system that only tolerates research can only be critical of the value structure of that system and the compromises he has made of professional expectation." [9]

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[9] Benezet, op. cit.

Additional light is shed on this subject by Dressel in The Confidence Crisis, a study of departmentalism. He identifies three kinds of departments in ascending order of preoccupation with research: university oriented, department oriented and discipline oriented. It is the university department which attends most to educational goals, stresses curriculum planning and emphasizes teaching. Members of departments at the other extreme seem simply to use the institution as a home base from which to conduct their research and consulting empires. Whatever teaching is done is at the faculty members' convenience and frequently by graduate students to preserve the professor's time for his own work.

The relationship between research and teaching is such a myth-laden subject that precise and broadly accepted generalization is almost impossible to make. Yet, if California institutions are to continue an educational mission, the issue must be faced and resolved. When all of the arguments and evidence have been digested, a rousing maybe seems indicated. Some research scholars do enjoy teaching; bring the fruits of their research into the classroom and some do not. Some research scholars do spend inordinate amounts of time counseling with students and some do not. Some research professors accommodate both their research and institutional obligations, while others abuse the freedom which light teaching loads allow. Some productive

scholars are highly regarded as effective teachers while others are seen as arid pendants contributing nothing of value to the education of students. When careful studies[10] of judged teaching effectiveness and research productivity are made, the relationships appear approximately zero - thus supporting the generalization of maybe yes - maybe no. All of this suggests that the matter of teaching should be largely disregarded in deciding policy for research regardless of category. If the University of California and/or the California State University and Colleges are to be encouraged to engage in research, it should be on other grounds - prestige, faculty satisfactions, economic or political.

The matter of costs in some respects is easier to answer - although those relating to benefits is not. Obviously, if faculty members shift from a 12-hour load to a 6-hour load on the presumption that the time freed from teaching will be devoted to research, increased cost results. If contract or sponsored research is conducted in university facilities and overhead allocations are less than full cost, additional expense to the university is entailed. If, a university, in order to attract capable research scholars must grant tenure to them as well as tenure to professors who teach, eventual additional costs are involved.

As a general rule, it would appear that costs of higher education in the United States began to increase at rates faster than other indices in the economy at the same time

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[10] See Lewis B. Mayhew, Report to the ESSO Education Foundation ("Annual Teaching Effectiveness Audit"; New York: ESSO Education Foundation, 1971).

universities were encouraged to enter research in extensive ways. Further, the increase in costs appear sharper in those institutions which stress research than in others which do not. It is revealing in this connection that a correlate of institutions which in 1972 are in serious financial difficulty are those which have taken advantage of many federal grants and those which have increased faculty salaries sharply - both correlates of a research emphasis. Thus the answer to the question does increased research emphasis produce increased cost is clearly yes.

The State of California is paying more because of the research emphasis of the University of California and will pay more if the California State University and Colleges are encouraged to pursue a more active research role. This is so important it should be reemphasized. If professors are freed from heavy classroom contact to engage in research, costs of classroom instruction rise, although presumably the instruction might be better. If professors spend a great deal of time devising and supervising graduate student research - generally on a tutorial basis, costs also rise. And if professors are provided specific state or other funds to engage chiefly in a research project, then the overall institutional expenditures will rise.

The policy issue thus resolves itself into the question of whether additional costs are warranted by additional benefits. And these are many. College professors are attracted to scholarship and hence are attracted to institutions which encourage and reward it. The results of some research have

been enormous economic benefits - which more than offset costs. The early development of hybrid corn is just an example. Results of research in the biological and health fields have revolutionized the practice of medicine as have research results from the physical sciences in aerospace, thus making possible flights to the Moon and even safer air travel. But how to quantify such benefits defies present technology. Research and education (as well as climate) have been associated with the expansion of the California population and economy. Also associated with the attractiveness of research and education has come overcrowding, exploitation of resources and a steady increase in tax levels to support the larger population and its needs. If all elements are considered and costed, what would be the overall value of heavy research emphasis? Even with such a caveat, probably on balance the research emphasis which has characterized California higher education most likely has been beneficial. But what the State's future role should be is still moot. Paul Dressel argues, and the Carnegie Commission on Higher Education strongly implies that the states should maintain or even increase support for the education offered by state institutions, but that the federal government should support research conducted in perhaps 100 national research universities. Those would certainly include the University of California (Berkeley and Los Angeles) and Stanford University.

Heavy research emphasis largely supported by outside funds has apparently not jeopardized the behavioral concept of academic freedom. At times there has been the fear that research funds controlled by agencies outside the university would provide that agency with unwarranted control over institutional matters. Several institutional studies,[11] and one interinstitutional study have largely exploded that belief. There are, of course, qualifications. Individuals and departments are influenced by the availability of funds and may modify somewhat the direction of their own work to obtain financial support. Department of Defense classified research contracts may have violated something of the spirit of academic freedom but these are being rapidly eliminated. And institutions which have relied heavily on federal funding for research have experienced problems when federal funding began to level off and even decline in some fields. To the extent that these strictures have forced institutions to eliminate staff positions or modify programs because of shifts in federal funding, institutional integrity may have been affected. But to arrive at this conclusion requires somewhat torturous reasoning.

However, other academic values such as institutional loyalty and responsiveness to student desires seem to have been eroded, especially during the 1960s. Discipline-

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11 Charles V. Kidd, American Universities and Federal Research Funds (Harvard University Press, 1959).

oriented departments - supplied with an outside economic and political base - seem to have been somewhat indifferent to institutional guidelines. The fact that the large research oriented institutions experienced the greatest intensity of student protest during the late 1960s may be related to the research and consulting preoccupations of the faculty. Institutional documents prepared in support of a major research emphasis may dispute such a conclusion but the view of thoughtful students who have examined many campuses as well as the results of several surveys point to the existence of such a relationship.[12] And a heavy research emphasis may have adversely affected a sense of colleagueship or community on college and university campuses. Walter Metzger has described the delocalization of university campuses as professors have been able to spend much time off campus, supported by extramural funds, dealing with problems which transcend campus boundaries.[13] With many professors, each dealing with his own specific research or the research of a limited number of close colleagues, there simply is no time or energy to relate with other elements of the campus community. And this seems true regardless of the source of support for research. There are, of course, gains,

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12 Seymour Martin Lipset, Rebellion in the University (Boston: Little, Brown, 1972).

13 Walter Metzger, Academic Freedom (Urbana: University of Illinois Press, 1969).

and these should not be overlooked. But the large research institutions are different places since research has come to be a major focus of attention. Stanford is probably no different from the University of California and on that campus convening committee meetings of senior professors is a difficult task largely because of outside commitments of faculty members (which include their own research.)

SEGMENTAL RESEARCH ASPIRATIONS

The various segments of California higher education obviously have different plans and aspirations. And, of course, it is the purpose of policy decision to encourage, modify or outright discourage those plans and aspirations.

University of California

The University of California clearly wishes to maintain and enhance its research emphasis in both applied and basic areas. All faculty members are expected to engage in research. While most research is related to teaching, much is still conducted which is not. The University continues to value this whether or not it is directed toward the solution of various social problems.

> To limit research goals to the solution of important contemporary problems seems undesirably restrictive. Very important research, even research which is not directly related to teaching - is sometimes undertaken with the conviction that a deeper understanding of fundamental issues is essential, though without any assurance that the research effort will be productive of results which can be applied to contemporary problems in the future. It is our certain conviction that a university must engage in fundamental research both on topics that have obvious bearing on contemporary problems and on topics that may appear to have no connection with any immediate or useful application to current needs of society.[1]

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[1] Charles Hitch, op. cit.

California State University and Colleges

The California State University and Colleges has somewhat different aspirations. The chancellor has a vision of institutions staffed by teacher-scholars who do scholarship and research to maintain intellectual reality, to assist in the preparation of graduate students, to bring fresh insight to knowledge and to contribute to the solution of some social problems. He sees no conflict of roles with the University of California - for the state universities and colleges would not engage in medical projects which require research to be divorced from teaching. While he would not prohibit basic research, he feels that much of what his faculty members would do would be applied. Thus he would value the preparation of a textbook as a significant scholarly effort, as he would a pilot project for teaching inner city children. However, he, the Board of Trustees, and the presidents of the several campuses all believe that such a mission requires definite state support in the form of limited research project funds and greater freedom to deploy faculty time to allow for research and scholarly efforts. High among needs are funds to provide several kinds of leaves of absence for faculty members who wish to do research, and a more equitable salary level which says in effect that the state values the teacher-scholar as much as it does the research worker.

California Community Colleges

Public community colleges, having an essentially teaching and service mission, adopt a different posture. They do not discourage individual scholarly effort but make no explicit financial provisions to support it. Research in connection with teaching, however, is encouraged, and most of the colleges have created the position of Director of Institutional Research to facilitate this task. Thus, unless community colleges were to be converted into four-year institutions and begin to compete with CSUC, there is no particular policy issue which must be resolved. There is, of course, the matter of the proportion of lower division students which community colleges should educate, and this does have implications for state research policy. Community college leadership, as exemplified by several presidents of large community colleges, would like a policy which directed all lower division students into community colleges, thus forcing CSUC and UC into upper divison education, graduate and professional education, and, of course, research. And this is an issue which the Legislature may ultimately need to decide.

Private Institutions

Research plans and aspirations of the private sector are similar to those in the public sector. The great private universities - Stanford, University of Southern California, and the Claremont group - all anticipate heavy involvement in research (both basic and applied) and tend to look at the University of California as an equal. The

private four-year colleges generally seek to accomplish a teaching mission enriched through appropriate and frequently small-scale research effort of individual faculty members. While the private universities are not the direct concern of the Legislature, the research efforts of several are clearly related to statewide research policy. This certainly necessitates that the University of California be aware of research emphases at Stanford and, when possible, avoid unneeded duplication of program.

Evaluating Segmental Plans

Describing research plans is easy - evaluating them is not. As is true of so many other portions of this paper, evidence of a persuasive sort is unavailable to prove much of anything - hence recourse must usually be had to assessment and argument. The University of California aspirations for research are based on some rather solid accomplishments. President Hitch, in his brief prepared for the Coordinating Council's Select Committee on the Master Plan, lists - campus by campus - a wide range of research projects under way, and an impressive list of accomplishments and honors. However, some questions remain. It is doubtful that a faculty the size of the University of California can possibly possess a large proportion of creative individuals who make the dramatic breakthroughs in knowledge implied by the listing of research accomplishments. Such breakthroughs must rest generally on the detailed work of lesser scholars; but again it

can be seriously doubted that the number of those who do underlying work of significance would be as large as 50% of the faculty. It should be made clear that there are no data to support these impressions - but the impressions do persist. This, if valid, would leave a large segment of the professoriate whose research work would be pedestrian at best and contrived at worst. Yet the University of California policies of requiring published evidence of research or scholarship demands that these individuals conform if they wish to remain faculty. Now, it may be that such a policy with its accompanying production of good and bad research, is the best way of insuring that the creative few do their work. This, however, flies in the face of what is known about creative people who do their work in spite of obstacles. A more relaxed policy which would allow creative research workers to do their work while others would be allowed to develop their careers through teaching and service could be viable and could improve the teaching contacts of those who chose not to concentrate on research.

Alternatively, if the University of California wishes to emphasize research to the degree it apparently does, does this not suggest a radical deemphasis of other activities, with perhaps a shift of undergraduate education to the State University and Colleges, the community colleges and institutions in the private sector? The Master Plan envisioned a variant of this scheme (i.e., a percentage decrease of lower division students) which has never been

accomplished.[2] It is generally argued that the presence of undergraduate students is essential for the desired intellectual mix of a university campus. But nowhere is there persuasive evidence of the validity of this concept. Rather, it might appear that political and economic reasons were the controlling ones supporting continuing substantial undergraduate effort - political in the sense that large undergraduate enrollments do support the research aspirations of departments. One department, for example, accepts large numbers of doctoral candidates, exploits them as teaching assistants for three years and then decimates their ranks through a single, extremely rigorous examination. The large number of teaching assistants are essential to staff the large undergraduate enrollments necessary to generate FTE support. But the field is overcrowded so the rigorous examination insures that only a few Ph.Ds are produced each year. Related is the matter of recent intensive efforts on the part of the President and the chancellors of the University of California to stimulate radical reform in undergraduate education. If these are necessary, does this not question the alleged compatibility of research and undergraduate education? If the state maintains its policy of division of responsibility through segmented higher education is there not reason to consider

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[2] Arthur G. Coons, Crises in California Higher Education (Los Angeles: The Ward Ritchie Press, 1968, p. 78).

an even more radical distinction between the three public segments? The idea of doing so has long existed in American higher education but has never really been attempted.

Similarly, the aspirations of the State University and Colleges rest on warrantable accomplishments. They have educated large numbers of California residents and have become the largest producers of Master's degrees, many in technical fields. With limited resources, many of their faculty members have contributed original scholarship and creative research. Many more have adapted results of research and scholarship to the educational needs of students. And the ideal of this teacher-scholar is an intriguing one, conjuring a vision of a university professor living for his students but keeping always abreast of the latest scholarship and doing research himself to maintain intellectual freshness.

Questions also arise concerning these dreams. The history of American higher education since World War II has revealed what an insidious thing is graduate education and research. With rare exceptions (Towson State in Maryland is one) faculties have fought for the right to reduce teaching loads, enter graduate education and engage in at least the manifestations of research. And with reason. The life of a research-oriented professor in the 1960s was a good life, including great personal freedom, reasonably adequate compensation, and a cloak for various activities of claimed uncertainties of research and creativity. Is there not the danger that if greater encouragement for research was given

CSUC faculty members, this would begin an inexorable evolution toward a full research-oriented institution?

Secondly, a major basis for the arguments of the State University and Colleges for more research is to improve faculty morale. Claimed high attrition among faculty is blamed by the presidents on the lack of research opportunities. Yet there are other sorts of institutions, located in much less salubrious climates, which stress teaching, produce well educated people, and maintain a highly stable and satisfied faculty. This suggests that if morale is the issue there may be other ways of solving the problem which could range from placing salaries on a parity with the University of California to increasing secretarial help for professors.

Thirdly, one gets the impression that CSUC faculties may not be as imaginative about their teaching as the rhetoric implies. Faculty decisions about curriculum seem to have been generally shaped by disciplinary considerations in spite of growing evidence concerning the developmental needs of youth. Would not greater encouragement of research tend to increase this disciplinary orientation? Some of the highly successful institutions such as Sarah Lawrence or Stephens College have discovered their programs moving away from the needs of students as they recruited more research-oriented professors.

RESEARCH POLICY IN OTHER STATES

California research policy is somewhat different from that found in other wealthy and industrial states, chiefly in the attempt to concentrate research in one segment of higher education. The justifications for university research and the aspirations for ever more state support are substantially the same whether they are advanced from the University of California or from all of a given state's four-year institutions. In Michigan, for example, there are three comprehensive universities - Michigan State University, University of Michigan and Wayne State University, and nine regional universities of varying size, which serve essentially the same role as CSUC's in California. State policy is to allow each of these institutions to evolve in whatever direction the region, administration and faculty judge appropriate. Dressel summarized the situation thusly:

> In general, the picture is of twelve institutions of differing sizes, systems of financial support and backgrounds of purpose and function, but which, with perhaps one or two exceptions, are moving or planning to move toward increasing research activity and graduate programs. While it is doubtful that the regional universities will ever approximate the magnitude of research carried on in the three major universities, administrators of the regional institutions believe that their research function should be expanded to contribute to an intensified level to the needs of the nation and state, to meet the requirements for adequate training of students, and to provide opportunities for professional fulfillment on the part of their faculties.[1]

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[1] Paul L. Dressel and Donald R. Come, Impact of Federal Support of Science, (Washington: National Science Foundation, Contract No. NSF C-506, 1969, pp. 41-42).

Texas public higher education consists, as does California, of systems of institutions, but these are not sharply differentiated from each other with respect to level of education or function. There is the University of Texas system and the Texas A. & M. system, and while the University of Texas system is more involved in research than the developing Texas A. & M. system, state appropriation formulas make no distinction between the two flagship campuses and the smaller elements of the system. The research potential for all campuses is stressed in a recent examination of organized research in Texas, conducted by the Coordinating Board, Texas College and University System. It argues that:

> Each institution of higher education in Texas has a number of significant research opportunities suitable for investigation given sufficient organized research money; and each of these institutions is now achieving less than its full research potential.[2]

An equally permissive posture toward research characterizes the City University of New York. Its Master Plan reads:

> Faculty research and scholarly activity is encouraged in all units of the University and in all of the programs from the community colleges through the most advanced doctoral programs. The several colleges plan expanded research opportunities for all faculty members by reorganizing their teaching schedules, providing released time for research, increased funds for

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[2] The Critical Role of Organized Research in Texas Higher Education. (Austin, Texas: Coordinating Board, Texas College and University System, 1972).

> assistants, secretarial help and supplies, and through the formation of research centers and institutes. The nature of the facilities provided in all of the units for the preparation of proposals is improving.[3]

Another way of comparing California research policy to other states is to examine several multicampus universities, each similar in some respect to the University of California system or the California State University and Colleges. In general, those systems can be classified into three categories: segmental (California, Missouri, Wisconsin, and North Carolina), regional (New York) and mixed (Illinois and Texas). In general, the segmented systems are somewhat less flexible with respect to research opportunities and tend to assign different roles to different higher education levels within the state. In Missouri, for example, the four campuses of the University of Missouri are expected to engage in research. However, the state colleges are not. In contrast, research at all institutions is encouraged in the two New York systems (SUNY and CUNY) and in the mixed Texas and Illinois systems.

Each of these different patterns has arisen out of tradition and indigenous factors and there is little concrete evidence to support one scheme over another. The California segmented system has maintained some ostensible difference of function between the University of California and the State University and Colleges, but at some cost to

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[3] Master Plan of the Board of Higher Education for the City of New York, 1968, p. 131.

faculty morale and perhaps institutional prestige in important areas such as attractiveness to extramural funding. However, there has been a drift on the part of some campuses (San Francisco, San Jose) to a de facto university status which might call for a reassessment of support for research. In mixed systems, individual campuses seem to feel freer to develop their own strengths, but with the danger that such freedom leads to precipitate rush to graduate work and research. If there is sentiment on the part of scholars of higher education, it is in the direction of growing disillusionment over the rigidities of the California segmented system but uncertainty as to how institutional ambitions can be contained with another system.

EMERGING FEDERAL POLICY

State policy for research cannot be decided without reference to federal research policy. Hence, it is instructive to distill out of much discussion what federal policy is likely to be. Dael Wolfe has digested much of this material and provides a reasonably consistent view of what is likely to happen.[1] Generally three historic tendencies will provide the framework for research policy. There is an absence of a master plan and none is anticipated. Competition between institutions has been the rule and has helped build science and universities; it is likely to continue. There has historically been cooperation between the federal government and universities and this, too, will prevail.

Within those parameters several trends seem logical and inevitable. The federal policy of using universities and other private agencies to achieve research goals rather than monopolize the domain itself will likely continue. Although federal grants to support institutions are almost a reality, research goals will continue to be achieved through project grants and sponsorship made to both public and private universities to such an extent that both will emerge as quasi-public utilities. The federal government will also continue to channel research funds through many agencies rather than through one superagency. There likely

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[1] Dael Wolfe, The Home of Science (New York: McGraw-Hill, 1972).

will be an increase in the number of federally created institutes for specific research missions. As an over-arching policy, the United States government will continue to strive for research excellence over a broad front rather than concentrate in limited fields as Switzerland and The Netherlands have done.

But these tendencies will be modified by certain intractabilities. Funds available for research will increase each year but at a much slower rate than was true in the 1960s. This slowdown will accompany a slowdown in rates of increase in university enrollments which may actually decline for a few years after 1980-82. This means that the need for Ph.Ds will decline, which suggests either curtailment of supply or a search for other means of utilizing their skills and talents. Because of the overall slowdown there will be more intensive competition for federal funds. Research funds will not increase at the rate of increase in the number of research workers. Thus states wishing their share of research funds might consider limiting and strengthening the number of institutions which logically might search for them.

POLICY ALTERNATIVES

The policy alternatives available to the Legislature are many, varied and complex. At the most fundamental level are two questions. First, should the state attempt to set research policy? And if so, is the underlying theory of accomplishing diversity of education through a segmented system of higher education still valid? The tripartite system of colleges and universities codified into law in 1960, has increased the input of students into higher education. However, outputs of the state in terms of degree and certificate holders has lagged behind other states with a less rigid structure.[1] With respect to research the segmented system has allowed the University of California to feel preeminent in the field and to exploit fully the research opportunities which the federal government provided during the 1960s. The system tolerated some research within the State University and Colleges, but has contributed to continuing resentment on the part of faculties that they are indeed second-class citizens - having lower salaries and larger teaching loads - yet are required to meet certification requirements minimally similar to those maintained at the University of California. Now, if changes were to be made, one of several alternatives seems available:

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[1] R. J. Jaffe and Walter Adams, "Two Models of Open Enrollment," Universal Higher Education (Washington: American Council on Education, 1971).

Changing Master Plan Provisions

1. Campuses of the University of California and the California State University and Colleges could be converted into coequal comprehensive institutions (regardless of source of control) and permitted to expand as regional needs, availability of funds and faculty talents allowed. Such a scheme could witness Riverside and Santa Barbara being more college while CSU, San Francisco or San Jose emerge as research-oriented comprehensive universities. There are some models in which mixed roles exist in the same system - note Minnesota, Illinois and Louisiana. It would recognize the reality that San Francisco and San Jose are already at the comprehensive university status (i.e., liberal arts, graduate programs and a number of professional schools) and that UC, Riverside is not - nor is it likely so to develop. Certainly the scheme would demand equalization of salary and prerequisites for faculties performing similar functions.

2. A more radical alternative would be to dismember existing systems, replacing them with regional systems, each of which would operate community colleges, four-year colleges and university centers. This in a way is in effect in New York with metropolitan New York being one region and the rest of the state another. Obviously, the constitutional status of the University of California

would make accomplishment of this plan difficult, and probably impossible to accomplish. But the regional concept has the virtue of bringing control of institutions closer to the people who support them and can allow regional planning which could locate new campuses or assign role and scope to existing campuses in a more rational manner than is currently true - e.g., the present overlap of some functions at San Jose and Santa Cruz.

3. An even more radical alternative would take one of two forms: Both segments could be dismembered, new governing boards created for each campus and each institution allowed to pursue its own destinies under constraints imposed by a stronger Coordinating Council for Higher Education. Or a similar goal could be achieved by the creation of a single statewide board responsible for all four-year institutions in the state - similar to the system in Florida. The new board would then allocate role and scope to campuses according to need and local conditions.

4. A fourth alternative would allow the two systems to stand but would remove statutory limitations on the development of individual campuses. Thus the designation of UC as the primary research agency would be removed as would the limitation on re-

search at CSUC. This then would allow state colleges and universities, when appropriate, to move into a much greater concentration of research efforts, and unless restraints were imposed, would result in an overall expansion of research activities in the state. A modification of this concept would allow the provisions regarding UC to stand but would relax the limitation imposed on CSUC somewhat. Such a revision might use such language as: "Faculty and student research is recognized and supported insofar as it is appropriate and essential to the primary instructional function of the California State University and Colleges." This revision would please CSUC officials and may be sufficiently unthreatening to officials of the University of California as to find acceptance with that segment. Hence, this might be the most realistic revision, if revision is to come about. An implication of the revision, however, would be the acknowledgment that state financial support at some realistic level, would be provided to the State University and Colleges.

But the state posture toward research, almost regardless of the provisions of the Master Plan, can be modified in any one of several directions. The status quo can be continued with either greater or lesser monitoring of research by the Legislature and executive offices of the

state government. The state could vastly increase its encouragement of research or it could move in the opposite direction and actively discourage research either on all campuses or on selected campuses.

Modifying Research Emphasis:

The previous alternatives for the most part imply some change in the overal structure of California higher education. Very likely no significant restructuring is possible. However, within the existing system at least three general alternatives are available and can be brought about through existing mechanisms:

Alternative	Mechanism
1) Intensify research emphasis	A. Removal of some distinctions between the University of California and the State University and Colleges.
	B. Appropriation of funds specifically for research.
	C. Creation and funding of centers and institutes.
	D. Encouraging search for extramural funds.
	E. Making lump sum appropriations for both segments.
	F. Increasing state support for enlarged community college capacity.
	G. Creating incentive for greater research activity especially in the State University and Colleges.

2) Reduce research emphasis

A. Maintaining present limitation on State University and Colleges research or making even more stringent restrictions.

B. Reducing appropriations according to extramural grants made to institutions.

C. Eliminating direct appropriations for organized research.

D. Appropriating funds according to a weighted formula favoring undergraduate enrollment.

E. Restricting capital appropriations for educational facilities only.

F. Modifying mission of campuses of the University of California through appropriations.

G. Appropriating funds on the basis of perceived heavier teaching loads.

3) Maintain current emphasis

Intensifying Research Emphasis

If the state were to encourage an ever greater emphasis on research for the University of California, it could take any one or all of a number of steps. It could declare the University to be an exclusively graduate and professional research-oriented institution, and through negotiations with the Board of Regents could seek to eliminate undergraduate students. This would, of course, mean changing levels of state support. But while the University would lose appropriations for undergraduate teaching, those could be com-

pensated for by increased levels of support along several dimensions. Faculty members would be senior professors expected to meet one formal graduate course each term, aided by advanced graduate assistants and post-doctoral fellows. Faculty members would be expected to spend the bulk of their time advising graduate students and conducting research.

A number of institutes and centers might be created by the state and supported on a sustaining basis in the way in which agriculture and oceanography are now supported. And there is good reason for this to happen. Research on urban problems, pollution, inner city education and the like have not been particularly productive because no sustaining support has been available, thus forcing scholars to shift attention according to the availability of funding. Several of the institutes at the State University of New York at Stony Brook are prototypes of what could be attempted. In addition, the University could be encouraged to seek extramural support for basic research and provided such incentives as being allowed to retain all overhead expenses. This could stimulate still further research. State government itself could also sponsor and support basic research and could routinely require that all state-contracted research be first offered to relevant campuses of the University of California. Such a radical shift in emphasis would be reflected in budgets in many different ways, the details of which transcend the scope of this paper.

A variant of this posture would be to encourage Berkeley,

U.C.L.A. and perhaps another of the comprehensive campuses to become research universities and to require through limitations on appropriations that the research activities at the other campuses of UC be curtailed.

The implications are obvious. Greater student enrollment would be placed in the state colleges and universities and the community colleges. There would likely be considerable antagonism on the part of alumni and segments of the faculty most concerned with undergraduate teaching. It might produce a constitutional crisis and probably would require amending the Constitution. The chances are that such an extreme step could not be taken; but there have long been persuasive arguments that research should be separated from undergraduate teaching, extending as far back as Cardinal Newman, the first President of Stanford, and most recently by critics such as Paul Dressel or Alvin Weinberg.[2] They hold that while intellectually alert people are needed for undergraduate teaching, research scholars are not, and that to confuse roles means hurting one activity or another. The research needs and the educational needs would be best served by a clear break, painful though that might be.

A more realistic variant would be for the Legislature to try once again to enforce the provisions of the Master

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2 Alvin Weinberg, Reflections on Big Science (Cambridge, Massachusetts: M.I.T. Press, 1967) and, P. L. Dressel and D. R. Come, Impact of Federal Support of Science (Washington: National Science Foundation, 1971).

Plan which would limit the lower division enrollments at the University of California or perhaps make them even more stringent. This action, coupled with a general reduction in graduate enrollments brought about by the oversupply of doctorates, could bring about campus reductions in certain kinds of services as well as an intensification of faculty research. This, of course, is the broad policy favored both by CSUC and the community colleges. It would be opposed by the University of California on educational grounds (desirability of student mix, and access to bright undergraduate students) as well as on political and economic grounds. But it may well be the most feasible alternative.

Reducing Research Emphasis

Or the adverse policy could be adopted, i.e., reduce the research emphasis. The instruments are at hand even if a bit draconian. The Legislature could mandate increased teaching loads as it now does for the State University and Colleges. Of course, an outright requirement would encounter the constitutional freedom of the University of California as did a similar attempt on the part of the Michigan legislature to mandate teaching loads for Michigan State University and the University of Michigan. However, the same result could be achieved through appropriations limitations or emphasis. It could separate from state support the several major research installations. It could increase the proportion of overhead funds which revert to the

state or even subtract from appropriations amounts received from contract or sponsored research. It could, as a matter of public policy, announce that only research conducted for the preparation of graduate students could use university facilities, and require strict accounting for the use of faculty time on contract or sponsored research projects.

The implications of such an extreme policy can be quickly indicated. Many scholars would leave the university. Loss of prestige would probably adversely affect recruitment of graduate students, new faculty and extramural funds (whose sources always assume that the state will, in one way or another, pay at least a share of research projects). It further might adversely affect the health sciences and could hurt efforts to find solutions to vexing California problems. And certainly the political repercussions would be substantial. This is not really a viable alternative but it does possess elements which, if adopted in moderation, could be acceptable.

The Legislature could assume that the 1950s and 1960s produced an over-emphasis on research and that some curtailment is desirable without destroying the whole enterprise. It could transfer to federal control some installations and then on a program-by-program basis eliminate those which seem farthest removed from the central educational mission of the university. At the same time, it might call into question the need for comprehensiveness on all UC campuses. It could be argued that Berkeley, U.C.L.A. and Davis should be so supported and that the others, even though they have

expanded research interests, could be cut back to the educational missions comparable to the State University and Colleges. This would clearly cause dislocations but all of which could be accommodated. Undergraduate enrollments at Berkeley, U.C.L.A. and Davis could be reduced with students and excess faculty transferred to the other campuses. Similarly, major research teams, scholars and installations could be transferred to the research-oriented campuses. Such limitations would be based on the need to curtail graduate enrollment, the inability of the state or federal government to support the number of comprehensive research campuses which now exist, and the conviction that what California needs is more attention to education and less to graduate study and research.

The general approaches suggested for the University of California could be applied with modifications to the State University and Colleges. Or the Legislature could maintain the status quo.

CONCLUSIONS

While this paper was designed to pose policy alternatives for the Joint Committee, several observations seem so salient that they should be presented to aid in interpretations of the the alternatives.

While gross legislative or executive audits and attempts to regulate research activities overlook subtle nuances as to how universities function, they do imply - and my own observations corroborate - that the research emphasis of the University of California has been overemphasized to the detriment of undergraduate education, some graduate education and needs of the state. As indicated earlier, research productivity has been impressive; but even casual visits to the various campuses suggest that far from all faculty are productive scholars living on the frontiers of knowledge. There is much textbook writing and sheer redundancy which is classified under the heading of research. Not that these are bad. But they do differ from the ideal described in various University position papers. What is needed is a legislative posture which will allow research and scholarship but which will restrain such a preoccupation with research that every permanent appointment is presumed to do research. Faculty members at no major university are all productive scholars and institutional policy should reflect that fact.

A second impression is especially complex and contro-

versial. This has to do with the relationship between research and teaching loads and what difference, if any, that relationship makes. As has been indicated earlier, the evidence concerning the relationship between research productivity and teaching effectiveness is so mixed that the whole matter must be declared moot and research policy discussed on grounds other than contributions - positive or negative to teaching effectiveness. However, there is a relationship between research and time spent in teaching. The Department of Finance 1972 audit of teaching loads and student enrollments suggested that classroom contact hours of four campuses of the University of California ranged from 4 to 6 hours and implied that these loads allowed considerable time for research of either departmental or contract variety. The University of California on the basis of its own studies suggested that teaching contact hours, including contacts for independent study, more nearly were in the 15 - 17 hours per week, emphasizing that research had not cut into contact hours. Rather, the argument ran, the research-oriented faculty used a variety of teaching techniques many of which were made possible because of research interests of the faculty. It is difficult to reconcile such divergent conclusions. However, from impressions gained from many campus visits and the testimony of campus leaders, a research-oriented faculty teaching contact of 5 - 6 hours is expected as the rule. This is not to say that more teaching hours are wasted or that they should

not be supported. Rather it points to the fact that as research effort goes up, teaching loads go down.[1]

In light of this discussion, developments in higher education generally, and the problems facing the State of California, several recommendations can be made to suggest one consistent set of policy decisions.

1. It would seem wise to drop the language declaring the University of California as the primary research agency and limiting the research mandate for CSUC. The language conceals reality and forces the University of California into an unnecessary preoccupation with research on the part of all fulltime faculty and forces distinct feelings of inferiority on CSUC faculty. If there is need for monitoring the research effort of either segment, it can be done by other means.
2. It would also seem wise to examine the possibility of a national evolution of research effort into a condition in which not more than one hundred institutions were the principal research agencies, supported for the most part by federal funds. If this were to happen, and powerful groups urge it, then California might expect to maintain possibly four - or at the outside five - major research campuses (Berkeley, Stanford, U.C.L.A., Davis and

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[1] Lewis B. Mayhew, Graduate and Professional Education 1980, Op. cit.

perhaps Irvine or the University of Southern California). Faculties on other campuses in either the public or private sector would obviously not be enjoined against doing research. But their primary missions would be education and relevant service.

3. If national research universities did become a reality, then the reason for the clear-cut assignment of different functions to UC and CSUC could be eliminated. Several plausible structures suggest themselves. The two systems could be maintained for historical reasons but with no presuppositions of essential differences between campuses of one or the other system. Or all of the teaching campuses could be accommodated within one system, while another system would control the research campuses and still another would administer the medical centers. In a sense, the doctrine that medical education necessitates that medical schools require close affiliation with a university is open to question. The interchange between faculties of medicine and other parts of a university are usually slight. When medical schools need new insights such as sociological, psychological and the like, there is the tendency to appoint relevant fulltime faculty members to the medical school rather than draw upon appropriate faculty members from graduate schools of arts and sciences. Nor is the existence

of a medical school an essential for a university wishing strength in the biological sciences. Princeton does not maintain a medical school yet has experienced no difficulty in creating a strong program in biological sciences.

Among the many things which the Legislature should consider in making policy decisions are the mechanisms by which state research policy should be established. As has been indicated, present policy has been established by several sentences in the Education Code, the various policies and programs of the federal government, decisions by the Department of Finance, opinions of the Legislative Analyst, aspirations of educational leaders, and obviously by the interests and desires of faculty members. That mixture of checks and balances worked reasonably well during times of expansion and relatively unlimited extramural funding, particularly for the various campuses of the University of California. However, if one assumes that rates of federal spending for research are bound to be slower during the 1970s than during the 1960s, and if one also assumes that research support will more frequently be provided for applied research than it has in the past, the previous mechanisms for establishing research policy may prove inadequate. What new mechanisms may be produced will, of course, depend on the capabilities and limitations of the various instruments which, when combined, result in the apparatus for establishing policy.

At the base of university research policy are the interests of scholars who have found within the American university an ideal place in which to do their work. More frequently than not, those interests have focused on basic and pure research conducted without particular regard for application to practical problems. This faculty interest in basic work has, in the opinion of many, placed the United States in the leading scholarly role; and there are those who contend that faculty interests should continue to govern. However, within the scientific community there has arisen the belief that the American society will no longer support basic pure research without some explicit concern being given to a pay-off in terms of practical benefits. If this is true, then faculties must be persuaded to undertake more applied work in critical social problems, or some devices must be created to control their research plans to insure social concerns are accommodated.

If some monitoring of research is necessary, it will be most effectively done on individual campuses through published guidelines indicating campus priorities, through careful review of research proposals, and through monitoring to insure that research efforts support or at least are consistent with other campus missions (education and service). Procedures for this kind of campus direction have long been in existence. However, if the legislative desire that ". . . research efforts unrelated to teaching contribute to the solution of important contemporary prob-

lems" is to be achieved, those procedures should be made more effective.

But in a state maintaining separate systems of higher education, campuses cannot develop guidelines independently without producing considerable redundancy. System offices must also develop guidelines and monitoring techniques which can assign differing research roles and varying scopes of research to individual campuses. This would be particularly true if some attempt were made within the University of California to stress research on some campuses while emphasizing teaching on others. This is a delicate matter for central offices have a propensity to develop into rigid bureaucracies. There is some criticism on some CSUC and UC campuses that the central bureaucracy has already grown too powerful and too cumbersome. However, risks must be taken if a rational statewide policy is to emerge and the two systems, if they are to be maintained, should be expected to do considerably more than simply endorse campus aspirations. This role for a segmental office would be a new one, for in general all multicampus universities have left the substance and direction of research to individual faculty members, subject only to broad budgetary constraints. However, there is a growing conviction that while a central staff is not qualified to initiate or assess specific research proposals, ". . . it does have an interest in the overall substance and direction of campus research that is not met by fiscal monitoring alone. With

adequate information about both trends in funding and current campus research capabilities and interests, the central administration can play a valuable role in uniting these to produce a greater research potential than that of any single campus."[2]

Even statewide systems may take too limited a view of a state's research needs, hence a search for still higher levels of monitoring and control. Three principal options seem open: (1) to rely on administrative offices of state government and legislative scrutiny, (2) to create a statewide board of control as has recently been done in Wisconsin, North Carolina and Rhode Island, or (3) to invest a coordinating agency such as the California Coordinating Council for Higher Education, with greater responsibility for research policy. In general, those who have studied statewide coordination and planning, such as Robert Berdahl[3] favor strengthening the role of the coordinating agency so that it can involve itself more directly in research policy. Typically these agencies review and make recommendations regarding new educational programs proposed by the various campuses and systems; but they have not entered into the research emphasis of campuses and systems except in such cases as the California Coordinating Council's support of the request for research funds by CSUC. Perhaps the time has come when the Coordinating Council should enter more

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[2] Eugene C. Lee and Frank M. Bowen, The Multicampus University (New York: McGraw-Hill, 1972, p. 379).

[3] Robert O. Berdahl, Statewide Coordination of Higher Education (Washington: American Council on Education, 1971).

directly into research policy. This could take the form of exposing to the public the various issues related to research policy or doing more to prescribe role and scope for the various campuses and systems.

It may be, however, that state research policy is so complex as to require a completely new instrumentality. Federal research policy only became focused after the creation of the National Science Foundation. Perhaps California should consider a statewide equivalent with a charter somewhat similar to that of the NSF as it was originally planned. It was to furnish funds needed for basic research in colleges and universities, to coordinate research programs and matters of importance to national welfare and to formulate national policy toward science. A serious alternative for the Legislature would be a state science foundation.