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UNIVERSITY OF MINNESOTA

SENATE DOCKET

Special Meeting, April 12, 1956

Your Committee on Business and Rules respectfully presents the following matters for your consideration at the special meeting of the University Senate on April 12, 1956 in Murphy Hall Auditorium at 3:30 p.m.

I. REPORT OF THE COMMITTEE ON INTERCOLLEGIATE ATHLETICS

Reported for Action

Western Conference Rose Bowl Proposal

A special meeting of the Conference was held at East Lansing, Michigan, on March 2-3, 1956. The Conference Joint Group (composed of the Faculty Representatives and Athletic Directors of the member schools) at that meeting adopted a Resolution on (1) approving continuation of the Conference's participation in the Rose Bowl game after the termination of the present arrangement on January 1, 1957; (2) authorizing the appointment of a committee to negotiate an agreement with the Pacific Coast Conference for that purpose; and (3) submitting that Resolution to the faculties of the Conference members.

It is recommended that the Senate, as the duly constituted representative of the faculty of the University of Minnesota, reject the proposal to continue the Rose Bowl arrangement with the Pacific Coast Conference after the termination of the existing agreement between them.

J. Warren Stehman, Chairman

II REPORT OF THE COMMITTEE ON EDUCATION

By action of the Senate on February 2, 1956, it was resolved:

"That the Senate shall carefully and fully study the educational implications and possible consequences of any such contemplated transfers (that the Department of Physics be transferred from the College of S.L.A. to the Institute of Technology); and that the Senate Committee on Education be charged with the responsibility of conducting such a study and of reporting its findings to the Senate for consideration and formulation of recommendations."

The Senate Committee on Education membership for the year 1955-56 is as follows: E. Adamson Hoebel, Stanley V. Kinyon, Errett W. McDiarmid, Elio D. Monachesi, W. M. Myers, Merrill Rassweiler, Leo Rigler, Wilfred Sellars, Lloyd M. Short, John E. Stecklein, Gerhard von Glahn (Duluth), C. Gilbert Wrenn, Chairman. Professor Rigler was on leave for the period involved and Dean McDiarmid voluntarily absented himself from this series of meetings.

In order to provide for a more complete representation from the science faculties and the professional colleges the Committee was augmented by appointment by the President upon nomination of the Committee of the following faculty members: Cyrus P. Barnum, Jr. (Medicine), Francis M. Boddy (Business Administration), Bryce Crawford, Jr. (Institute of Technology), Henry E. Hartig (Institute of Technology), and Dwight E. Minnich (SLA).

The drafting sub-committee for the report consisted of Professors Kinyon, Myers, and von Glahn (Chairman).

Following an extended series of meetings of the augmented committee over a period of two months, the following conclusions are presented to the Senate.

I

In considering the educational implications of the proposed transfer of the Physics Department to the Institute of Technology, the committee attempted to distinguish between predictions based upon substantial factual data and those based largely or wholly upon subjective opinions and beliefs; between conclusions based upon some factual evidence and those not so based. It is possible to determine conditions that now exist and that have existed in the past, but the impact of the Physics transfer upon future conditions remains in the realm of prediction, based either upon inference from facts or upon mere opinion and belief.

There appears to be ample evidence that the Physics Department has been inadequately supported, that this is the outcome of a complex situation, and that no specific blame should be attached to any person or agency for this condition.

The Committee further recognizes that this condition must be remedied if the department is to discharge its appropriate educational functions of teaching and research and to develop a program which will meet the needs of both liberal arts and professional education.

There also is evidence that the educational function of the Physics Department has become increasingly central in the curriculum of the Institute of Technology.

There is a majority opinion in the Committee that from the standpoint of support (administrative, financial and professional), the advantages to the Physics Department of a transfer to the Institute of Technology substantially outweigh the disadvantages to that department. Opinion is divided in the Committee as to whether there are more potential educational advantages than disadvantages to the Department of Physics in the proposed transfer. There is a strong majority opinion in the Committee that the potential educational advantages to the Institute of Technology from a transfer of the Physics Department are greater than the potential disadvantages. There is also a strong majority opinion that there are a number of potential educational disadvantages to the College of S.L.A. in this suggested transfer.

The Committee recognizes that the suggested transfer of the Physics Department to the Institute of Technology involves further modification of the present concept of the function of the College of S.L.A. in the University. It is, on the other hand, unable to predict whether the total University program would be strengthened or weakened by the move because that decision must rest upon weighing against each other value judgments and opinions.

In a poll taken of the Committee membership at a fairly late point in its deliberations, (with four members absent or abstaining,) six concluded that the university educational function of the Physics Department could best be discharged if the Department were administratively located in the College of S.L.A.; four concluded that its university educational function could be discharged while it was administratively located in either the College of S.L.A. or the Institute of Technology, i.e. its administrative location was not vital to its function; one concluded that its educational function could best be discharged if it were located in the Institute of Technology.

The distinction between the educational function of a department and its administrative location is central to the entire question of the suggested transfer of the Physics Department or any similar administrative shift of a teaching department. It deserves more attention than the Committee was able to give to it but the principle involved was a factor in the Committee's consideration of the recommendations to be made in the case of the suggested Physics transfer.

After careful consideration of the facts and opinions advanced, of the distinction between educational function and administrative location, and after weighing what it considered to be the best interests of the College of S.L.A., the Institute of Technology, and the Physics Department, the Committee favored by a vote of ten to five the first of the following alternative recommendations:

1. Leave Physics in the College of S.L.A. This is predicated upon the assumption that the Department will be strengthened financially both immediately and as a matter of long range policy, and upon the further assumption that there will be recognition by S.L.A. administration and faculty of the realities of competitive salaries in certain departments and an acceptance by the University of the principle that a particular department must be supported to its full need regardless of its administrative location.

2. Transfer Physics administratively to the Institute of Technology. This is predicated upon the assumption that the Physics Department will be better supported immediately in the Institute of Technology than it is presently supported in the College of S.L.A. and that there is a convincing

likelihood that it will be better supported in the I.T. on a long range basis.

The Committee recognizes that the adoption of either alternative requires recognition of the distinction between administrative location and educational function. This would require first of all that the faculty of the Physics Department would serve as members of the faculties of both the Institute of Technology and the College of S.L.A. Beyond this the multi-college educational function of the Physics Department might be strengthened by (1) the joint appointment of Physics staff members by the Deans of both colleges, and (2) the assignment for a portion of their time of certain Physics staff members to the College in which the Department of Physics is not administratively located, for teaching or research functions in that college and with administrative support of these staff members by that college.

II

In the consideration of its specific mission with regard to the proposed Physics Department transfer, the Committee dealt with some policy issues which would seem to relate to similar inter-college problems in the future. It therefore proposes two policies bearing on inter-college staff and curriculum relationships:

1. Inter-college transfer of departments is a matter of University educational policy and should always be reviewed by the Senate. A policy decision by the Senate with reference to the impact of such a transfer upon the educational program of the University may, if so specified by the Senate, be submitted as a recommendation, for consideration by the President in the light of administrative expediency and support.

2. In the interests of the total University program, the administrations of the University and of the several colleges and schools are encouraged to scrutinize with care the interrelation of courses and curricula between colleges or departments in order to ensure that, insofar as possible, proposed additions of courses or staff are necessary for the discharge of the total University function, and that the existing staff and curricula are utilized at an optimum level.

III

The above proposals regarding the immediate problem are factors in a needed overall policy statement regarding total university development. This could not be attempted in the time available nor should it be attempted until the Self-Survey Committee studies have been presented to the President. It is assumed that some of the recommendations of the Self-Survey Committee which relate to total University educational policy will be those which the President will wish to refer to the University Senate for their study and consideration.

C. Gilbert Wrenn, Chairman

UNIVERSITY OF MINNESOTA
SENATE DOCKET SUPPLEMENT
Special Meeting, April 12, 1956

President Morrill has received from the Chairman of the Central Self Survey Committee that committee's report on the Department of Physics. Dr. Morrill has requested me to transmit a copy of this report to all Senate members and to all faculty members entitled to vote for Senate members.

T. E. Pettengill, Clerk of the Senate

LETTER OF TRANSMITTAL, April 10, 1956

Dear President Morrill:

To you as President of the University, I submit herewith, on behalf of the University Self-Survey Committee, its report on the problem of Physics.

This report was adopted by unanimous vote of the Survey Committee yesterday, April 9.

The subject of the proposed transfer of Physics has been under study by the members of our Committee for more than a year. As you will recall, however, we chose not to bring the study to a conclusion or to adopt recommendations with respect to transfer until we had substantially completed our review of the issues confronting us in the Survey. Many parts of our total report are now very nearly in final form. Some are being typed for presentation to you in the near future.

In dealing with Physics now, in advance of other parts of our report, we have taken into account your expressed desire to have this question brought to a head, if possible, before the budget plans of the University for 1956-57 are completed.

We considered it desirable, however, that before taking action, we should have the privilege of reading and studying the report on Physics by the Senate Committee on Education, with the thought that it might present new information that could affect our conclusions. That report was made available to us before our meeting on April 9, but the Committee did not find in it grounds for altering its own independent analysis of the problem.

Our Committee has read and studied the various documents and reports that have been brought out by faculty concern with, and consideration of, the problem of Physics. We have devoted numerous meetings to an effort to understand and weigh, as fairly and objectively as possible, the arguments and reasons advanced pro and con. We trust that our report gives evidence of the earnestness and sincerity of this effort, as well as of our conviction that the problem before us was fundamentally an educational problem. On this, as on other issues, the Committee has, I believe, kept in the foreground of its thought the good of the University in its teaching, research, and public service.

Sincerely yours,

Theodore C. Bløgen

III. REPORT OF THE UNIVERSITY SELF SURVEY COMMITTEE

PHYSICS

An important problem confronting the University Self Survey Committee has been that of the college affiliation of the Department of Physics. Shall this department be transferred from the College of Science, Literature, and the Arts to the Institute of Technology or be continued within the College of Science, Literature, and the Arts? This question had been raised in the Self Survey, but became a matter calling for decision and action when, in the fall of 1954, a majority of the faculty in Physics, including the departmental chairman, specifically requested the University to establish the department as a unit of the Institute of Technology.

It was at first the thought of the Self Survey Committee that this problem would be met through negotiations within the two colleges involved and by administrative action, without incurring the delay involved in a study by the Committee, which took the position that it could make no recommendation on Physics save in the context of a comprehensive review of other organizational and educational problems arising from the self-study.

The President, the Dean of the Arts College, and the representatives of the Institute of Technology believed, however, that the matter was one for consideration and recommendation by the Committee. It therefore took it in hand, and since the question crossed the boundaries of its established subcommittees, it was studied by a special subcommittee which interviewed the deans of the colleges involved, the chairman of the Physics Department, and a considerable number of faculty members in both colleges as well as others in the University as a whole. The subcommittee had access, not only to the Survey documents, but also to the correspondence between the Physics Department and its college administration, and of course to the many documents and statements that have appeared during the widening discussion of the problem in the University, including those presented to the University Senate. The subject has also been under deliberation in many sessions of the central University Self Survey Committee.

The Committee pays tribute to the earnestness and sincerity with which those favoring the change and those opposing it have set forth their points of view, reasons, and conclusions, and it has endeavored to review with fairness the arguments presented on both sides. As an introduction to its report, therefore, the Committee wishes to present summaries of the cases as they have been presented for and against a transfer.

The Case as Presented for a Transfer

Dr. Nier, as spokesman for the majority of his colleagues in the Physics Department, believes that trends in education point to a transfer if Physics is to meet effectively its basic educational responsibilities for instructing large numbers of students performing significant research, training physicists for the future, and playing its part in what he calls the interactions of the University.

Dr. Nier believes that Physics must keep pace with changing advances in its entire field. It must do all its tasks well, with a staff of outstanding teachers and scholars if it is to maintain its position of leadership in instruction and research, and since the fall of 1954 a majority of its senior staff have been convinced that it can do so more effectively

within the framework of the Institute of Technology than as a department of the Arts College.

The educational ties of Physics, it is asserted, are much closer to the Institute of Technology than they are to the Arts College. Physics does not now play a very important part in the educational program of the Arts College, as witnessed by the fact that relatively few arts students make Physics a part of their liberal education. One of Dr. Nier's colleagues points to what he regards as an anomalous situation, namely, that while Physics operates organizationally as a service unit for areas outside the Arts College, actually it is functioning as a service department within the Arts College, whereas its major work is more a part of the Institute of Technology.

The decline of Physics in both the high schools of the country and in the liberal arts colleges synchronizes with changes nationally, in the light of modern needs and developments, which emphasize the role of Physics as basic to professional education, including engineering. It is in this setting that 75 per cent of the Physics enrollment now comes from the Institute, while no small part of the remaining 25 per cent comes from pre-professional students for other areas outside the liberal arts.

Certain changes in the character of a modern Physics department, meanwhile, seem to Dr. Nier and the majority of his colleagues to place Physics in a closer relationship to I.T. and to differentiate it from other S.L.A. departments. In particular, the problems of large machines and enormous research expenditures seem to set up situations of a kind not ordinarily met with in an arts college. As Dr. Nier presents the case, engineering is becoming more dependent on Physics, while Physics is making more use of engineering applications; and one result is that in both fundamental and applied research, there is great dependence on complicated mechanical reasearch installations and devices produced by engineers. The bond of physicists and engineers is illustrated by the new Linear Accelerator which, Dr. Nier suggests, would not have been possible save through the active cooperation of the two.

Some idea of the magnitude of the operations of Physics may be had by noting that, whereas its total printed budget is something over \$200,000, its research funds run to about four-fifths of a million dollars. This picture touches on the importance of Physics, both in its staff research and in its training of undergraduate and graduate students, to our scientific and technological progress and indeed, also, to our national defense in an age of grave uncertainties. Concurrently there are demands for more and more physicists and also for new ideas, methods, and tools that can be brought to bear on the advance of other sciences. As in undergraduate instruction, so in research and research training. Dr. Nier and his colleagues argue that the kind of support and fullness of understanding needed for Physics is more likely to develop in an area in which the discipline forms a key department that in a college where it contributes little to major students and its role is in fact that of a service department.

The Case as Presented for S. L. and A.

The arguments for the retention of Physics in the Arts College have appeared in various committee and departmental statements, but are put more fully in documents prepared by the dean of the college.

Dean McDiarmid declares that the moving of Physics would be a fundamental shift in the organizational concept of the University -- a turning away from the idea of a liberal arts college embracing all the basic liberal subjects. The central question, he suggests, is whether or not the University is to have a strong liberal arts college -- and if it is, the sciences, he believes, must be an integral part of it. He asks certain questions: Should S.L.A. continue to be basic for both liberal and pre-professional studies? Is the preparation for professional studies to be divided between S.L.A. and the Institute? Shall there be a college of science and also a college of literature and the arts?

It would be difficult, the dean believes, to provide a unified program of liberal and pre-professional education with a divided administration, since responsibility for curriculum, staff, research, and all-University services would then be divided. The arts group would essentially promote the arts for liberal education in isolation from the sciences and vice versa. The dean raises the question whether a student would be able to study science with the creative attitude provided in a liberal arts college.

Moreover, balance and understanding among the component parts of a liberal education would prove difficult to assure if a faculty were overwhelmingly concerned with technical and professional education. The loss of Physics would either remove from councils and committees and organizations in S.L.A. the contribution of the physical sciences or make it difficult for the Physics faculty to take part in decisions relating to counseling, teaching, fellowships, and the like. The dean also suggests that liberal education is one of the best ways of preparing for vocational and professional programs, and its position in this respect would be endangered by the removal of Physics. He also argues that separation of science from the arts would result in unhealthy competition between pre-professional and liberal studies for facilities and funds; and unity at the university level would be hard to achieve because of the college administration of staff, budgets, and curriculums. He doubts that cross-college committees or intercollege consultation would be effective. If Physics took no part in the Arts program, the program and goals of general education would be harmed.

On the research side, the removal of one area of fundamental knowledge would create an undesirable imbalance. Dynamic research, it is stated, is a major goal of S.L.A. Underlining freedom in teaching and research, he suggests that the arts college is more likely to be free of the pressures of applied research than the Institute, and the basic teaching of Physics would be free, in the Arts College, from the pressures of engineering. The long-term emphasis of professional schools, he states, has been on application, and an imbalance of basic and applied research would be more likely for Physics under I.T., with basic research competing with applied research for support.

Dean McDiarmid is concerned also about excellence in teaching, which S.L.A. has traditionally regarded as fully equal to research in importance as a college responsibility. Physics has made distinguished contributions

in this field, and the college would suffer if its high standards were removed from the college, while Physics would suffer if separated from a college which gives such constant attention and encouragement to improvement in teaching. The dean also asserts that the idea of placing Physics with engineering has almost no precedent in other universities.

Finally, Dean McDiarmid suggests that a physical science in a professional school aimed at imparting professional experience, knowledge, and ability would have but a limited objective. He closes with the concept of liberal education as the heart of a university, with a strong arts college encompassing basic knowledge, the natural and social sciences, and the humanities, and emphasizing unity of knowledge and a firm foundation under professional, technical, and graduate instruction. The arts college must be strong in a true university; it would be weakened by making it custodian of only a limited part of our heritage.

Since the report of an Arts College committee under the chairmanship of Professor Feigl has had considerable attention in University circles, it is desirable to review its major points in reference to the problem of Physics. This committee urged the retention by S.L.A. of Physics on the ground that Physics occupies a key position among the sciences in the college and its going might lead to further attrition; it reflected the view that it is undesirable to tie pure science in too intimately with technology; the withdrawal of a "core science" would mean an administratively unhealthy balance of forces; and the committee thought it undesirable as policy and as precedent to encourage departments to expect more favorable treatment in one college than in another. On more general grounds, the committee, looking at the costs of scientific teaching and research, concluded that the natural sciences cannot prosper if the fiscal thinking behind them is "geared to old SLA standards." It criticized the omission of budget provision to meet increased teaching loads when new service functions were taken on by SLA at the "behest" of technical schools; and it stated that the technical schools request new courses or modifications of old, on a service basis, with the implication that if they are not set up, competing courses will be initiated. Much of the report centered in the problem of General Studies and various ancillary functions, but attention was given to the need of increased support for science within the college and the allocation by the central administration of additional funds.

Many of the departments of the Arts College have formulated statements opposing the transfer of Physics to I.T. These emphasize impairment of faculty morale, the need of solving the Physics problem in the context of related problems of science within the college and the University, the jeopardizing of other departments, the importance of channeling larger funds alike to Physics and other areas of basic science, and many other points that are discussed for the entire college in the statements of the Arts College dean.

Views Presented on Certain Specific Problems

1. Will Physics, if transferred to I.T., be deflected from basic to applied research? Will it move toward the applied fields in its teaching?

On these questions there are differences of opinion. Some argue that it is not healthy for a basic science to be guided by the philosophy of technology. Dean Buchta, urging retention of Physics in S.L.A., emphasizes the differences in point of view of technology and basic science. The Mathematics Department of S.L.A. urges that the most favorable environment for basic research, on which advancement in all branches of knowledge depends, is that of the liberal arts college, and suggests that even under wise administration, departments connected with fields of application cannot be free from forces to orient research toward seeking solutions to specific, practical problems. Dean McDiarmid believes that there will be a pull toward applied fields if Physics is a part of an organization whose major concern is the education of applied scientists. Even granting abundant recognition of the value of basic research at present in I.T., he is concerned as to whether one can be sure that this philosophy will continue to operate over the years.

On the other hand, Dr. Nier, with the experience of Chemistry in mind, finds no reason to fear domination by engineering, which he says wants more pure science in its curriculum and desires its students to be drawn closer to pure science and its philosophy. Dean Shepherd believes that Physics can develop freely as a basic science in the atmosphere of I.T., pointing out the increasing importance of fundamentals to engineering problems and the revolutionary changes in both engineering and engineering education during the past two decades.

Professor Crawford, reflecting the views of scholars in Chemistry, reports complete freedom of research which he and his colleagues enjoy as members of the Institute's faculty, without pressure toward applied research. Dean Spilhaus looks upon Physics as a fundamental to all the activities of I.T., no matter where it may be placed. In a large university, he suggests that one should expect to group areas by their similarities within a field of knowledge. The Institute, he says has "moved away from any idea of delimiting its work to the applied sphere." It believes that the "blended atmosphere" of pure and applied science is mutually advantageous.

2. Could Physics, if transferred, continue to play a part in the educational planning of S.L.A.? Would it continue to make its contribution to liberal arts education?

Dean McDiarmid, as has been noted, fears that the transfer of Physics would remove its contribution from the Arts College councils or in any event make it difficult for the Physics scholars to participate in college discussions and decisions. The Department of Zoology believes that the move would impair the participation of Physics in general educational responsibility, which is one of the main functions of S.L.A. as the "core of the University." Other documents, as the general review indicates, voice fear that liberal education at Minnesota would be endangered by the removal of Physics.

Dr. Nier takes the position that under the present college administration Physics does not play an important part in the educational program of the Arts College, but he says that Physics could serve other colleges as well from I.T. as it can from S.L.A., that, if the department is transferred, S.L.A. students would still be able to major in Physics as easily as they now do in Chemistry, and that, if moved, Physics would hope to continue to be included on committees and councils of other colleges than their own. Minnesota, according to Dean Shepherd, has "prided itself in interdisciplinary cooperation," with students freely crossing college lines.

3. The question of financial support.

One factor in the situation is the understandable conviction of the Physics faculty that the University obviously must have a strong Physics department. A great university of the present time cannot fail to have a strong Physics department, in view of its national and local responsibilities and its competitive situation, as Dr. Nier suggests. Some of the Arts College departments have protested against what is termed the out-bidding by one college of another for a given department. Dean McDiarmid rejects this view, stating that he has no feeling that Physics is looking for the highest bidder or will be "sold" to the highest bidder, and the President properly regards such a question as irrelevant to the basic educational considerations upon which the issue will be determined.

Necessarily the support of a strong Physics Department must be taken into account, as indeed, since the controversy arose, it has been taken into account in the Arts College, with central administrative budgetary aid in an effort to improve support in the face of urgent needs. That I.T. is trying to "buy Physics" is ridiculous, in the view of Dean Shepherd. I.T. would establish priorities, if the transfer were made, and would have to do so, based upon its estimate of the importance of Physics within the Institute and on the demands of our society for a high level of scientific training in this field. It would plan, Dr. Shepherd says, to budget its funds so as to aid Physics effectively and thus help the University to accomplish its mission. Dean McDiarmid has suggested that the problem of support should be decided on an all-University basis, with the central administration deciding the issue.

Dean Spilhaus has spoken of the effort of the Institute to economize in doing its job, without encroaching on the quality of the job done. He points out that by internal budgetary adjustments there has been growth in certain areas of I.T. activity in a period of retrenchment with no preferred support to the Institute as against other units of the University. The policy followed was one of pruning some activities and concentrating upon areas considered of primary importance.

4. If the need for a change be assumed, have alternatives to the proposed transfer been suggested?

One member of the Physics Department, though approving the proposed transfer, does so with reservations and suggests, as an alternative, the establishment of a separate administrative unit of Physics. He believes that the department, as now organized, has lost intellectual contact with

the Arts College. The difficulties of Physics he regards as inherent in the society in which we live and he states that organization must keep pace with the changing demands of our age. An institute of Physics might, he suggests, become the nucleus of a future college of pure science. Others have similarly raised the question of a college of science separate from both I.T. and the Arts College. A group of scientists speaking as individuals within the Arts College suggest as a reform within the college administration the appointment of three persons to aid the Arts dean, each serving as a spokesman for a major division (presumably the social sciences, the humanities, and science) and together forming a dean's cabinet.

Comments and Recommendations by the University Self Survey Committee

In the light of its consideration of the problem, the Self Survey Committee desires, first, to recommend the acceptance by the University of certain principles and understandings of a basic educational character:

1. One of the major objectives of the University should be that of providing a first-class liberal arts program leading to the Bachelor of Arts degree, and this program should obviously be under the College of Science, Literature, and the Arts. Another major objective should be that of seeing to it that all pre-professional and professional school students secure an effective introduction to the liberal arts, with the purpose and aim that these students may be liberally as well as professionally educated. The main responsibility for liberal arts education in the University must rest with the faculty in S.L.A., but the faculties in all the other colleges and schools of the University have a supporting responsibility for seeing to it that their students also secure the benefits of a liberal education. Necessarily, suitable basic and advanced courses in Physics as in other fundamental sciences should be kept open for students in S.L.A., I.T., and other colleges, whatever may be the decision as to administrative location.

2. The advancement of fundamental research in Physics shall be encouraged and supported and shall not be subordinated to the demands of applied and technological research, whether Physics be retained in its present college or transferred to the Institute of Technology; and, whatever its place in the University organization, its members shall be free and shall be encouraged, within the framework of University policy, to plan and to carry out research projects of a fundamental nature.

3. In the case of Physics, as in every instructional department, the development of good teaching shall be encouraged and recognized as one of the great and basic objectives of the University. Balance between the goals of instruction and research must be maintained to assure the integrity of both of these University functions.

4. Major research installations and equipment suitable for research and advanced teaching shall be available, as far as humanly possible, for use by trained scholars in any branch or unit of the University, no matter where these may be located or what their administrative relationship may be.

5. If Physics is retained in the Arts College, a suitable number of members of the departmental faculty should be invited to sit with the faculty of the Institute of Technology, with the privilege of voting and of serving on committees. If Physics is transferred, a number of its faculty members who teach undergraduate and graduate students should hold similar privileges in the Arts College, including participation in faculty meetings and in the deliberations of committees.

6. Whether or not a change is made in administrative location, earnest efforts should be made by the central administration and the appropriate dean to meet as effectively as possible the budget needs of Physics -- as of the basic sciences generally -- in the light of documented representations, available resources, and the needs of other University departments. If any college or institute so alters its requirements as to throw heavily increased burdens of teaching on another department, efforts should be made to effect appropriate budget readjustments.

7. As a rule, there should be in the University only one department for each major subject, as, for example, a single department of Physics and a single department of Mathematics. In every case where, for reasons of distance between the Minneapolis and St. Paul campuses or because of differences in objectives, or because of economy and efficiency it seems educationally wise and proper to have more than one department for a given subject, there should be regular interchange between them of ideas, course information, equipment, faculty, and so on, and a clear division of work and responsibilities, to the end that the best possible use may be made of all University resources with a minimum of duplication in facilities and programs. And where there is only one department for a major service and convenience to the majority of those students and others who are directly concerned with its courses. Moreover, account should be taken of the fact that the University has undergraduate, graduate, and professional-school students, research programs, and public-service responsibilities, all of which should be considered and appraised when a decision is made about the location of any department or service unit within the University organization.

As these understandings and principles suggest, the Self Survey Committee views the basic problems before it as educational in the context of the University. The University as a whole, as a single corporation, has the responsibility for all the educational objectives and curriculums of the institution. The Committee believes that the internal divisions of the University for teaching and research purposes should be such as are likely to produce the best educational and scientific results. Whatever the internal divisions, and whatever the changes that may be made in them from time to time, we believe that every organization unit, large or small, should be charged with and accept a University-wide responsibility to perform its part in recognized University teaching, research, and public service programs. The University of Minnesota should be an integrated University, not a loose collection of colleges, schools, and professional units. In the present case, the fundamental factors seem

to the Committee to be successful teaching and successful research in Physics and the relation of such teaching and research to the educational purposes and program of the University.

In this educational setting, the Committee offers its comments and specific recommendations on the question of the administration of the Physics Department. It does not find the case so overwhelming on one side or another that any quick or immediately obvious conclusion leaps out from the pros and cons presented, but it believes that several considerations seem to point the way to a decision. Changes in the internal divisions should be made, and made courageously, when needed, and when improved results are reasonably certain to follow. They should not be made lightly or without regard to traditions and hitherto established organization or without faculty discussion of their reasons and meaning. Such discussion, in the case of Physics, has already been extensive among departmental groups, in various committees, and in the University Senate.

That Physics, if transferred to the Institute of Technology, would move away from basic research and good teaching, seems to the Committee to be an unfounded fear. The educational and research philosophy of the Institute, the character and fundamental beliefs of the scholars in Physics, the nature of the problems with which they are confronted, the example of Chemistry, the interrelations in the University community of scholarship, and the leadership of the University with respect to the importance of basic work seem to the Committee to be conclusive on this point.

In such a complex and closely interrelated institution as the University, there is and must be a great deal of intercollege teaching service, and both the fact and the necessity of such service are taken for granted. In the case of Physics, however, we confront not only the fact that the great majority of all its students are enrolled in the Institute of Technology, but also the fact that its educational and research ties seem a good deal closer to the Institute than to the Arts College, that, in short, its closest contacts are with the Institute and its greatest understanding and recognition come from the Institute. Some testimony has been offered as to the importance of Physics as an integral part of the Arts College, but the evidence, as far as we can appraise it, seems to indicate that Physics does not in fact play a very significant part in the educational program of that college.

Not unrelated to this situation are the character and magnitude of the operations of a modern Physics department, with its machines and research expenditures, which in the judgment of most of the scholars in Physics seem to differentiate their department from other S.L.A. departments and point to a closer relationship with the Institute of Technology. Underlying this point is the importance of Physics in a great university not alone for the training of physicists but also for the discovery of new methods and tools in behalf of modern scientific progress, utilizing the machines of the discipline in a climate of intimate and sympathetic understanding of its problems and needs.

The Committee has taken into account the widely expressed fears that the separation of Physics, administratively, from S.L.A. would be a blow

to the liberal arts tradition and influence. The Committee suggests that the educational scene, not only locally but also nationally, has changed over many decades with the development of universities in their many branches and with the advance of specialized instruction, research, and service. It may well be possible to improve the bridges of inter-faculty cooperation, communication, and understanding in the face of changing needs and situations. The Committee suggests that the services of Physics to liberal education in the Arts College might perhaps be strengthened by means of such bridges and if the department should be developed as a unit of the Institute, where Physics is recognized as a truly key discipline, making vital contributions not alone to the Institute's program but also to that of the University as a whole.

On the research side, the Committee suggests that the fears of imbalance perhaps do not take fully into account the wide range of, and emphasis upon, fundamental research throughout the University and the intercollege ramifications and cooperation of University research. These aspects, characteristic of the research enterprise within the University, have contributed richly, the Committee suggests, to the University's research success as well as to the true community of scholarship within the University.

The Committee ventures to suggest, further, the need of a somewhat wider orientation than the individual and departmental representations have provided for the understanding of the interrelations of physical science, the humanities, and liberal education. An entire volume could be written on this subject, and in this report the Committee can only point to a few items.

We may note that Plato was among the first writers and thinkers to express alarm concerning the physical universe, with its materiality and its ever-changing and usually unpredictable hazards and threats to man. In his teaching he sought for the permanent, the enduring, the reality behind changing scenes, and he found this in ideas, right ideas, in the nonmaterial world. His emphasis in teaching was on philosophy, morals, aesthetics, and related fields of study, with a large place for that other nonphysical discipline, mathematics, in which he hoped to find an explanation of things. Such, to him, were major elements in a liberal education.

Leaping across the centuries to England and to the English colonies in America in the seventeenth and eighteenth centuries, we find a similar but perhaps somewhat broader idea of a liberal college education. The emphasis was on the Greek and Latin classics, on ancient and modern languages, on moral philosophy, and on mathematics. Natural philosophy (or science) was slow, and rather late, in gaining a foothold in the curriculum. The program of studies then covered three to four years of college work, ending with a bachelor's degree. There was no graduate study and indeed there were no professional studies save, in a sense and to a small extent, for the ministry. There was virtually no research, except in the printed word.

The late eighteenth and the nineteenth centuries saw an increasing struggle to secure recognition in the curriculum for physics, chemistry, astronomy, and biology, although frequently, and perhaps usually through

a fairly long period, there was only a single professor of natural philosophy for the scientific area. Nineteenth-century American liberal arts education was still based primarily on the Greek and Latin classics, ancient and modern languages, English literature, composition and speaking, moral philosophy, and mathematics. History, economics, political science, sociology, and psychology, among other newer special subjects, faced, as did the sciences as now understood, a long struggle before gaining full recognition. In time, however, both the natural and the social sciences did attain both recognition and status in the liberal arts program.

The name "Science, Literature, and the Arts" for the undergraduate college at the University of Minnesota evidences a rather early recognition of science. It appears that the degree granted was normally that of Bachelor of Arts, but usually when programs showed undue concentration on the natural or social sciences, the degree of Bachelor of Science was used to mark the difference.

Recent efforts to revive or strengthen liberal education have brought renewed emphasis on the humanities as the core of the program. Where this effort has coincided, more or less, with a drive for "general education," there have been efforts to create courses in the humanities, in "general science," and in general social science. The hard-won places in the curriculum of the distinctive natural and social sciences--physics, chemistry, economics, political science, sociology, and others -- have been challenged not only in the first two college years but even in the senior college by the increase of general or survey courses. Whereas in research, in professional organizations, and in public service the distinctive fields of the separate natural and social sciences are largely recognized -- and indeed are the bases from which extensive and significant modern advances in knowledge have proceeded -- these separate studies seemingly have not been considered, in the view of not a few advocates of general education, as especially pertinent or suitable for a general, liberal education.

Such a minor excursion into some aspects of the history of the college curriculum should, the Committee believes, at least make us pause to raise a few questions, if only for perspective. One is whether or not there is a fixed meaning to a liberal education. Coupled with this is the question whether a liberal education has always included a balance, or approximately equal attention, to such major divisions as the humanities, the social sciences, and the natural sciences.

One wonders whether the free elective system (coming after about 1870 in American colleges) broke down the older concept of a fairly standardized liberal education that emphasized the humanities but at the same time failed to give the natural and social sciences much more than an outside chance to bring their subjects to the attention of students.

Did the coming of the free elective system mark the beginning of the struggle for the recognition of the social and natural sciences? Was the introduction of major and minor requirements and minimum group requirements a gesture, possibly somewhat belated and ineffectual, toward inform-

ing students that they should study the natural and social sciences among other disciplines?

What has been the role of "general science" and general social science courses, as more recently introduced? Have such courses been in effect a partial denial or a questioning of the values of full majors and minors in the established departments of the natural and social sciences? Have they tended to invite students to refrain from taking advantage of the offerings of the established departments?

The purpose of the Committee, in drawing attention to such questions, is simply to suggest that through the changing years there evidently have been changing conceptions of the scope and meaning of a well-rounded liberal education. It seems equally evident that assertions based upon assumed tradition sometimes are not supported by the historical facts. In thinking of the problems of liberal education, one needs to be clear as to what is meant by such an education and the extent to which its goals have been consistently pursued in the past. Earnest thought must be given to the question of how the values and goals of liberal education should be achieved in the future.

Meanwhile, other developments in our time, and certain other aspects of the problem, call for consideration. The world of knowledge has moved on and is still doing so, and seemingly with acceleration, toward goals difficult to mark out with precision. At one time the bachelor's degree was the culmination of the individual's education, but as one views education in the modern world, it is obvious and undeniable that the situation has changed. Today professional and graduate schools provide educational goals far beyond anything visualized a century or more ago. The natural sciences have advanced so far and so fast in the discovery and utilization of knowledge that, as everyone now must admit, what was learned or can even now be learned in undergraduate studies is only a small part of what is attainable. Great advances have also been made in the social sciences, but necessarily our attention must be devoted chiefly, in the present context, to the natural sciences. These sciences call for graduate study on the part of increasing numbers of the students who pursue them as undergraduates. Career opportunities in scientific research, in the industrial development of the findings of science, in medicine, agriculture, and other fields, beckon to those who as undergraduates study natural sciences and see their possibilities and opportunities. More and more, the undergraduate studies have to be integrated with professional and graduate school studies.

In the light of its review, the Committee has tried to appraise some of the major elements in the problem it was asked to consider. The proposal of transfer has brought to the surface, and perhaps into clearer focus, certain basic questions, and indeed some sincere misgivings, about the future of liberal education. The basic fears transcend the immediate issue. To some it evidently seems that liberal education is going to be destroyed by the impact of modern science and technology, by industrialism and commercialism, and by other forces of social change. The

Committee suggests that many fears seem to be mixed up together, so that there is some difficulty in seeing clearly what is involved. Fears of the decline of "moral man," fears of bigness in government, fears of war, fears of bigness in universities -- all seem to become involved in our thoughts and feelings, and often with strange results. Some years ago, with the coming of nuclear fission and the atom bomb, many feared -- perhaps many still do -- that physical science had gone too far and that it ought to be restrained lest it bring about the destruction of our world.

Today there is a fear that the administrative transfer of Physics at Minnesota might mean the beginning of the end for liberal education in this University. The Physics Department, it appears, has become very much wanted and is regarded as a symbol of the unity of its college and of the completeness of the circle of liberal education. Some even fear that, if moved, the scholars in Physics will cease to do fundamental research or reduce their interest in such research, perhaps becoming mere participants in technological applied studies. Yet another fear seems to be that S.L.A. students who wish to study Physics will not be able to do so effectively if the department is in I.T. rather than in S.L.A. The Committee, attempting to view the Physics problem as objectively as it can, does not find a convincing basis for sharing such fears.

Recognizing that the applications of physical principles will take place in numerous divisions of the University, the Committee is of the opinion that the University should have one Department of Physics, not two or more, for fundamental teaching and research in that field.

This one department should be maintained as a distinguished department of the University, capable of maintaining a place in the vanguard of physics departments everywhere.

In order to maintain such rank the department needs a budget sufficient to provide an adequate staff with adequate salaries, needed teaching and research assistants, and modern equipment and laboratories.

In the nature of things such a department will be asked to undertake, and it should undertake, large-scale research contracts covering fundamental research for the national government and for research organizations. It should also take part in inter-university research programs of importance. In these relations and respects the Committee suggests that the work of the department is not unlike that of certain major divisions of the Institute of Technology, especially Chemistry and Electrical Engineering. Its faculty have inevitably been drawn into close working and intellectual relations with members of those departments. It will continue to be so drawn. Its ties probably will become even more intimate than they have been.

With respect to excellence of teaching, to which attention is devoted in the arguments opposing a transfer, the Committee expresses its belief that in all parts of the University there is a deep commitment to such excellence at all levels of instruction as an essential and primary goal. It voices the confidence and faith that no administrative arrangement will lessen the sincerity and devotion of the faculty in pursuing that goal.

The idea and implications of a single college of basic science or a separate institute of Physics -- matters on which we find no documentation in the original papers of the Self-Survey -- relate to fundamental reorganizations of a kind that the committee has not found it practicable, within its time and means, to explore and analyze with care and in precise detail. The Committee is not prepared to recommend either the one or the other.

With respect for the convictions of those who desire to have the Department of Physics carry on its work within the framework of the College of Science, Literature, and the Arts, the members of the Self Survey Committee believe that the future growth and strengthening of the Department of Physics in its teaching, research, and service will be more surely and more fully achieved by its integration with the Institute of Technology.

We therefore recommend that the University accede to the request, as made to the President by a majority of the faculty in Physics, that the department be transferred to the Institute of Technology.

In so doing, we urge the observance of the educational principles and understandings outlined earlier in this report, so that:

1. There shall be one department of physics in the University and that it will be the strongest department of physics that the University can afford.

2. That this department shall discharge all its University-wide obligations in teaching, research, and service for students and faculty.

3. That effective inter-faculty and inter-college consultation and cooperation shall be maintained in the University interest.