Bulletin of
The University of Minnesota

REPORT OF THE SURVEY COMMISSION

III

a. THE DEPARTMENTS OF THE UNIVERSITY
b. THE NEEDS OF THE UNIVERSITY OF MINNESOTA

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A: THE DEPARTMENTS OF THE UNIVERSITY

TO THE INTERIM EDUCATION COMMISSION OF THE LEGISLATURE:

Your Committee asks for information concerning the success of the various departments of the University and the desirability of continuing, modifying, or enlarging them. This is an exceptionally difficult question to answer. An adequate treatment of it would involve a thorogoing analysis of the historical evolution of university education in America, and particularly of state university education. It would also involve a discussion of the educational significance and importance of each unit or department of the University. Furthermore, it would involve us in an attempt to project university education into the future ten to twenty years or more. It is obvious that a thorogoing treatment of any one of these propositions would involve an enormous amount of work. One could easily devote years to the consideration of these questions and feel that he had not answered them adequately. In saying this we have no desire to avoid the attempt to answer any question which you may wish to ask, but we feel that it is wise for us to limit ourselves to those phases of university education which will be of immediate assistance to your Committee in reaching a sound and satisfactory conclusion concerning university practice. With this in mind, we shall, therefore, confine our discussion of your question, for the time being, to certain matters of fundamental importance and to those principles that are generally accepted as basic to efficient university administration.

ORGANIZATION

The University of Minnesota originally consisted of five departments, namely the College of Science, Literature, and the Arts, the Law School, the School of Medicine, the Department of Theory and Practice of Elementary Instruction, and the Department of Agriculture. Actual instruction in some of these departments or colleges did not begin for many years after legal provision had been made for their establishment. The first charter of the University of Minnesota was provided by the Territorial Assembly of 1851. Changes were made in this from time to time until 1868, when the Legislature passed an amended act which constitutes the charter under which the University is now operating. The Law School actually took form in 1888, the School of Medicine in 1888, the College of Dentistry in 1888, the School of Mines in 1891, the College of Pharmacy in 1891, the School of Chemistry in 1897, the Graduate School in 1905, the College of Education in 1905, and the School of Business in 1919. In the original plan of organization there were but five departments or colleges, now there are thirteen. How the tiny school of the late sixties has grown to a great cosmopolitan university can not be told in a few words. The curriculum, the plant, the library, the faculty, the student body, the educational machinery, the administrative and business machinery, the finance, the experimental and research work, the publications of the University, each represents a large chapter in such a history.

THE INFLUENCE OF NEW SANCTIONS

In the early days, the University consisted largely of an Arts College. It provided general education. Training for the professions was secured through some modified form of the apprenticeship system which prevailed in that day, but gradually the knowledge in each of the professional fields was enlarged and the practitioners of the professions themselves began to set up standards for entrance, so that a certain amount of training was required of all recruits. Since then knowledge in the professional fields has grown more vast, more scientific and exact in character, the professional standards have been raised, and more and more training has been required of those desiring to enter the various professions. The differentiation of the curriculum into many professional curricula, the elaboration of these curricula so as to provide satisfactory training and practice, are two explanations of the increased cost of the University, for professional schools must have laboratories if their work is to be carried on satisfactorily.

The elaboration and expansion of various curricula and the establishment of professional schools have not taken place because of the whims or caprices of educators. They are the direct result in every case of pressure brought to bear upon the Regents for the establishment of the new units and the enrichment of the curricula. In many cases the Regents responded reluctantly to requests for the establishment of new units because they realized that new units always mean an added expense, but in every case the pressure was so insistent and the need so obvious, that it would have been unwise to have hesitated longer. A university is but the reflection of the people's desires. The fundamental desires of the people sooner or later find expression in the schools, particularly if they represent needs that emphasize justice, insure health, or are likely to increase wealth, improve citizenship, or advance knowledge.

AN AMERICAN TRADITION

The faith of the people of the state in this tiny institution of the late sixties, the institution that had only 18 students of collegiate grade in 1869, is expressed in its growth. The people whose children come to the University are the taxpayers of the state. They pay their taxes to support the University partly that their children may be trained for the practice of some business or profession, and partly that they may become familiar in an intelligent and dispassionate manner with the political, social, economic, and industrial questions and problems of the day. They realize that a higher degree of trained intelligence is necessary for the solution of the problems of this day and generation than was necessary for the solution of the problems of 1870, and that more education will be required of the next generation if it is to deal intelligently with the issues of its time. They appreciate the fact that the past generation sacrificed that their children might have better opportunities than they, and they, in turn, are willing to make a corresponding sacrifice for the benefit of their own children. One of the traditions inherent in American democracy is that each generation provides more liberally for its children than it was provided for. For any generation to transmit its social inheritance unimproved to its children means that it has contributed nothing to civilization. For it to fail to be a torchbearer of civilization means that it is untrue to the generations that have gone before.

THE PRICE OF DEMOCRACY

The problems which American democracy faces at the present time are the most gigantic and overwhelming, the most numerous, complex, and intricate, the most baffling and elusive that any generation has ever faced. One of the true bulwarks of liberty, which since its founding to the present time, has remained supreme in its unbiased search for truth concerning all sorts of human issues, questions, and problems, is the university. Not only has it concerned itself with those questions which relate to individual and social justice, but also with those which relate to the ethics and practice of every important profession.

The state university like the public schools is a creature of the people and a child of the times. Its policies, materials, and problems are all directly and intimately related to the needs of the people and to the spirit of the age. The question is being raised as to whether or not we can continue to support a growing and expanding university. It is almost axiomatic that when a university ceases to adjust itself to the problems and spirit of the age, it ceases to be a university. It may be a very respectable school, but it will no longer be a university. The problem for the people to consider is not what does education cost but rather what does democracy cost. The question of paramount importance is: are we willing to pay the price of democracy? Our forefathers paid it and paid it willingly. They sacrificed and sacrificed heavily to do it. They realized that a university is not a charge but an investment in futures. Many of them have lived long enough to see that the wealth of the state was increased immeasurably by the education they provided their children. This is always so. Students in the long run provide the cost of their own education, or at any rate a very large share of it, and in turn they increase the wealth of the state enough to provide a proportionate share of the cost of education for the next generation. Should the universities of these middle western states be wiped out, the hard earned institutions, educational, political, and social, of this region would soon disintegrate and disappear.

THE GUARANTEES OF CIVIL LIBERTY

After all there are only two guarantees of civil liberty; one an Anglo Saxon guarantee, and the other a guarantee indigenous to our own soil and country. The Anglo Saxon guarantee of civil liberty is that all men shall have equal rights before the law. The term "right" no longer connotes what it meant a hundred years ago. It has been expanded, elaborated. There are new liberties, and these new liberties must be interpreted in relation to rights whether they refer to social, political, economic, or industrial rights. We soon discovered that the administration of the Anglo Saxon guarantee required an intelligent citizenry, that a stupid and uninformed citizenry could not actually assure equal rights before the law. Consequently in our attempt to carry out the Anglo Saxon principle we added to it another, that the children of all the people shall have equal educational rights and privileges. The state, in order to insure these rights and priveleges, assumed that education was a state function, enacted compulsory education laws, and took over the administration of the schools from the very lowest to the very highest grades, including the university. In the interpretation of this principle from the very earliest days, we have included the university as one of the units necessary to provide equal educational privileges and opportunities for the children of the state.

It would be interesting, if there were time and space, to trace the evolution of this principle of equal educational privileges and opportunities from Colonial times down to the present time, but that can not be done. Most of the earlier schools had a fixed curriculum. This was also true of the colleges and universities. All students took almost exactly the same work. The curriculum of those days appealed to the abstractly minded. Little consideration was given to differences in types of intellectuality, nor had society grown sufficiently complex to require systematic training for the various professions. The consequence was that students of every type of mind and with intellectual variations as wide as the poles were put in the same class, subjected to the same curriculum, molded in the same way without respect to variations in ability or their professional desires. The natural result of such a policy was that many students acquired possession of a considerable fund of information that all people need and need alike, but they were not fitted for anything in particular. Those to whom the curriculum did not appeal were cast out upon the human scrap heap to find their way more or less blindly in a world for which they had not been fitted by the kind of training that they had received.

With the discovery of wide variations in ability, with the specialization of professional life, with the increasing division of labor, demands for variations in curricula became insistent and impelling. These variations were introduced not merely to take care of the concretely and executively minded who had been attending the abstract school, but to provide training for other types of mentality that had not been attending any school at all. The natural outcome of this policy was that more and more students began attending both the lower and the higher schools. Schools of every type began to introduce new subjects. The new subjects that came in were not fads, they were necessities, if equality of educational privilege and opportunity was to be guaranteed. There is no better test of a school's socializing power or its adaptation to the needs of the times than the presence of these new subjects. In view of our knowledge of human psychology and of the organization and constitution of society, it will not be possible for us to place a limitation upon registration in any of these tax supported institutions without denying the principle of equality of educational privilege and opportunity, and to deny that means that we shall place a limitation upon equal rights before the law. It means that we shall strike a blow at the very heart and foundations of democratic society.

As has already been stated, new schools were created and new subjects came in, in response to new social needs. With the introduction of new subjects, the principle of election was introduced in American colleges and universities. All students were not required to carry exactly the same curriculum. They were not all fitted to the same mold. They were allowed to do some choosing. They chose in accordance with their interests and purposes. The first distinguished educator to advocate this principle in this country was Dr. Charles W. Eliot, president of Harvard University. Harvard introduced the principle of free electives. It was soon found, however, that it did not work satisfactorily, for some students lacked the information necessary for them to make intelligent choices between subjects. College faculties began to wrestle with the problem. They abandoned the principle of indiscriminate election. They began to organize the materials and courses

into curricula, leading to fairly definite objectives. They insisted that students must choose between groups of subjects, rather than between subjects, and that when the choice of a group was once made there should be fairly definite prescriptions within that group. This is the principle that is now in use in all reputable American institutions of higher learning.

NEW ADMINISTRATIVE ADJUSTMENTS

It is sometimes claimed that college faculties have expanded their curricula unnecessarily and that they are now offering far more courses than are necessary. It is assumed that by the elimination of many of the courses the cost of education may be very greatly reduced. A very careful analysis and study, last year, of the situation in the College of Science, Literature, and the Arts at the University of Minnesota, which offers the largest number of courses of any college in the University, revealed certain very definite and rather interesting conclusions:

1. That this college is really offering fewer courses than any corresponding college in any middle western university of the same relative size;

2. That this college is not offering any more courses to-day than it was six years ago, yet the registration within the college has practically doubled within that time. The elimination of courses would mean no reduction in faculty or in expense, if we go on the theory that there should be 30 or 35 students per section. In other words, the elimination of certain courses that now appeal to the interests of the students, would mean more sections in other courses. Just as many instructors would be needed to teach these additional sections as are now needed to teach the richer curriculum. The adoption of this principle would mean a restriction of choice and the elimination of opportunity for students;

3. That the number of students per class throughout the college is larger than the average number of students per class in any of the high schools of the Twin Cities;

4. That the Arts faculty was forced to introduce many new devices for the purpose of keeping down the cost to the lowest possible minimum, and that some of these devices may have been introduced at the expense of educational efficiency. These devices have resulted in a modification of the instruction. Simply by way of illustration, we wish to call attention to one or two of them. For example, in History I, in 1914-15, there were five classes with 37 students per class; in 1921, eleven classes with 32 students to the class and one lecture class of 353 students. In History III, in 1914-15, there were nine sections of 37 students per section; in 1921-22, five sections of 41 students to the section, and also one lecture course of 208. In History V, in 1914-15, there was one lecture course with 79 students; in 1921-22, there was one lecture course with 150 and five sections of 32 students each. In Political Science I, in 1914-15, there were six sections of 30 students each; in 1921-22 there were seven sections of 36 students each, and two lecture sections of 125 students each. In Psychology I, in 1914-15, there were ten sections of 34 students each, and in 1921-22 there were twenty-five sections of 32 students each, and two lecture sections of 369 students each. It is clear that in this group of departments the size of sections has been kept down by adopting the lecture-quiz system of instruction in the last few years. One man lectures to a class ranging from 150 to 450 students, and the sections are placed in charge of instructors or

assistants for quizzes. If the classes above cited were to be taught by independent sections, as they were in 1914, without increase in the present staff, the recitation sections would have to be of the following sizes: History I, 80 students; History III, 100 students; History V, 80 students; American Government, 90 students; Psychology I, 88 students.

If on the other hand we should undertake to maintain sections of the same average size as we had in 1914 and to teach in the same way, the present number of students in the classes cited would require the following increases in hours per week of the instructor's time:

	Now required	Would be required
History I	25	50
History III	18	28
History V	13	28
American Government	20	42
Psychology	21	66

This would mean more than doubling the number of instructors in these subjects.

It will be observed that we have chosen a few of the larger non-laboratory departments for illustrative purposes. The laboratory sciences introduced the lecture-laboratory-quiz method many years earlier. In some of these departments there has been no change in the general method of handling the students, but an increased number of students has been cared for without any considerable addition to the staff. Thus the course in general zoology has increased from 381 in 1914-15 to 787 in 1921-22, in charge of the same professor with an increasing number of assistants. In physics alone there has been a saving of at least $12,000 a year by the introduction of this plan. When we say, for example, that we have more students in proportion to faculty than we had in earlier years, it does not mean that we are simply holding larger classes under the old plan. That would be ridiculous. It means that because of the pressure we have modified our methods of instruction and the courses of study offered. It means:

a. That older members of the faculty in terms of rank are spending more of their time upon elementary courses.
b. That fewer courses of study suited to, and intended for, advanced undergraduate and graduate students are provided than formerly.
c. That much larger numbers of students are under the guidance, direction, and inspiration of each older member of the faculty than formerly, and that these men have young and less experienced teachers to assist them.
d. That independent of the higher cost due to the war, students are being instructed in this University in a much less expensive way than formerly.
e. That to a very large extent young students are getting their instruction by listening to lectures in large classes and reciting to young assistants, instead of studying and discussing the subject with the professors as was usually the case ten years ago.

EFFECT OF REDUCED CURRICULA

A year ago when the question of the number of courses offered by each of the colleges and schools of the University was raised by members of the Legislature, we secured detailed information in answer to the question from each college. We

will not burden the Committee with the answers of all the colleges, but we do wish to call particular attention to the situation in one or two of them.

The youngest school of the University is the School of Business. Certain questions were asked of this college. They were:

Question 1. Has not the work in economics been expanded rapidly in recent years?

Answer. This department is offering 42 courses this year as against 45 five years ago.

Question 2. Does the practice of other similarly situated institutions seem to warrant such a variety of courses?

Answer. Of the nearby universities, Wisconsin offers 51 courses, Iowa 61, Chicago 53, Northwestern 54.

Question 3. Does not the School of Business bulletin list more than 42 courses?

Answer. It does, but

a. Many differ only in the numbers given them to separate the sections of the same elementary work offered to different colleges. For example, elementary economics when offered to agricultural students is known as 5 and 6, to engineers, 8, 9, and 10, to students in the College of Science, Literature, and the Arts, 3 and 4, to home economics students, 7.

b. Related courses in other fields such as history, political science, and agriculture are listed by the School of Business for the convenience of its students, but are not a regular part of its work and should not be counted twice.

c. With the introduction of the quarter system the School of Business found it desirable at times to give a separate name to each quarter's work in an all-year course, altho for practical purposes it is a single course with virtually the same students continuing straight through the year.

Question 4. After making due allowances for the above factors, are not the 42 courses excessive?

Answer. There are more than 2,500 enrolments in economics. They come from nearly every college in the University. There is a very great demand for business courses which give the training desired by a particular group. For example:

(1) There are College of Engineering men, many of whom become factory managers, efficiency experts, or enter some field of business related to engineering. It would be wholly unjustifiable for the state to deny them the special training in factory management, cost accounting, personnel work, and other fields which will fit them to operate a plant on a scientific basis instead of by rule of thumb.

(2) There are the agriculturists who realize that profitable farming and profitable operation of fruit and produce exchanges, coöperative elevators and dairies depend upon a knowledge of sound business principles. They are clamoring, therefore, for special courses in marketing and farm accounts and farm credits, commercial law, and the like, all of which must be adapted to the problems they are intended to solve. So important has this phase of business become that the New York legislature recently voted funds to Cornell University for eight professorships in this field alone.

(3) The term "business" includes a number of quite widely different callings. A modern banker is no longer a "note shaver" but a real professional man with an understanding of foreign exchange, negotiable instruments, investments, and business forecasting, most of which are of little interest to the farmer, the accountant, or the engineer. Students trained in these necessary subjects enter the banking business with a big advantage over the man who tries to acquire some training in the school of "hard knocks."

(4) The accountant who hopes to pass a Certified Public Accountant examination must obtain thoro training in auditing, income tax procedure, and other specialized fields which have little of interest for the insurance man, the statistician, or the merchant. The study of these subjects under a skillful teacher will give to a man years of advantage over the person who attempts to gain them through long and ill-paid apprenticeship.

The same can be said of a score or more of other prominent business activities.

Question 5. Is a separate School of Business justifiable?

Answer. For more than five years the united activities of more than 10,000 business firms of Minnesota were directed through their respective state organizations towards securing a school. They were keenly aware of the handicap under which an untrained business man labors. They felt that they had a right to the same facilities for the study of business science as were being accorded to other professions. They insisted and still insist that money be spent on business education.

If the business training demanded by our citizens is not given in a separate school, it would have to be provided by the other colleges of the University at practically the same expenditure of funds and with a loss of the fine professional spirit and unity of interest which have been developed in the separate organization.

Question 6. If this state failed to provide adequate facilities for training prospective business leaders what would be the result?

Answer. A few would seek this training elsewhere. The great majority would be compelled to enter business under a handicap. If our business men of the future are less well equipped than those of other communities, the State of Minnesota will suffer accordingly in business competition with other states.

Question 7. In what respect have we a greater responsibility than some of our neighboring universities?

Answer. Unlike Iowa, with her lack of metropolitan business interests, and Chicago and Northwestern, with their devotion to the problems of urban business alone, our peculiar situation in the midst of equally important rural and urban economic interests places upon our school a twofold responsibility and gives to its staff a twofold interest.

Question 8. Would there be any economy in abolishing both types of (agricultural and urban) advanced courses in economics, thus compelling all persons to take the same work?

Answer. No. With as large a body of students as we have, in spite of the variety of our offerings, there are in practically every class more students than can be taught to the best advantage. Let us suppose that we abolish these courses and herd the 500 seniors into the same class regardless of their life plans. In order to be taught effectively they would have to be split up into 25 classes of 20 each. Then why not split them up into 25 courses where they will be grouped according to their special interests, instead of arbitrarily? In this way men who are experts in particular phases of a subject can be assigned to the groups that are seeking to master those respective phases.

Dean Wulling, of the College of Pharmacy, says: "We could not in any wise reduce our courses without seriously impairing the standards of our work. Our regular course covers a minimum of subcourses and credits consistent with average good work and represents considerably less in scope than the minimum course outlined by the government as a war course in pharmacy. I emphasize this latter fact because the war courses in general were made to include what the government regarded as the minimum of instruction toward a desired end. The College of Pharmacy offers no electives."

Dean Owre, of the College of Dentistry, says: "We are offering only those courses now that are required by law."

Dean Appleby, of the School of Mines, states that the policy of the School of Mines has always been to incorporate new material in existing courses rather than to develop new courses. The subject-matter of the individual courses is thoroly revised each year with this end in view. Under such a policy it is difficult to see how any reduction in courses is possible.

Dean Fraser, referring to the Law School, declares that the curriculum is much too restricted now, that it is more restricted than is the curriculum of twenty of the thirty leading law schools of the country.

Similar statements can be made with reference to the other colleges,—Engineering, Education, Agriculture, the Medical School, and the School of Chemistry. In every case the curriculum has been reduced to the lowest possible minimum consistent with educational efficiency.

THE INFLUENCE OF ELECTIVES

There are no electives in pharmacy, mines, very few in law, and the number of electives in the other professional schools is limited. Where electives have been introduced, there is a small amount of election in the sophomore year, and still more in the junior and senior years. In medicine, for example, the entire freshman year is prescribed. About 85 per cent of the sophomore year is prescribed and 15 per cent elected. This elective work was introduced six years ago in order to make a more elastic curriculum. The electives serve several purposes. According to Dean Lyon, they

1. Make the student give thought to his program and to his choice of subjects, thus fostering responsibility.

2. Allow some variety in teaching and add interest both for teachers and students.

3. Lead often to research and the development of investigators.

4. Develop teachers. Our assistants and instructors come chiefly from the group of students who become interested in particular phases of medicine through the electives.

These electives in medicine were added without any increase in the budget. The hours of the required courses were reduced and the electives substituted.

SHALL SMALL CLASSES BE DROPPED?

It has been suggested that all small classes be dropped by the University. It is always possible to drop a few of the small classes, but the number, however, that might be eliminated would be comparatively small. It would be a great mistake if one attempted to deal with this matter in an arbitrary manner. If, for example, he said that all classes in the University having five or fewer students in them should be cancelled by the institution, he would drop practically all of the classes in clinical medicine. Each of these classes has only four or less students in it. The best advice that we have been able to obtain indicates that there should not be more than three students in such classes. These students are preparing for surgery. To have so many in the class that they are unable to follow every detail of an operation would be little less than criminal, for the inefficiencies of these young surgeons would later be manifested in poor practice, sometimes even in malpractice, on the citizens of the state. The student of medicine must learn by doing. He cannot be taught practical work in large classes.

There always are. of course, a number of small classes in other departments of the University. The size of these classes, however, fluctuates from year to year. Some of them are in the strictly graduate group. Probably the largest number of small classes in proportion to the registration is found in the College of Agriculture, but even there it does not seem possible to make any material change, for these classes vary greatly in size from year to year, and some of the work most important to the development of scientific agriculture is found in these classes.

Instead of attempting economies by placing a limitation upon the number of courses that the University may offer, by reducing the electives, and by cutting out certain small classes, it would be far better if the institution could offer more, rather than less, work. The offerings in many cases are altogether too limited. Constant pressure is being brought to bear for the introduction of new courses. For example, courses in journalism, in the history and interpretation of art, and in various phases of farm management, farm economics, chemical engineering, library training, and the training of commercial teachers are being vigorously sought. Within the field of practically every department there are constant and frequent demands for additional work more varied and new. These demands are merely a consequence of the great increase in specialization in the industrial and professional worlds. It has been a constant aim of the University to act conservatively upon all these demands. Indeed, it has been forced by the exigencies of its financial situation to proceed conservatively.

THE STATE'S RESPONSIBILITY

If the reasons already presented are not sufficient to convince one that no radical reduction in the number of courses in the University is advisable, there are certain others worth consideration. The University by virtue of the sanction that it has received from the people of the state in the past has entered into a definite obligation to those students who are now registered in the institution, and to thousands of others who expect to come, to provide them with certain lines of work. Many citizens have made and are now making personal and economic adjustments to send their children to the University for special training. A sudden change in a program which has been implied by almost every act in the past, would shake confidence in the state government and in the stability of the University's policy. What the effect of such an action would be no one can really anticipate, but it might be disastrous. It would certainly mean that we would be breaking abruptly with the traditions and the history of all American commonwealths with reference to the tax supported institutions of higher learning.

A radical reduction in courses would really operate seriously to impair the welfare of the state, because it would mean that we would not turn out our quota of trained teachers, trained dentists, pharmacists, nurses, and doctors. Just as the mental and physical life of the people would suffer for this reason, so our economic efficiency would be reduced by our lack of experts in agriculture, by our failure to prepare professional engineers, accountants, mining experts, physicists, bankers, and lawyers. Without educational advantages equal to those of neighboring states, Minnesota would retrograde and the state would soon occupy a second-rate position. Any considerable reduction of the courses and curricula of the University would reduce, if not destroy, our relative standing with other higher educational institutions, and as a result it would be impossible for us to attract or retain strong men on our faculty.

TWO PERSISTENT FALLACIES

The statement is frequently made that it makes no difference what a student studies,—he will get as much training from one subject as he gets from another. The advocates of this theory and doctrine say that they would as soon have their children study Greek as modern history, or Latin as modern social problems. This

theory is based upon an antiquated, outgrown theory of mental training. There was a time in the history of education when we believed that the training an individual received in one field could be transferred without loss to other fields. No close observer or student of education supports such a doctrine to-day. There is abundant evidence that it is not true. Of course, there is always some transfer of training from one field to other fields, but the amount of transfer depends primarily upon the similarity of the materials, standards, or methods of work in these fields. One can not learn to play a piano by tossing a ball. One can never become a successful and skillful practitioner of medicine by the study of law, nor a keen judge and interpreter of the rules of justice by taking a course in physics.

Another equally mistaken view is held by those who wish to substitute trade experience for training. They say that they would prefer to have their sons enter a bank and learn banking through a system of apprenticeship than to have them take a course in banking. Medicine, law, dentistry, pharmacy, engineering, and now journalism and nursing have given up this doctrine. It is also disappearing among business men. Persons who have grasped the complicated character of modern business are not found to-day among its advocates.

The practitioners of the various professions have learned two things:

1. That a broad and liberal foundation is necessary when one enters upon a specialized training for his profession. In other words, the more an individual is sharpened to a point the broader the base must be. The more highly specialized he is the wider his appreciations must be.

2. That the liberal training must be followed by a highly technical and detailed training in a reputable institution, supplemented, as far as possible, by practice later on.

Sound educational practice, therefore, would seem to maintain that if one wishes to become a successful banker he should have a fairly liberal academic foundation, and later a technical and specialized course in the general fields of commerce, economics, and business, and that this should be supplemented by a period of apprenticeship in banking. Banking like every other profession is not banking merely, it has become highly specialized and has differentiated into many fields. In any large bank to-day there are specialists on farm loans, industrial mortgages, foreign exchange, insurance, credits, and income tax.

The fact that experience in banking is not sufficient to satisfy a banker is illustrated every year by the short course at the University of Minnesota which is attended by from two to three hundred bankers of this state who come here to be instructed by members of the faculty in the special aspects of their work.

EFFECT OF INCREASED TEACHING LOAD

It has been suggested that Minnesota might secure more work without increasing the cost by increasing the teaching load of her staff. By "teaching load" is meant the hours per week an instructor spends in the classroom or laboratory, but this does not indicate the amount of work the instructor does. To the number of hours that he actually teaches must be added the number of hours that he spends in preparation for teaching, the hours that he spends in personal conferences with his students, consulting with them and advising them upon the work that they have with him, and the hours that he spends in administrative work. Even when one

has all this information, it is not proper for him to compare the work of one instructor with that of another instructor until he knows something about the relative number of students with which the two instructors are working. Any figures, therefore, relating to the total work load of members of the staff of one institution as compared with the work load of the faculty of another institution are subject to very great unreliability. A survey of the situation at the University of Minnesota shows, when we include classroom teaching, student conference, preparation, research, administrative work, and public service, that the professors and associate professors are carrying a heavy load.

The teaching load can be increased, but it will have to be done at the expense of other types of work which the University instructor does. If the load is increased then the time for preparation will automatically increase, or else the quality of the teaching will suffer. If the teaching load and the time for preparation increase, the instructor will do less administrative work and public service work or research. The administrative work in a university is almost constant, consequently it is difficult to reduce that; the public service demands are of too great value to the state, and in many cases too difficult to avoid. It is only, then, from the field of research that extra time for the teaching load could be taken.

It is the collective judgment of men of experience in colleges and universities throughout the world that a university instructor who neglects his research for any length of time decreases his ability to inspire and to teach the students. Then, too, in the senior and graduate class work, where the students are mature, an instructor who does not do research work practically loses the confidence of his students. Furthermore, the research work conducted by state universities is largely of direct value to the state. This is particularly true of the fields of the applied sciences. In the Department of Agriculture the result of research has been one of the greatest influences in the rapid development of the agricultural industries. The value of research in medicine and surgery is universally recognized. Research in the fields of business has enabled business organization and specialization to go forward.

Comparative statistics show that the teaching load is as great in the University of Minnesota as in other large universities. Studies within the University indicate that if it is increased materially it will seriously lower the scholarship, the quality of service, and the institutional standing of the University. It is practically impossible to set a specific standard for a teaching load for a university. In some subjects an instructor can teach longer hours and larger classes than in others without impairing his work. In the most important of the advanced work only a very small group of students can be taught by the instructor. At present at Minnesota the freshman and sophomore classes are the largest in the history of the University. There are a number of classes in the junior year which have from 50 to 100 or more students. Owing to the large freshman, sophomore, and junior classes this year, there will be of necessity larger classes in the senior and graduate work, and also a larger number of sections than this year unless the teaching staff can be increased.

The educational effect of increasing the teaching load would be bad. University teachers can not teach without preparation any more than clergymen can preach successful sermons without preparation. How many clergymen would agree to give nine, twelve, or fifteen sermons a week and carry their pastoral work and

prayer meetings in addition? The teacher who does not keep up his active work and improve his knowledge of his subjects soon becomes dead and uninteresting to the class, behind the times, inaccurate and unreliable.

Preparation for teaching includes actually making ready the subject-matter to be dealt with and the laboratory materials or equipment in science or other subjects to be used, and the selection of reference books in the library which the class requires. It also includes continual study and reading of books and periodical journals to keep abreast of the subject to be taught. This is the explanation of the large number of books that the University needs. The hundreds of journals coming out each week carry a continuous supply of new knowledge. Every man must keep up with several of these journals in his field. He must not wait until these new contributions to science are digested by others and put into new textbooks, for then he and his students will always be from one to two years behind the times. Moreover, should Minnesota pursue the policy of getting her knowledge second hand, she would select and retain mediocrity rather than ability on her staff.

And finally, as has already been indicated, preparation for teaching includes, in the case of most university men who reach the higher ranks, the prosecution of research in order that they may make their contributions to the growth of new knowledge in their fields. The life and spirit of any university depend on the opportunity and encouragement it gives to the research work which is necessary for every live and progressive man.

To increase the load of teaching would necessarily decrease the preparation for teaching which is the very foundation of success both for the teacher and the University. It would make our instruction less vital, less up-to-date and less reliable. It would lower the value of the service that we render to our students and to the state.

ELIMINATION OF DEPARTMENTS

Another suggestion that has been made is that Minnesota, instead of attempting to provide first-class work in the fields that she is now supporting, abolish or abandon some of them and urge the students to go to other state universities and colleges where first-class departments in such lines exist. This is done now in the graduate fields, and to a certain extent in the undergraduate fields, but obviously there is a limit beyond which we cannot go in maintaining such a practice. Minnesota cannot and will not depend upon other states for the training of her leaders, nor does she propose to have scientific knowledge concerning her industries and her agriculture collected, prepared, published, and disseminated by institutions supported by other states. She has both the pride and the wealth necessary to maintain reputable departments in every essential field of learning. She will not abolish the Dairy Department of the College of Agriculture and urge her students to attend the University of Wisconsin to become dairy experts, nor will she abolish her Law School and urge her students to attend the law school of North Dakota.

There is one other point that is often overlooked in the suggestion that reciprocal relations be established between states for the training of persons in certain specified fields. Should such relations be established, they would require an expansion of our own departments to meet the increased demands from the other states, so that the money saved by dropping one department would be largely

absorbed in the expansion of the one we retained. That, however, would not be the greatest misfortune we would experience. The greatest misfortune would be that we would receive poorer service than we would have a right to demand in many fields. Minnesota conditions, for example, are somewhat different even from those of Wisconsin, and we could not and should not rely entirely upon Wisconsin for the training of our dairymen and the conduct of our research. Naturally the first consideration of any state would be the service demanded by that state. The problems, therefore, that would be studied most intensely by the members of the staff would be those that were concerned most intimately with local conditions.

Inasmuch as your honorable Committee has asked whether the various units of the University are a success and should be continued, we shall undertake a more elaborate statement concerning each of the units. No attempt will be made to treat them in the order of their establishment.

THE GRADUATE SCHOOL

In numbers, the Graduate School, with a registration that has risen from 175 in 1913-14 to 801 in 1920-21, is the third largest unit in the University. Its work is supported directly by an assignment from the University budget, exclusive of the Mayo Foundation, of only $25,000. This sum covers the salaries of the dean, two clerks, the cost of research publications, and aid to some thirty members of the faculty who need assistance and materials for their researches. As a form of expenditure it is wholly negligible when compared with the results it obtains.

Occasionally, but only occasionally, is the suggestion made that the University is spending too much on research. One, however, can scarcely believe that the Legislature and people of the state would fail to endorse the policy which made their state University a contributor, not only to the intellectual life of the state but to the larger community and the nation. Certainly everyone recognizes now that no form of activity, commercial, industrial, agricultural, or educational, can be carried on without the leadership and help of the trained and technically qualified specialist. Such men are the products of graduate work. It is from them, and from them alone, that university faculties are recruited, and to abandon their training or to fail to do our part toward it would mean that education everywhere would take a step backward. Once we were dependent for the training of these men upon foreign universities. Fortunately for this country that complete dependence began to disappear in 1880. Then we were largely dependent upon the Atlantic seaboard institutions, endowed by men of means and controlled by their alumni. The limitations that their conservatism put upon new types of work led to the development of graduate work in the state universities, where scholarship in its relation to all forms of activity and productiveness was quickly recognized. The rewards have been exceedingly large in proportion to the very small amount that has so far been spent in training such leaders in any state, but they have, indeed, been important enough, so that in Illinois the legislature by voluntary action established a graduate school, with its own special appropriation, as a permanent part of the university.

If Minnesota should recede from the position that it took in 1905, in definitely organizing the Graduate School which now ranks among the half dozen leading

graduate schools of this country, it would abandon one of its most responsible and successfully met obligations. If every state university should join in the same action, we would be thrown back into the position in which we were forty years ago, and our leaders in social and economic matters, science, medicine, and other fields would come only from the limited supply furnished by the endowed institutions. One can not believe that any self-respecting democracy would willingly and definitely condemn itself to mediocrity.

Possibly the largest return that the Graduate School makes at the present time is in holding here, through its opportunities, the most distinguished scholars who are leaders of the undergraduate colleges. To such men the opportunity for research and for association with advanced students is a necessity and if it is to be denied them no money equivalent can keep the keener and better men here, nor can we attract anything like their equivalent from institutions where research is definitely accepted as a function of the university. Simply because it has the Graduate School, the University of Minnesota is now a member of the very limited group of the Association of American Universities and stands in a position of distinction and initiative in the field of national education. If we lay aside for the moment what it means to retain scholarly men on our faculty, we find that of the six or seven hundred graduate students registered in the University of Minnesota last year nearly 65 per cent were also giving some form of service to the University for a small stipend. In most cases their real reward came in the opportunities to study here and to prepare themselves for university teaching and research positions in laboratories and in private business. It is, therefore, quite correct to say that these graduate students make, in their teaching service, at low wages, a return to the University far greater than anything that is expended on the Graduate School. Further than that, they represent the keenest, the most progressive and ambitious group. If their teaching hours had to be taken over by instructors hired solely for that purpose, we should naturally, of course, attempt to get such instructors at the lowest salary and would receive not the best of the younger crop but the culls. We would pay them much more than we pay now in scholarships and teaching fellowships. No truly self-conscious state will decree the closing of this form of work and put its central educational institution back to the point where it is only an aggregation of colleges, taught by men who have no rank or part in the world of scholarship. It certainly should be a source of pride that it is this group which carries the name of Minnesota to-day into many foreign lands and makes it not only of national but of international importance.

THE MEDICAL SCHOOL

Medical education has been unified in Minnesota through the Medical School. For years there were several medical schools. These were finally absorbed and unified in the State University. This was an advance because better educational standards could be enforced and better facilities offered. At the same time unification involved responsibility for all the work in medical education in this section. There is no other place where students can go.

The Medical School is geographically so located as to have more than a statewide importance. There is no other complete medical school in the Northwest this side of Portland, Oregon. The states of the Northwest have no large cities

in which medicine can properly be taught. These states are bound up with Minnesota in intimate, economic, and social relations. We should produce physicians for these states just as we produce flour and farm machinery for them. This is a matter of broad, public policy.

The University should also provide short courses for the practitioners of the state, so that they may acquire the latest methods and use them for the benefit of their patients. This the Medical School has done to some extent, but with larger hospital facilities it could do more. There is great need in this direction.

The Medical School is an outstanding division of the University with a national reputation for efficient teaching. The school was among about a dozen to be classed for some years as A plus by the American Medical Association. It remained in that class as long as the association maintained its system of classification. Last year the medical school of a neighboring university collected from a considerable number of medical educators their opinions as to the fifteen best schools. Minnesota appeared upon all the lists except one. The school has been a leader in educational reforms and experiments, such as standards of admission, the required interne year, and the student interneship. The latest report of the inspection of the Medical School by representatives of the American Medical Association and the Association of American Medical Colleges contains this sentence, "No one can visit this great university medical school and consider any portion of it without recognizing its enormous advantages."

The graduates of the school are excellently prepared for their work. This is shown by the record of our men in the army and navy, and especially by the reports received from numerous superintendents of hospitals all over the country where our graduates have served as internes in competition with graduates of other schools. In the last five years only one of our graduates has failed in any state examination for license to practice out of 272 who have been examined in various states.

The Medical School has attached to it one of the best schools for nurses in the country. It is the only school of nursing in the Northwest which has a collegiate basis.

The School of Nursing has recently been greatly enlarged by the affiliation with it of the Minneapolis General Hospital, the Miller Hospital, of St. Paul, and the Northern Pacific Hospital, of St. Paul. A preliminary quarter of scientific training is given at the University for all nursing students. After this three months of study they are distributed to the various hospitals for practical training. One foresees the possibility that nursing education in the state of Minnesota may be unified in the University, just as was medical education at an earlier day. There are good arguments for such a development.

The Medical School is an active research institution. The publications of members of its staff contribute to human knowledge and reflect credit upon the University. The results of their research have been of immediate and practical value. The school in addition to fulfilling its educational function renders an important service in the medical and surgical care of very many of the poor people of the state at the University Hospital and Dispensary. The University Hospital treated last year 2,604 patients and the Dispensary had 69,133 visits.

Every physician is in a real sense an officer of the state. He must make reports of births, deaths, and contagious diseases and perform other duties essential

to the public health. Therefore, quite apart from the private demands of the individual citizens for good medical service, the state government itself has a vital interest in an efficient medical profession and in the education of young men and women for this profession.

The Medical School should be enlarged:

1. Because it has been obliged to limit its enrolment and is not able with its present facilities to train all the fully prepared candidates from the state, to say nothing of those from neighboring states who look to this University for medical education.

2. Because of marked deficiency in present facilities. A committee consisting of Dr. Frank Billings, of Chicago; Dean Victor C. Vaughan, of the University of Michigan; and Dr. John M. T. Finney, of Johns Hopkins University, recently made a survey of the Medical School of the University, and recommended among other things that provision be made for 400 hospital beds at once, and that there be erected a nursing building for the housing of the nurses.

3. Because of its intimate relation with the Graduate School of Medicine, the survey report above referred to praises our Graduate School and says, "While the Mayo Foundation is not administratively connected with the undergraduate Medical School of the University, the association of the two in the same University is a benefit to both." The fundamental sciences of anatomy, physiology, bacteriology, pharmacology, and pathology are essential to the training of medical specialists. Every graduate medical student must receive further training in one or more of these branches. Ample clinical facilities and thoro clinical training in the undergraduate school are essential for the turning out of acceptable candidates for graduate fellowships. The Graduate School of Medicine can not remain in its present enviable eminence unless the undergraduate school is kept to a high level of efficiency.

It should be stated, moreover, that the further development of graduate medical work and its connection with the undergraduate medical school is of great importance, not only for the teachers of the fundamental departments but for the teachers of the clinical departments also. Good undergraduate teaching will only be done in the atmosphere of research and graduate study. The teaching fellows are valuable teachers. The Medical School, therefore, must have adequate facilities for graduate students in all departments.

4. In order that it may be of greater service to the state in caring for the sick and poor and restoring them to productive life. The University of Iowa has 680 beds which are continually kept full with patients from all parts of the state. Michigan is building even a larger hospital, and Iowa is considering an enlargement. Wisconsin is building a 300 bed addition to complete their small unit. Minnesota should not be behind these others in furnishing adequate medical service to her citizens.

5. To include adequate facilities for public health teaching and all sorts of public health work.

6. In order that it may maintain its position among the greater medical schools in the country. In the last ten years, Harvard, Johns Hopkins, Michigan, Iowa, Cincinnati, Vanderbilt, California, Washington universities, and others have made

great advances in hospital and laboratory facilities. Wisconsin, University of Chicago, Rush Medical School, Illinois, Tulane, and others are building additions or have funds provided for building.

THE LAW SCHOOL

The requirement of two years of college work as a prerequisite to entrance to the Law School became fully effective in 1913-14. The total attendance by years since that time has been:

1913-14	162	1918-19*	117
1914-15	177	1919-20	266
1915-16	171	1920-21	269
1916-17	222	1921-22	297
1917-18*	134		

*War year.

The present registration would have been larger had not a considerable number been excluded who would have been admitted in the past as special students. That the growth has not reached its maximum is indicated by the fact that there is this year an increase of 30 per cent in the registration of pre-legal students in the College of Science, Literature, and the Arts. It is consequently fairly certain that there will be a further increase in the Law School at least in 1922-23 and in 1923-24.

Most of the students are training for the profession of law. There is a growing appreciation that the law course is a preparation for business as well. The school does not provide special instruction for these students, nor do we advocate that special provisions should be made for them.

The Law School has endeavored to promote high scholarship amongst those going into the profession of law. One of the best external evidences of the success of the school in this respect is the Maintenance of the *Minnesota Law Review* which is now in its sixth year. The *Review* each year issues seven numbers of about eighty pages each. The "Notes" and "Recent Cases" departments are maintained almost wholly by the students and it has been said by judges that the work in some of these case reviews is equal to the best briefs that come before them. The *Review* has taken high rank among the legal periodicals of the United States.

Other evidence of the success of the school in preparing men for the profession may be had by inquiry of older lawyers in whose offices its graduates have found employment and of the judges of the courts before whom they practice.

We take it that there can be no question of continuing or discontinuing the Law School of the University. The immediate function of the Law School is the training of men for the profession of law, for future judges, and for many of the future legislative and executive officers of the state and nation. Indirectly through its graduates, and directly through the efforts of its faculty, it contributes to the improvement of the law of the state. The ultimate object of the Law School is the maintenance of law and order and the preservation of liberty. It can not be denied that without them advancement in other lines of endeavor would be impossible. Lawyers are the engineers of society and upon their probity, skill, and public spirit depends the smooth working of the social machinery. Surely there can be no more important work than preparing men for these functions.

In a notable address in 1916, the president of the American Bar Association, Mr. Elihu Root, declared it the plain duty of all Americans, whatever their calling, to consider by what means they can contribute towards the permanent higher efficiency of the people of the United States. This appeals with peculiar force to lawyers. Then pointing out that with a highly developed individualism there is a continual pressure toward promoting individual rights, and very little pressure toward maintaining the community's rights, he added, "There are indeed two groups of men who consider the interests of the community. They are the teachers in the principal law schools and the judges on the bench. With loyalty and sincere devotion they defend the public right to effective service." Again at the last meeting of the American Bar Association in Cincinnati, Mr. Root, as chairman of the section on legal education, and also as chairman of the special committee to recommend action to be taken to create conditions which would strengthen the character and improve the efficiency of those admitted to the practice of law, submitted a report, the fundamental ideas of which were that, in order to secure proper training for lawyers, it should be a condition of admission to a law school that the applicant have two years' training in college and, further, that he should have three years' training in a law school of satisfactory standards. In this effort to elevate the bar he received the enthusiastic support of Chief Justice Taft and others. The report and recommendations were adopted by the association.

Law is a public profession. It has been the experience of mankind that no matter how excellent the laws are, justice can not be had without trained counsellors. Lawyers as counsellors are engaged in a public service. They are the officers of the courts, and upon the manner in which they and the judges selected from among them render their service depends in a large measure the public confidence in, and support of, the law. The state has consequently an interest in the ability, training, and probity of the members of the legal profession.

The importance of having the recruits for the profession of law brought in contact with university ideals can not be overestimated. The prerequisite university education and the legal education under university conditions open the mind, broaden the outlook, and instill into the students the ideals which should animate the profession. It is the best substitute for the personal contact with the older members of the profession which students had in the days of apprenticeship. The influence at a university of trained men in the development and administration of law can not be overrated.

Advancement in law has not kept pace with advancement in other fields of thought. It must be remembered, too, that this retardation takes place at a time when because of changes in the manner of life, particularly in the methods of production and distribution, the problems presented to the law for solution have become unprecedentedly complex and difficult of solution. The world has made discoveries and inventions. It has developed new appliances and forms of organization, which challenge and threaten the very civilization which created them, unless means can be found for their regulation. We need only to refer to the methods of destruction in warfare, to the organization and industry of both employers and employees, alike dangerous to the existence of our civilization unless these powers are regulated as individual physical force was long since regulated by law.

No one will question the importance of expenditures by the state for the development of the productive power of its people in agriculture or industry. No one will question the importance of teaching and research which save the people from pain, disease, and death. Some will question the expenditure for the study of law. The difficulty lies in our ability at times to understand the relation between law and our welfare. Living in a time of comparative security, we take law and order for granted, forgetting that it was achieved and has been maintained in the past only by severe struggle and sacrifice. The benefits accruing are intangible and consequently can only be appreciated by people of foresight and imagination.

THE COLLEGE OF EDUCATION

The College of Education was established by act of the Legislature in 1905 in response to an insistent demand that the University provide opportunity for the training of teachers. It grew very slowly until about 1916, at which time the Board of Regents placed all courses for the training of teachers, both general and special, in the College of Education. In 1919-20, all students expecting to receive a teacher's certificate from the University were required to register in the College of Education. The registration in 1916-17 was 204; 1917-18, 199; 1918-19, 286; 1919-20, 496; 1920-21, 599; 1921-22, 642. The College of Education also serves an increasing number of graduate students. The demand for advanced training is steadily increasing in the public schools of Minnesota and there is an increasing attendance of persons, who have already received a Bachelor's degree, for the purpose of pursuing graduate work.

The College of Education devotes itself primarily to the training of teachers for high school work, to the training of superintendents, supervisors, teachers of subnormal children and of the various special subjects, as, for example, home economics, agriculture, trades and industries, physical education, and art. The total number of high school teachers needed in the state of Minnesota annually is about 660. The University of Minnesota with its present facilities is able to furnish about 175. The demand for adequately trained teachers in the fields served by the College of Education is further apparent from the requests which come in constantly to the Appointments Bureau. Last year this bureau received 2,088 requests for teachers, among which were 953 for teachers of academic subjects in high schools, 63 for music and art supervisors, 69 for manual training teachers, 30 for physical training and athletics, 80 for commercial teachers, 48 for normal school teachers, 9 for supervisors and critics, 5 for librarians, 163 for principals of high schools, 245 for teachers of home economics, 91 for teachers of agriculture, 36 for the junior high schools. One thousand one hundred ninety-five of these requests came from public schools in the state of Minnesota. The remainder were distributed throughout 34 states, and one foreign country. When one compares this demand for over 2,000 teachers with our production of about 175, he can easily see that the college has not reached its necessary development.

The attempt to provide education for all children has greatly affected the scope and character of public education. The problems which the expansion of our public school program has created fall under the following general groups:

Buildings and equipment	Child accounting
School finance	Curriculum
Training of teachers	Instruction
Problems of rural education	School organization
Administration	

In each of these fields there is an abundance of carefully worked out and collected scientific data with which the man who expects to be an expert in education must be familiar. The whole machinery of public education has grown so rapidly and has become so vast and complicated in its ramifications that the person who has given no study to it feels helpless and lost when he is suddenly brought face to face with its manifold problems and considerations.

Large city systems have resorted to specific agencies whose sole business is the investigation and study of the educational situation within these cities. Thus cities like Detroit, Los Angeles, Kansas City, and Boston have bureaus of educational research the function of which is to study the problems confronting the school systems of these cities. Such bureaus have multiplied greatly in number in recent years.

State departments of education also have undertaken to foster educational research, with a view both to a better handling of the state problems of education and to direct assistance to local school systems unable to finance bureaus of their own.

It is amazing what has been done with the development of education in the last ten years. To-day there are definite standards, so that it is possible for one to compare the third grade in one school with the third grade in another school, or one school system with another school system in the manner of achievement in almost every subject of study. It is also possible to compare the different school systems with reference to budgetary matters. The details and standards for the erection of buildings have been worked out with great care.

Education is no longer a hit or miss affair. It no longer depends upon individual opinion. It is becoming more scientific every day, largely as the result of the work of the scholars in the various training schools and colleges of education.

A college of education also has another function, and that is the function of direct service to the schools of the state. The underlying reasons for this are:

1. The growing need on the part of public schools for correct and helpful information.

2. The present condition and training of administrators, coupled with the excessive multiplication of administrative duties which have grown up in most schools.

3. The financial inability of smaller schools and school units to provide specialists in their corps.

4. The presence in the university faculties of men possessed of the necessary information and skill.

Very inadequately the College of Education at the University of Minnesota has attempted to render this direct service. It has never had any special fund for such service and its chief assistance to public schools is that which has been rendered by members of the faculty in addition to their teaching duties. The universities of Iowa, Illinois, Michigan, Ohio, and Indiana have surpassed the University of Minnesota in providing for this type of work. Each of these

institutions has an organized bureau with budgets ranging from $10,000 to $35,000 for this work.

There are certain departments in which the college is providing no training, for example, teachers of commercial subjects, physical education for men, rural education, school librarians, and certain types of general education. There is an increasing demand for teachers of commercial subjects and for teachers of physical education. The University should, sooner or later, give more serious attention to the establishment and equipment of a department of rural education and, as soon as conditions will permit, it should give attention to the training of teachers for special classes of children, as for example, the subnormal, crippled, blind, and deaf, as well as for those children who are especially gifted.

THE SCHOOL OF CHEMISTRY

The activities of the School of Chemistry may be considered under three heads, namely instruction, research, and service. As an instruction unit in the University of Minnesota, the School of Chemistry performs very broad functions, inasmuch as the largest part of its work consists of the instruction of students of other colleges of the University. This work is distributed approximately in accordance with the following figures:

College	Total student credits
Arts College, including pre-medical students	5477
Agriculture	2558
Chemistry	2942
Dentistry	1372
Education	333
Engineering and Architecture	4453
Graduate	439
Medical	193
Mines	706
Pharmacy	1456
Total	19,929

It will be seen that the colleges of Science, Literature, and the Arts, Agriculture, and Engineering, together, receive about 63 per cent of the total instruction given in the School of Chemistry, while the students registered in this school receive only 15 per cent of the total instruction.

It is evident from these figures that the growth of the University enrolment will be directly effective in increasing the work of the School of Chemistry. Moreover, it is a fact that more and more chemistry is being added to the curricula of the various colleges, so that the number of students receiving instruction in this subject is increasing for this reason also.

The importance of research in chemistry can not be overestimated. It should be carried on simultaneously with instruction to which it offers direct and powerful stimulation.

The third function of the School of Chemistry is to give service to the people of the state by using its facilities for the solution of such problems as may be presented to it by various industries in this region.

There are six divisions in the School of Chemistry, namely, general inorganic, analytical, organic, physical, technological, and chemical engineering. All of these divisions give courses which are required for certain curricula in the School and the University. In addition elective courses and research are provided for all students having the necessary prerequisites. The work of each of these divisions is so important as to require its continuance, altho it must be recognized that the development of new fields of chemistry may render it advisable in the future to organize new divisions or to modify and enlarge the present ones to correspond with the new demands. The rapid development of chemical activities in the past ten years is but an indication of the future.

The division of general inorganic chemistry gives instruction to students registered in various colleges of the University in general chemistry, qualitative analysis, and advanced inorganic chemistry. The major part of the work of this division, however, is general chemistry and qualitative analysis. For this quarter, the following table shows the distribution of students other than those registered in the School of Chemistry.

Arts College, including pre-medical and pre-dental students	542
Engineering and Architecture	328
Mines	70
Nursing	61
Pharmacy	80
Agriculture	254
Total	1,335

Three years ago this division gave thirteen distinct courses to meet what was thought to be desired in the various schools and colleges. The present courses have been standardized so that we have but two real divisions in general inorganic chemistry—one for students who have taken chemistry in high school and one for those who have had no high school chemistry. These courses carry four and five credits per quarter depending upon the amount of chemistry necessary to meet the requirements of the various colleges. To meet the demand of students taking their major or minor work in chemistry, this division has added advanced courses in inorganic chemistry, history of chemistry, and qualitative chemical analysis. These additions were also necessary in order that any student wishing to take work for an advanced degree, with his major in this division, might have sufficient supporting courses.

The objects of the division of analytical chemistry are threefold.

1. The teaching of analytical chemistry to those who intend following the profession of chemistry.

2. The teaching of analytical chemistry to those who intend to follow other sciences or technical branches. To such students this study furnishes the prerequisite to certain subjects in their own field, as for example, physiologic chemistry and toxicology in the Medical School, dental metallurgy, chemical mineralogy, geology, and so on.

3. The advancement of knowledge along all lines, not only in applied analytical chemistry, but in the broader fields of general and physical chemistry, in their relations to the development of analytical chemistry as an organized science rather than an applied art.

Regarding the desirability of continuing, discontinuing, modifying or enlarging this division, it should be pointed out that so fundamental a branch as analytical chemistry, with its method and equipment differing markedly from those of other chemical fields, could not very well be discontinued. The subject is fundamental to all qualitative laboratory work in chemistry.

The war has shown us that the organic chemical industry and the dyestuff industry are the two industries whose products are necessary, directly or indirectly, to American industries, but when one considers in addition the synthetic drug, the photographic chemical, the explosive, all the synthetic organic chemicals, petroleum, rubber, paper, etc., and all other organic and non-synthetic chemical industries, his idea of the importance of organic chemistry cannot help but increase. Yet these are by no means all the industries that could be listed as primarily organic. Foods, fermentation, tanneries, living organisms, are all present problems to the organic chemist which are yet to be solved.

The industries which most interest the organic chemist are naturally those in which a knowledge of synthetic organic chemistry is called for. For instance, the petroleum industry, altho its products are all organic, has been chiefly an engineering industry and has reached its present position by the development of wonderful skill in the handling of substances already present in crude oil.

The dyestuff industry, on the other hand, owes its existence to the control which the organic chemist has learned to exert over the molecules of carbon compounds, by which control he has been able to convert the ten important crudes present in coal tar into thousands of dyes and to change the by-products into drugs, perfumes, flavors, photographic developers, etc. These synthetic industries simply would not exist if research in organic chemistry had not been the most preferred field in chemistry for many years.

For these reasons, the practical importance of organic chemistry can not be ignored. The theoretical importance of organic research to chemistry as a whole will not be denied by anyone conversant with the history of chemistry.

Physical chemistry is that branch of chemistry which pays most careful attention to the fundamental laws and theories on the basis of which the science is developed. Its training is essential for students who specialize in some other branch such as organic chemistry or chemical engineering. It is indispensable to the student who feels impelled to devote himself to a career of research either in the pure sciences or in any of the applied branches. As a cultural subject, it is to be placed along with physics and mathematics.

Physical chemistry is moreover of great service to many students specializing in different lines of work. The Medical School in prescribing a course in physical chemistry for the freshman has recognized its importance to workers in the biological sciences. This statement is emphasized by the fact that almost every year senior students in the College of Agriculture are advised by those in charge of the student's work to take advantage of a course in physical chemistry, and this whether the student is majoring in agricultural chemistry, plant pathology, or horticulture. In many different lines of modern investigation physico-chemical methods and principles are employed. Very few serious students of the physical, chemical, or biological sciences can dispense with some knowledge of physical chemistry.

The division of technological chemistry gives instruction to the students of applied chemistry, to mechanical engineering students in the College of Engineering and Architecture, and to graduate students. When this division was first organized in 1914, the courses in gas analysis, coal analysis, food analysis, and microchemical analysis were given to the students enrolled in the School of Chemistry alone. At the present time a course is given to students in chemical engineering and power plant chemistry, such as gas, fuel, boiler, and water analysis. Additional courses in calorimetry of fuel, the analyses of petroleum and petroleum products, animal and vegetable oils, paints and varnishes, of paper, and of various other industrial products are offered in the School of Chemistry.

The Chemical Engineering Division is best qualified to give courses in the chemistry of materials which should be taken by all students in the Engineering College preparatory to the study of strength of materials. Applied thermochemistry which would teach the applications of pyrometry would be valuable to the various chemistry, chemical engineering, and other engineering courses. It is certain that this is a field which offers almost unparalleled opportunities for development. The relationship between chemistry and engineering, particularly electrical engineering, is one whose value we are just beginning to appreciate. The students who go into this field in the future will be required to have a thoro course in chemistry and also a thoro course in electricity as a ground-work for the study of chemical engineering problems.

THE COLLEGE OF ENGINEERING AND ARCHITECTURE

The College of Engineering and Architecture has had an exceptional growth since the war. The present enrolment is practically the same as last year, that is about 1,000. This is more than double what it was four years ago. Every effort is being made to improve the conditions and facilities of the college. The faculty has been directed by the Regents to prepare plans for the erection of a new electrical engineering building, costing approximately $300,000.

Unless one is given some time to study the matter, he scarcely appreciates the enormous development of the engineering field. Less than two generations ago, engineers devoted themselves largely to surveying and the building of railroads and bridges. Since that time, engineering needs have very greatly differentiated, so that to-day there is a demand for mechanical, electrical, hydraulic, highway, and chemical, as well as civil engineers. This differentiation of the engineering field and the demands for trained men in each of its divisions has followed in the wake of the differentiation of social needs and desires in the world outside.

The Northwest, and Minnesota in particular, has been gradually becoming a more important manufacturing and mercantile region. The 1920 census figures show that the value of manufactured goods in this state is $1,218,000,000 annually. Manufacturing may even lay claim to being one of the foremost, if not the foremost industry of this state. With this development the demand for engineers has greatly increased.

There are in the College of Engineering and Architecture four professional departments, namely, Architecture, Civil Engineering, Electrical Engineering, and Mechanical Engineering; and three service or fundamental departments, namely Drawing and Descriptive Geometry, Mathematics and Mechanics, and the experimental engineering laboratory.

The Department of Architecture offers such courses in architecture, architectural construction, and decoration as are needed to prepare and equip one for practice in this field. While the development is only eight years old it has reached a position of recognized standing in architectural education as well as among practicing architects. More than one hundred students are enrolled in its course.

The course in civil engineering is being taken by about 300 students. The work in this department may be divided into the following branches: surveying, railway engineering, structural engineering, hydraulic engineering, highway engineering, and municipal and sanitary engineering. The laboratory work consists of structural and highway investigations. The highway laboratory work is done in close coöperation with the State Highway Department.

Electrical Engineering is the largest department in the college so far as the number of students is concerned. About 350 students are taking courses in this field. The department ranks high in the estimation of large employers of electrical engineering graduates, such as the General Electric Company, the American Telephone and Telegraph Company, the Western Electric Company, and the Westinghouse Electric and Manufacturing Company. Each year representatives of these companies seek the graduates of this department.

In addition to the fundamental courses in electrical engineering, the work of this department includes central stations and power plants, electric transmission, general electrical machinery, electric transportation and communication, and radio telephone and telegraph work. A close relationship exists between this department and the Signal Corps of the United States Army through the Reserve Officers' Training Corps.

An idea of the growth of this department may be obtained from the following figures which show the number of student hours of instruction per week given in the electrical engineering laboratories in the fall quarters of the following years:

1917-18	329	1920-21	855
1918-19	380	1921-22	1,299
1919-20	630		

There are about 200 students in the Department of Mechanical Engineering. A considerable number of students from other departments also take work in this department, especially in the shops. The work includes shop practice, industrial engineering, machine design, heat engineering, power machinery, power engineering, railway mechanical engineering, automotives, aeromotives, steam and gas engineering, and laboratory practice.

The work of this department has been very greatly restricted by its crowded shops. More space will be required in the near future.

THE SCHOOL OF MINES

The work in the School of Mines is of fundamental importance to the future of the state. Mining will continue to be one of the chief industries of Minnesota, we hope, for many years to come. It looked, however, recently, as if it would cease to be a very profitable industry in 30 or 40 years, as it was known that the rich ore in the Hibbing and Virginia districts was being mined at the rate of 30,000,000 to 40,000,000 tons a year, and that there was roughly only about 1,500,000,000 tons of it left. This would mean that within 40 years it would all be practically exhausted.

If the mining companies continue to take the ore out at the rate of 30,000,000 to 40,000,000 tons a year the peak of the load would be reached long before the 40 years had passed, and the instant the peak was reached and we began to take out less and less year after year, the importance of mining in the state would decrease and the income to the state in the form of taxes in one form or another would also decrease; but a recent development, at the Experiment Station of the School of Mines, of a log-washer making it possible to treat the low grade magnetic ore, which is found in vast quantities at the eastern end of the Mesabi Range, means that the mining industry may be extended for perhaps two hundred years to come. This one invention alone will undoubtedly increase the wealth of Minnesota many times over what Minnesota has contributed to education in all forms during her entire lifetime. Other researches of equal importance are under way and are so far advanced that, altho we are unable to make any definite statements as to their outcome, we feel very certain in our minds that their results will be quite as significant as the results of the investigations carried on in connection with the magnetic log-washer.

As has already been indicated in an earlier part of this discussion, the curriculum of the School of Mines is almost entirely a prescribed curriculum. It has been in operation for such length of time that we are confident we could not discontinue the work or even curtail it without seriously affecting the preparation of mining and metallurgical engineers. We, therefore, are convinced that all the work now offered should be continued with such slight modifications as may be necessary from time to time. We do not contemplate at the present time introducing any new courses, involving great additional expense.

THE COLLEGE OF PHARMACY

The College of Pharmacy will have completed its third decade with the closing of the current University year. The college was organized and made a division of the University at the initiative of the Minnesota State Pharmaceutical Association. The association has supported the college with its good will ever since. The college is regarded as among the foremost American colleges of pharmacy with respect to standards.

Up to April, 1919, persons entering the ranks of pharmacy were not required to attend the College of Pharmacy. They had to take a state examination, however, at the end of four years of practical experience. In April, 1919, the Legislature enacted the so-called prerequisite law which made it incumbent upon all persons who entered the ranks after that date to complete at least two years of successful work in a college of pharmacy of recognized standing. At the date of enactment of the prerequisite act there were probably 1,000 persons in the state who might ultimately become registered pharmacists, but who were not required to go to college. This number is rapidly decreasing, due to the fact that some of those who were exempt are becoming registered, going elsewhere, or dropping out. The College of Pharmacy, however, is confronted by the fact that the State Board of Pharmacy is registering at the present time approximately 100 pharmacists a year. This number will increase as the years go on. We are already feeling the impetus of the new law, and we would not be surprised if we would have a much larger enrolment next year and an accelerating enrolment the following years. For several

years we have made careful study of the pharmaceutical work in this state. There has been a slight increase in the number of pharmacists registered from year to year. This increase would have been greater had it not been for the fact that standards by state law and board rulings have been gradually raised. A further study of statistics shows that in a very few years now, possibly only two or three, few persons will be left who are exempt from the college training provisions. The present facilities of the College of Pharmacy are wholly inadequate if this increase takes place. There does not seem to be any possibility of reducing or limiting the work of the college.

It is a matter of interest to know that the College of Pharmacy prepares and delivers medicinal preparations to the University Hospital, the free Dispensary, the Health Service, the College of Dentistry, the Department of Pharmacology, the Farm School Athletic Association, the Department of Physiology, the Department of Psychology, and the Department of Pathology. The digitalis which it is producing in it medical plant garden and on which it has done much of its research work is being demanded in an increasing ratio by physicians in this and neighboring states and in states as remote as those of the Pacific and Atlantic coasts. This cultivation is done in connection with our medicinal plant garden and is engaged in, of course, primarily to improve our educational facilities and to provide a field for research work for which there is an urgent demand.

THE SCHOOL OF BUSINESS

Forty years ago, Joseph Wharton of the School of Commerce at the University of Pennsylvania expressed the belief that our business leaders must have thoro and scientific training, but the educational world was so unprepared to receive such a radical departure from its accepted curricula that the Wharton School met with indifferent success for many years. No similar institution of higher learning undertook the establishment of a separate school until President Harper created a College of Commerce and Administration at the University of Chicago in 1896. This was followed by the founding of a similar school in California the next year.

A further impetus was given to the movement in 1900, when Amos Tuck gave to Dartmouth College a large sum for the creation of the Amos Tuck School of Commerce. Since that date the teaching of economics and business administration has had a rapid development. More than twenty of the larger institutions have separate schools or divisions of business education. Now practically all schools of collegiate grade provide one or more courses in the field. The College of Commerce at the University of Illinois with more than 1,900 students has outstripped both engineering and agriculture. Wisconsin reports 1,300 in business administration, while at Northwestern, including the down town department in Chicago, more than 3,000 students are enrolled in commerce. The Wharton School now has 3,500 students and has been compelled to turn away more than a thousand others.

The reasons for this wide-spread growth of collegiate training for business were recently formulated by Dean Donham, of the Harvard University School of Business Administration, as follows:

1. The literature of business has grown beyond the capacity of the individual business man to follow.

2. The practice of business is developing rapidly a body of principles which may be formulated and taught.

3. There are standards and ethics in business activities outside the scope of law, similar to the ethics of the older professions.

4. The future of business at its best lies in the further development of the professional point of view.

5. In the ministry, the law, and medicine, experience has proved that the shortest and most effective way to absorb the fundamental facts, principles, and standards of a particular profession and to prepare for its practice is in a good school.

6. The busy practitioner of any profession has neither time, specialized training, nor the equipment for the systematic instruction of the beginner. This is particularly true of business men.

7. The difficulty of transition from college to business and the increasing recognition by progressive business men that training for business may be acquired in schools as effectively as training for law, is responsible for the recent evolution of organized collegiate business schools, and is one of the most important and far reaching developments that has ever affected the American college.

At the University of Minnesota, courses in economics, marketing, banking, insurance, and like subjects had been given for many years, but the business men of the state were not satisfied with the status of business education as one of the many departments of the liberal arts college. Their contentions were that so important and specialized a body of instruction should be in charge of a separate faculty with the right to conduct the work according to the judgment of those trained in the field. They insisted that there was just as much justification for the maintenance of a separate school for training business executives as there was for the existence of separate schools of law, medicine, engineering, and agriculture, and that the nominal increase in overhead expense in the case of any important professional course was more than offset by the ability to develop a real professional atmosphere and the freedom of the faculty group to solve the problems in its own special field.

After five years of agitation on the part of organizations representing more than ten thousand retail, wholesale, accounting, and banking firms in Minnesota, the Board of Regents in 1919 created a School of Business. They provided that the first two years' work should be given in the College of Science, Literature, and the Arts as a pre-business course and that the junior and senior years be given over to the more advanced professional work in the School of Business.

The faculty of the School of Business, in order to establish a reputation for high standards and to avoid an influx of the type of student who is carried away by the glamour which surrounds business courses, formulated a pre-business course in which every student must earn an average of C in all his work. As a result, the registrations in the junior and senior years have been very modest: 54 in 1919, 108 in 1920, and 146 in 1921. The result has justified the measures taken. The school has acquired a reputation for hard work and high standards. The business men of the Twin Cities have given unsparingly of their time and establishments in furthering instruction in their respective fields. A few weeks ago a plan was inaugurated whereby seniors in the School of Business will be able to spend a part of each week in business houses, banks, and accounting firms in order to coördinate their work with actual business practice.

The large enrolment of students in the pre-business courses, in 1918-19 to 1921-22, bears out the prediction that within a short time there will be a registration of 600 or 700 students in the two years' course in the School of Business.

The instruction of the juniors and seniors registered in the School of Business is but a minor part of the work of the teaching staff of this school. First it offers instruction in the various branches of economics to 2,317, including a considerable number of persons in arts, engineering, education, and agriculture and a few from some of the other schools and colleges. Students in all these fields in increasing numbers are seeking fundamental training in banking, marketing, accounting, statistics, and business law.

In our Agricultural College, stress is being laid upon the necessity for better business methods, if the farmers expect to survive. As a result an increasing number of students are electing accounting, marketing, and other business subjects. A related demand upon our facilities in economics and business administration lies along the line of the training of managers and accountants for the rapidly growing numbers of farmers' coöperative enterprises. It is generally conceded that the coöperative movement is only in its infancy and that it is revolutionizing rural marketing and finance. So important has the business side of agriculture become that Cornell University has provided for eight professorships in that field alone. The faculty of the College of Education is sending to the School of Business not only those persons who expect to teach commercial subjects, but those who are in training to be superintendents and principals of schools. The need of a proper understanding of public finance and of business practice is recognized as an important factor in their preparation.

As members of the teaching faculty of our Graduate School, the professors on the staff of the School of Business are called upon to direct the training of candidates for higher degrees in the field of economics, and to give suitable advance instruction in their respective fields of specialization. The importance of this phase of the work lies in the fact that from this source come not only the future professors of economics and business administration, but a rapidly increasing group of consulting economists in large business establishments and in government service.

As members of the staff of the Extension Division, some of our faculty give work in the evening to business men and women in the Twin Cities and in Duluth. They outline the work and correct the lessons of persons throughout the state who are taking courses in business subjects by correspondence.

THE COLLEGE OF DENTISTRY

Certain facts relating to the College of Dentistry have already been presented in an earlier part of this discussion. It is not possible to place any further limitations upon the College of Dentistry. The building is being used to capacity, all of the students that can be accommodated are permitted to register, and the curriculum is practically all prescribed. No change can be made in this college unless the course is shortened and that does not seem to be at all desirable if we wish to turn out well-trained dentists. The college has admitted a certain number this year who wish to be trained as dental mechanics. They take a one-year course and are prepared to do all the mechanical work in a first-rate dental office under the direction of professionally trained dentists. It seems that there is a growing demand

for such workers, but such men have not had the training in the fundamental sciences, nor in the fundamental aspects of the dental work that would entitle them to be classed as professional dentists.

The dental situation throughout the United States has been the subject of more or less controversy in recent years, particularly in recent months. The Carnegie Foundation for the Advancement of Teaching has recently arranged for a careful study and survey of dental education. It will be recalled that a similar study was made by this foundation a number of years ago for medical education, and that the medical schools were classified upon the A, B, and C basis. The study resulted in a very marked improvement of medical education everywhere throughout the United States. It is conceivable that the study to be undertaken for dental education may produce similar results.

THE DEPARTMENT OF AGRICULTURE

The activities of the University Department of Agriculture are centered in the Agricultural Experiment Station, the College of Agriculture, Forestry, and Home Economics, the agricultural schools, the short courses in agriculture, and Agricultural Extension. In the name of the department the state owns land and conducts work at the University Farm, Duluth, Cloquet, Grand Rapids, Crookston, Morris, Waseca, and Excelsior. The total area of land owned by the state at these points is 4,917.06 acres. In addition the department operates a forestry experimental station at Itasca Park and ten experimental and demonstration fields of soil provided for by special legislation.

Few states, in fact it is doubtful if any other states, have attempted to recognize in a material way the needs of their agricultural population as has Minnesota.

It is realized that Minnesota is a very large state, presenting many diversities under agriculture. She has a very wide range of climate and types of soil. In age her agriculture ranges from 70 or more years to new clearings in the forest. The whole range of problems from the pioneer farmer to the farmer on exhausted soils must be considered. Particular attention is called to the fact that the cost of operating such a large and widely scattered plant is very great.

Now that these various interests are established and equipped, it would surely be poor policy for the state to furnish inadequate support to any of them so long as their existence can be fully justified. Moreover the futility of expecting experimental and demonstration units of agriculture to be self-supporting has long since become evident. The recent attempts in this direction in some of the states have resulted merely in defeating the purposes in view. Therefore, there seems to be no other alternative for the state but to expend considerable sums on the Department of Agriculture, if it would take adequate care of its needs.

The needs are evident in practically all of the departments. On the other hand, it is quite evident to anyone who makes a careful examination of the Department of Agriculture that the stations are in a more satisfactory condition than the University Farm, where there are certain needs that are outstanding and pressing. The University Farm is the home of the main experiment station, the College of Agriculture, Forestry, and Home Economics, and of the Central School of Agriculture, the largest of the agricultural schools. It serves as headquarters of the administrative force of the department and also for the Experiment Station and Extension

Division. Various short courses and many meetings of county agents are held here and hence there are many demands for space over and above the demands for the organizations that function regularly on the campus.

The schools of agriculture at University Farm, Crookston, and Morris, with a total enrolment of about 1,400 students, are serving a very important purpose in the development of the state. Even under the present condition of agricultural depression the registration in the schools of agriculture is just about holding its own. Their graduates, now about 3,000 in number, are taking places of leadership in the rural communities of the state and are making rural life better and richer because of the education they have received. Nearly all of the students in these schools are young men and young women from farms who, for various reasons, have missed out in other educational institutions, and at a relatively mature age are again making an effort to obtain an education to fit themselves for the practical affairs of life.

In the College of Agriculture, Forestry, and Home Economics, the present registration is about eleven per cent higher than the highest previous registration. There has been actual decrease in the agricultural course this year, due, no doubt, to the present agricultural depression. This decrease has been more than compensated for by the twenty-seven per cent increase in the home economics registration, which comes largely from the cities.

It is one aim of the college to send back to the country men well trained both in actual practice of agriculture and also in the fundamental principles of the sciences of economics and sociology, so that they shall become agricultural leaders in their communities. Minnesota can well afford to give generously to the training of such men for the improvement of her agricultural future. Better farm conditions will undoubtedly show steady increases in the agricultural enrolment. It is exactly in such times of depression as these that greater knowledge and training is most needed to solve the agricultural problems of the state. However, there are certain aspects of agricultural work that are in serious need of development. No argument is necessary to show the importance of agriculture to the state of Minnesota. It is the fundamental industry of the state. Minnesota ranks near the top in her cattle industries and particularly in dairying. We have every reason to believe that in the course of a few years she will be first among the states of the Union in all aspects of dairying. The northern part of Minnesota may conceivably become a second Denmark in this respect. We have all the natural conditions there for the development of dairying,—abundance of grasses, plenty of water, and a variable climate.

Experimental and research work of the Department of Agriculture, as carried on by the Experiment Station, has been of untold value to the state. It is impossible to estimate in dollars the value of the studies on the feeding of livestock, the improvement and grading of wheat, the development of new varieties of corn, new varieties of strawberries, the testing of milch cows, the control of animal diseases and of diseases and insect pests in plant crops, the study of white pine rust, the eradication of the barberry, studies in white and flour chemistry, examination of soils, production of fruits, care of bees, improvement of poultry and so on throughout the entire list of things that touch the life and welfare of the farmer. What was said about mining is also true of agriculture; that is, its contributions to the wealth

of the state have been many times more than the total amount that has been appropriated by the state for the maintenance of all types of education from the very earliest beginnings of the state down to the present time.

Instead of reducing and limiting the work of the department, it really should be expanded. More attention should be given to the economics of farm life, to the study of forestry, to the development of dairying, coöperative marketing, land clearing, control of plant diseases, the development of improved varieties of plants, and the uses of farm machinery. The Department of Agriculture is expensive. It can not be otherwise. It will not be possible to reduce this expense if the state is really to be served.

THE COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

The primary function of the College of Science, Literature, and the Arts is to give the students instruction which should lead to the bachelor's degree, and to train them for intensive studies and original research in the fields of the several departments. The greater part of the work of this college consists of the service rendered to the other colleges and schools of the University, namely:

1. In preparing students for the professional schools of medicine, law, education, business, and dentistry.

2. In giving instruction which is prescribed in the professional courses of some of the schools, for example, physics for engineers, geology for miners, various subjects for students in agricultural education, freshman English for engineers, chemists, and so forth.

Three important consequences follow from this fact:

1. This college must give young students from the high school both the special preparation for the professional schools and their training in habits of study, their ideals and their attitudes toward the duties of educated men and women.

2. The work of this college is largely determined by the professional schools, both as to the subjects to be taught and the number of students who will come. Even in the Senior College year, the bulk of teaching in several departments is done for students enrolled in other colleges.

Every college of the University is interested in the development of the College of Science, Literature, and the Arts, because 70 per cent of its work is really service to these other colleges.

The College of Science, Literature, and the Arts has experienced greater changes in the last seven years than in any other corresponding period of its history. These changes may be analyzed as follows:

1. Growth

   a. The number of students has increased by 150 per cent, or from 1,592 to 3,963.

   b. The faculty has increased by 69 per cent, from 118 to 194.

   c. The Department of Economics has been separated from the college and incorporated into the School of Business.

   d. Students who are candidates for the teacher's certificate have been transferred to the College of Education for the junior and senior years.

   e. The departments of Animal Biology and Psychology have secured new building space. The space these departments previously occupied in Pillsbury Hall, Folwell Hall, and the Library has been given up.

2. Improvements.

a. The curriculum has been thoroly revised with a view to securing a higher order of work and making the four years' course more valuable to its graduates.

b. Many curricular regulations have been simplified in the interest of the students.

c. The division of the college into upper and lower divisions known as the Senior and Junior colleges has been made.

d. Registration has been placed under the guidance of faculty advisers, to enable the students to plan their work more wisely. Spring registration relieves the crowding of fall registration and makes it possible to give better attention to the needs of newly entering students.

e. A system of faculty advisers for freshmen has been instituted but in a very incomplete form.

f. There has been some gain in the number of men of distinction appointed to the faculty over the number of such men who have gone away.

3. Deterioration.

a. The faculty has not been increased in proportion either to the increase in student enrolment or to the student credit hours of teaching actually done.

b. The increase in numbers of the faculty has been chiefly in instructors and assistants.

c. The increase in enrolment has been wholly in the freshman and sophomore classes. These have almost trebled, but in the junior and senior classes have slightly decreased owing to the transfer of students to business and education. This has created a much greater need for advice and guidance which has not been adequately met.

d. The increase in elementary work demanded, together with a proportionate decrease in faculty, has compelled full professors to take on more elementary teaching and to withdraw advanced courses of study.

e. The proportion of the total University budget for salaries and supplies allotted to this college has slightly decreased since 1913-14, the decrease being from 30.8 per cent in 1913-14 to 27.4 per cent in 1921-22.

It will be found that there is a wide variation in the number of students registered in the various departments and in the number of students registered in each of the courses in the departments. This is inevitable. The number, however, registered in any department is likely to vary from year to year. The number registered in the various courses is also likely to vary from year to year. In recent years, the college has modified its methods of instruction, increased the number of students per class, placed many of them in large lecture classes, and in some cases added assistants and instructors where it should have added professors and associate professors. All these changes have been made in the interests of economy. It would have been better if there had been more additions to the staff in the higher ranks, if the number of students could have been kept down per class, if more sections had been created, and if there had been wider offerings in many of the departments. Additions are needed to the staffs of botany, English, mathematics, philosophy, physics, political science, Romance languages, geography, journalism, and sociology.

THE GENERAL EXTENSION DIVISION

The Extension Division is one of the major divisions of the University. It undertakes to render a public service of an educational and social welfare nature for which the University as a teaching and research institution is peculiarly fitted. Instruction is given through correspondence study, class work, club study, lectures, and short courses. A complete report of the various activities of the Extension Division is included in the Report of the President of the University to the Board of Regents for this last year, a copy of which is being mailed to the members of

your Committee. The possible expansion of these activities is almost without limit. Minnesota has only a partially developed division. A careful survey of extension work in other universities, state and private, indicates that in all of our work, excepting correspondence study, evening class instruction, and the lyceum, we are far behind such universities as Kansas, Indiana, Iowa, California, and Wisconsin. The functions of the Extension Division will require more money for operation, an enlarged staff, more equipment, and eventually adequate housing space.

The success of the Extension Division depends very largely upon its co-operation with the other colleges, schools, and divisions of the University. This is especially necessary in so far as extension teaching carries with it credit which a student may apply toward a degree in a resident college. It is also true to a limited extent wherever the University extension activities require expert guidance from men in the departments of the University; for instance, if the Extension Division undertakes to help public school teachers inaugurate and develop work in mental and educational testing it must have the confidence and coöperation of the Department of Educational Psychology. Again in conducting the merchants' and bankers' short courses, the Extension Division must have the full coöperation of the faculty of the School of Business. At the University of Minnesota the Extension Division has had the sympathetic support and coöperation of practically every department of the institution.

Through this division we are now providing instruction of a more or less definite character to nearly ten thousand persons a year, and this instruction is given at a very nominal expense. The other expenses are borne entirely out of the fees which are collected by the division. It does not seem possible for Minnesota to limit her work any more than she has already limited it. California is giving $85,000 a year; Iowa, $60,000 a year; Oklahoma, $72,000 a year; Indiana, $69,000 a year; Minnesota, $43,080, and Wisconsin, which does not include the agricultural extension division, 210,000 a year for the promotion, development, and maintenance of the extension service. Of course, it must be understood that the University of Minnesota really maintains two extension departments—one in agricultural extension on the farm campus and the other of a more general nature on the main campus of the University, but the Agricultural Extension Service is supported largely out of the Federal funds, while the General Extension Service of the University is supported partly out of support funds of the University and largely out of the fees collected from students registered in the short courses, correspondence work, evening classes, and the like. The lyceum is wholly self-supporting.

The number of persons seeking college education through the extension departments is constantly increasing. Columbia University has recently outlined a number of courses which make it possible for one to receive his degree from work completed entirely in the extension division. Chicago, we believe, has done the same thing. It is conceivable that Minnesota, since she is located in the heart of the Twin Cities, will have in the Extension Division courses leading to degrees in the comparatively near future. The students in these courses will be mature men and women engaged in business who wish to devote a certain number of evenings a week to study for their own personal improvement and

partly to increase their opportunities for promotion. This is an exceptionally valuable service for the University of Minnesota to render and one that should be encouraged.

It does not seem possible to place a limitation upon the work of this division. It would be far better, in case our finances permitted it, to encourage its expansion along certain lines.

CONCLUSION

We have now presented, in a more or less fragmentary way, our answer to the question as to whether or not certain units of the University should be enlarged or discontinued. It will be observed, of course, that we have not discussed many of the smaller subdivisions and units of the institution. We have avoided this, partly because it would involve us, as we stated in the first paragraph, in a discussion of the educational significance of the various subjects of study and branches of instruction. Such a discussion would become voluminous and perhaps more or less confusing. It is the intention of everyone connected with the administration of the University to spend the money of the state wisely in the interests of the educational development and improvement of the state. The principle which we hold before ourselves is that we should not spend a single dollar of the state's money that we would not spend in case the University were our own private institution. Economies are constantly being introduced. Here and there a course is occasionally eliminated. New methods of instruction and new administrative devices, in connection with the organization of the curricula, have permeated the whole institution. These adjustments have been forced upon the University partly because of its lack of financial support. In some instances, they have spelled educational inefficiency. In others, however, quite the reverse has been true. It is obvious to anyone who spends all of his time studying the administration of the University that almost nothing is to be gained by any attempt to restrict or limit its work. Gains for the state are to be made in the other direction, that is, by enlarging and expanding some of the work of the institution.

B: THE NEEDS OF THE UNIVERSITY OF MINNESOTA

A growing university that serves a developing and expanding state will have three sets of needs, each of primary importance. The University of Minnesota has these three needs. They are (1) a competent staff large enough to provide instruction to students in relatively small groups; (2) buildings for the instruction and housing of the students; and (3) modern equipment in all departments and laboratories. These needs are continuing needs. There will never be a time when they are not present at this University, unless the state at some future time deliberately denies the opportunity for a university education to thousands of the sons and daughters of the taxpayers of the state. The children of the taxpayers will come, and they will come in increasing numbers, to prepare for medicine, nursing, engineering, mining, dentistry, pharmacy, teaching, law, agriculture, business, and commerce, and to fit themselves to assist with the solution of the difficult and complex problems of citizenship and of social, political, industrial and economic life.

STAFF

If any one need is more fundamental than other needs in the life of a university, it is that of a high-minded and thoroly efficient corps of instructors. Minnesota, in my opinion, compares favorably with other American universities in this respect. Almost without exception, the staff is composed of exceptionally well-trained men and women devoted to teaching, investigation, and research,—men and women who do not regard the University as a personal or private enterprise, as a convenient place for earning a living, but as an opportunity for service and achievement..

The University of Minnesota needs more instructors and particularly in the upper ranks. There are enough persons on her payroll, in point of number, to provide instruction, but many of them, particularly in the lower ranks, are part-time people. An intensive study of the situation, made last year, shows that the ratio of the number of students per instructor has been steadily increasing at Minnesota. And it also shows that the teaching load has been gradually getting heavier. These changes are made at heavy expense, not in money, but in efficiency. Minnesota's ratio of students per instructor and the teaching load carried were both too high last year, as compared with some of the best institutions of the country and as compared with the commonly accepted standards among reputable educational institutions.

The situation is no better this year than it was last. We have approximately six hundred more students this fall quarter than we had last fall. These students have been absorbed without an increase in staff. Last year we had several hundred more students than we had the year before. These, too, were absorbed without an appreciable increase in the staff, all of which means that our debt to instruction is becoming heavier with the passing years. We have in our possession

carefully worked out analyses of this situation in some of the colleges of the University. These analyses all tell the same story, and that is that both the load carried by the instructor and the number of students served by him are too high.

It will be remembered that a request was made of the last Legislature for an appropriation of $382,100 a year to increase the teaching staff. The Regents of the University requested $3,344,000 for maintenance, and in addition certain special appropriations for equipment for engineering and physics, totaling $175,000. This request was not granted. Furthermore, the Regents asked for other appropriations for special purposes, such, for example, as equipping certain additions or rooms that had recently been completed, replacing the buildings at Duluth that were destroyed by fire, completing the Superintendent's house at Waseca, building a root cellar at Zumbra Heights, a seed house at Crookston, etc. The total request of the Regents for the first year of the biennium was $5,296,000, and for the second year $5,132,000. This included the estimated income of $408,000 a year from the mill tax and the $560,000 a year that had already been appropriated by the 1918 Legislature for buildings. It also included a request that the building program be set forward and that the money be made available at the rate of $1,120,000 a year instead of at the rate of $560,000 a year. The $408,000 accruing from the mill tax and the $1,120,000 asked for buildings were not a part of the total sum requested by way of direct appropriation from the 1921 Legislature for maintenance. Deducting these sums from the total budget suggested in the estimate submitted to the Legislature left $3,768,020 for the first year and $3,604,000 for the second year of the biennium. Had these amounts been granted it would have been possible for the University to have made reasonable increases in salaries, to have enlarged its staff, to have provided badly needed equipment requested in the estimate, and to have made certain necessary additions to buildings. The University authorities realize that the Legislature made as large an appropriation for the maintenance of the institution as it could in view of all the circumstances. A lump appropriation of $3,000,000 a year was made. Every one conversant with the situation was well aware that this would not enable the University to provide for all of its immediate needs.

This $3,000,000 was $1,135,000 more than the 1919 Legislature granted for each year of the biennium, and to those who were not familiar with certain other facts, it might seem as if it were large enough to provide for the immediate needs of the University. The 1919 appropriation was made in the spring of 1919 and on the basis of conditions that existed at that time. The situation was very different in the fall. The University suddenly found herself with 66.6 per cent more students on the campus than she had ever had at any one time in all her history. An emergency existed. The Regents decided to ask the next Legislature for an emergency appropriation of $1,610,000 to provide additional instruction, to increase salaries, and to purchase equipment and supplies. They actually instructed the University to proceed with the employment of additional instructors at once at a cost not to exceed $265,000. When the 1921 Legislature met the University authorities were facing a deficit of about $550,000. This included the money that had been spent for additional instructors to meet the emergency in

the fall of 1919. None of the deficit had gone into increases in salaries. A part of it was due to the purchase of supplies and equipment. Instead of asking the Legislature to appropriate $1,610,000 as an emergency appropriation to meet the expenses of the current year, the Regents, after carefully studying the needs of the University, requested an emergency appropriation of $1,097,635. The Legislature granted only enough of the emergency appropriation requested to meet the impending deficit,—$547,179. Nothing was appropriated for salary relief. Practically all of this $547,179 emergency appropriation constituted a fixed charge and consequently is included in the $1,135,000 increase for the present biennium. The actual increase for each year of the current biennium therefore is $587,821. It was understood that a considerable share of this would be needed to place the salaries at Minnesota on a plane comparable to that of other state universities. That has been done. Minnesota now compares favorably with other state universities in the matter of salary. But after the salaries had been fixed a wholly inadequate sum was left with which to purchase equipment for those projects that had fallen behind during war times. Something had to be done to make the conditions for instruction as satisfactory as possible. It was clearly understood and recognized by everyone that whatever was done would not be enough. It was also understood that no money would be left to increase the staff. Not a single new professorship was added this year. The need for the $382,100 for additions to the staff was imperative last year. It is even more so now, for the registration is at least six hundred more to-day than it was when the original request was made. And there is no reason to expect that we may not have another increase in registration next fall. Is it good business—it certainly is not sound educational policy—for this to continue indefinitely?

The suggestion has been made that the University should employ fewer, not more, instructors, but this suggestion is made without a careful investigation of the facts. We have already called attention to the fact that the number of students per instructor and the teaching load are approaching the point of inefficiency. Fewer instructors would mean larger classes and more students per instructor. It would mean mass education on a large scale. Such a policy can not be defended from the standpoint of results secured and it is wholly contrary to the collective experience of generations of disinterested educators.

BUILDING NEEDS

In order to set forth clearly what the building needs of the institution are, it will be necessary to outline in some detail the history of the comprehensive building plan of the University.

The 1918 annual report of the Regents contained the first statement of this comprehensive plan. Extracts from it read as follows:

> It should be stated emphatically that the only reason for requesting new buildings is that the actual work of the University may be prosecuted vigorously under favorable conditions. We have no desire for buildings as buildings. We only ask for the buildings, equipment, and facilities necessary for the scientific investigation and research work of the staff and for the training and teaching of students. It is not economy to sacrifice human resources to material equipment. If teachers can do better work and the students can be better trained by the provision of adequate buildings and laboratories, then no one can doubt the wisdom

of such a proposal. To limit the effectiveness of teachers and to deprive the students of modern opportunities is the most expensive policy that we can pursue.

In order to appreciate the acute form which this problem has assumed, it will be helpful to set down here in tabular form the appropriations for buildings which the Legislature has made since 1911.

LEGISLATIVE APPROPRIATIONS FOR BUILDINGS

Available for 1911-13	$1,761,980
Available for 1913-15	1,177,150
Available for 1915-17	296,650
Available for 1917-19	125,250

It is obvious at once that these funds have steadily declined since 1911. We must not overlook the fact that the great World War began in August, 1914, which accounts fully for the enormous decline in 1915. Likewise, in April, 1917, the United States entered the World War and consequently the appropriation for 1917 was cut to the very lowest possible minimum. Of the $125,250 finally granted, $56,000 was used to provide a dining-hall and assembly room for the School of Agriculture at Morris. Over against these appropriations, it will be wise to observe that in 1915, the University asked for $552,900 and received only $296,650; while in 1917, it asked for $1,150,000 and received only $125,250. In other terms, for at least four years the building needs of the University have been accumulating and now present a serious and acute problem. In normal times the demand for buildings would be great, but back of these needs lie the conditions arising out of delay and postponement. In reality we are seriously in debt from the standpoint of accepting our responsibilities for the steady and normal development of the buildings and equipment of the University.

Beyond these important considerations, however, lies the fact of the unprecedented growth of the institution creating unanticipated needs for new buildings. If the University has been organized by the people of Minnesota for the training of its youth, and if those youth come in increasingly large numbers to the campus, then new buildings become absolutely necessary.

On the one hand, funds for buildings have not been available and, on the other hand, the need for more buildings has grown apace.

A plan was then outlined which would provide $505,000 for the first year of the biennium, 1919, and the proceeds of a 35/100 millage tax for the next ten years, down to and including the year 1930-31. This plan was modified by the Legislature to the extent of reducing $5,000 for the general library plans to $3,000 and allotting $175,000 for the fiscal year ending June 30, 1919, and $328,000 for the fiscal year ending June 30, 1920, and instead of the 35/100 millage tax which would have yielded approximately $6,000,000 during the period, a sum of $560,000 a year for ten years was granted by the Legislature.

A detailed discussion of the need of each of the buildings listed in the original comprehensive building plan will not be presented here, but the buildings that were contemplated by this plan were as follows:

	Estimated cost	Probable cost to-day
Library	$1,250,000	$1,500,000
Mines Experiment	175,000	271,759
Electrical Engineering	250,000	300,000
Chemical Engineering	200,000	300,000
Plant Industry	400,000	500,000
Health Service	200,000	250,000
School of Mines	150,000	200,000
Animal Biology	250,000	325,000
Home Economics (addition)	60,000	90,000
Institute of Anatomy (addition)	75,000	150,000

Millard Hall (addition)	75,000	150,000
Observatory	75,000	75,000
Animal Industry	200,000	250,000
Nursing	125,000	250,000
Hospital Pavilion No. 1	225,000	225,000
Hospital Pavilion No. 2	225,000	225,000
Administration Building	400,000	550,000
Training School	200,000	200,000
Law Building	250,000	300,000
Physics Building	270,000	450,000
Mechanical Engineering	250,000	400,000
Dental Building (addition)	75,000	125,000
Music Hall	200,000	256,376
University Auditorium	500,000	1,000,000
Total	$6,080,000	$8,343,135

It was calculated that the comprehensive building plan would make available about $5,600,000 for building at the University and that this money would be available at the rate of about $560,000 a year for ten years. The Regents of the University began at once to make their plans for the erection of buildings in the order of their greatest necessity. It was obvious at once that some needs that had not been foreseen when the above plan was submitted had already become acute and that some of the money must be diverted to meet these needs. The living accommodations for the students at the University had grown steadily worse. Consequently, an addition to Sanford Hall, the women's dormitory, was ordered. This cost $201,752.94. It was necessary to build a new chimney at Morris, costing $4,183.74, a four-family cottage at Crookston costing $16,550.39, and a classroom building at Morris costing $84,442.86. The roof house in the Elliot Hospital was declared a fire hazard and a new one costing $40,765.47 was ordered by the Board of Regents. The roof house in the new chemistry addition was not contemplated when the original plan was prepared. With these exceptions, the building program has been carried out as planned.

The sums which have been diverted from the original plan will probably be more than offset by the gift proposed by the Alumni Association of a million dollar memorial auditorium and a million dollar stadium. The alumni, students, and friends had intended to carry on an active campaign to raise this money this fall, but, in view of the financial stringency that exists everywhere, it was decided to postpone the campaign to a later and more favorable time. The memorial auditorium will be an enduring testimonial to the heroic sons of Minnesota who dared to fight a war in the name of humanity. Dedicated to the use of all,—not a few students; to all,—not a few members of the faculty; to all,—not some of the alumni; to all,—not a few of the citizens of the state, and hallowed by the sacred memories of those who paid the supreme sacrifice, it will mean a new day, a new spirit, a new idealism for Minnesota. And the stadium, accommodating fifty thousand or more spectators at the annual football games, will contribute in manifold ways to the spirit and up-building of the University.

It soon became clear that it would be impossible to erect all of the buildings that were contemplated under the original plan. Building costs had increased. Consequently, the Regents delayed from time to time to order plans drawn or to

request the State Board of Control to let contracts with the hope that building costs would come down; but when they failed to do so, the Regents rather reluctantly agreed to the letting of a contract for the building of the addition to the chemistry building at a cost of $397,000. The need for this addition was imperative. There was no longer room to accommodate the students within the building.

Additions became necessary to the horticulture and plant pathology buildings at the farm campus, and appropriations of $45,321.50 and $42,294.44 respectively were made for these purposes.

A study of the utilization of the various buildings of the University showed that the music building was more nearly used to capacity than any other building. In fact, one hundred per cent of the space was used one hundred per cent of the time. We were no longer able to give instruction to students who were coming to the University for work in the various fields of music. Plans were ordered drawn for a new music building and the contract let for a building costing $255,376.

In 1914, the Regents entered into a contract with the Federal government to locate a mines experiment station at Minnesota. It was agreed that the University would provide suitable housing accommodations and that the Federal government would expend approximately $25,000 a year for the promotion of research in the various mining fields. The Federal government carried out its part of the contract, but the University was unable to proceed with its part until this year. Plans at a cost of $271,759 for the erection of a new building for the station have been approved.

Recognizing the almost imperative necessity of securing more room and better conditions for the administration of the University, the Regents two years ago ordered plans drawn for a new administration building. These plans were completed last year, but have not been advertised for bids. They were laid aside temporarily to enable the Regents to provide for other equally important needs. The erection of a new administration building clearly can not be delayed much longer without seriously crippling the work of the institution. The administrative offices are scattered about wherever it has been possible to find space or they are huddled together in cramped and unsatisfactory quarters. It is important that there be adequate space for instructional purposes; it is equally important that there be adequate space for efficient administration. This Minnesota does not now have and will not have it until the building that has been planned has been built. The University is making progress in improving the situation with reference to instruction, but it is being done partly at the expense of better administration.

A new electrical engineering building has been sought by the College of Engineering for years. The old building which was erected years ago is now hopeless from an electrical engineering standpoint. It is far too small, and the students and faculty are in constant danger in it. The Regents have understood all this and have made every effort to relieve the situation. At their last meeting, December 13, 1921, they directed the Department of Electrical Engineering and the College of Engineering to prepare plans for a new building, costing not more than $300,000.

The foregoing statements of what has actually been done to relieve the building situation are interesting in light of the 1917 Report of the Board of Regents. An extract from this report reads as follows:

The first outstanding need is for a new central library to serve the entire University. A library is the center and soul of a university. Around it the work of the entire faculty and student body must center. The present library was erected in 1895 when the total registration of the University was only 2,469. In 1917, our collegiate students numbered 6,311, and our total registration was 14,973. Our present library is utterly inadequate to the needs of this great University. Funds should be available for the beginning of a central library which ultimately, let us say in four or five years, will cost $1,250,000.

A new library is still the first outstanding need of the University. Since 1917, plans for a new building have been in process of preparation. They are now nearly complete and should be ready for bids in March, 1922.

At this point I wish to call attention to the following comprehensive table showing exactly how the building money has been expended to date, and what is contemplated in the near future. The table, I believe, is self-explanatory. It will be observed that this leaves only $1,088,113.61 for additional buildings. As a matter of fact, not all of this money can be used for additional buildings because the Regents will be forced to pay interest upon any money that is anticipated by them before it is actually collected by the state. For this reason, the Regents are moving cautiously, realizing nevertheless that every delay is made at the expense of thoroly efficient instruction and sound studentship at the University.

There are two things which have complicated the situation. The first is the growth of the institution, and the second is the increase in building costs. The buildings which were listed in 1917 were regarded as necessary then. They are even more necessary to-day. In fact, the need for them has been accentuated by the continued growth of the University. The total registration for the year 1917 was 5,567; 1918, 7,379; 1919, 9,027; 1920, 9,854; and this year it will undoubtedly approximate 10,000.

As has already been indicated in an earlier table, it is not possible for us to build the buildings that were originally contemplated out of the money appropriated under the comprehensive building plan because of the increased cost of building. Furthermore, the last Legislature made provision for the removal of the Northern Pacific tracks from the campus with the understanding that the $750,000 necessary for the removal of these tracks would be taken from the comprehensive building program fund. This places a further limitation upon the building situation of the institution and makes it more difficult for us to serve the students. The removal of the tracks is absolutely essential to the future welfare and growth of the University. Twenty-five years ago these tracks seemed outside the campus, but to-day, they run through the very heart of the campus. They interfere with scientific work. Their presence there would increase the cost of the foundations of the new buildings to the extent of approximately $100,000. If the tracks remained it would be difficult, if not impossible, for the institution ever to have a beautiful campus. They certainly would interfere with the material solidarity of the institution. The last Legislature very generously and wisely arranged for their removal, and it is better that the money for the removal of the tracks should come from the comprehensive building fund than not to be granted at all.

As a partial offset to this, the Regents are given the privilege of anticipating funds before they are due so as to erect certain buildings at once, but, as has already been stated, all funds, except those for the removal of the tracks, that are anticipated

will be interest-bearing funds and the interest must be paid out of the comprehensive building fund. These factors make the situation complex and difficult. There is no possibility of securing all of the buildings that are absolutely essential from the funds that have already been appropriated. It is to be hoped that before the ten-year period has expired, the Legislature may restore the $750,000 that has been diverted from the comprehensive building fund for the removal of the tracks, and that after the ten-year period has expired the tax for buildings may be continued until the building needs of the University are fully met.

A few words concerning some of the buildings included in the original plan, but for which money does not now seem available, may help one to appreciate somewhat the dilemma of the Regents. Their 1917 report contains the following language:

A new development of the University is the establishment of its Health Service. Other state universities, including Michigan, Wisconsin, and California, have maintained such an organization with great success for several years. The Health Service is indispensable to the operation of a large institution. It exists to protect the students and to prevent disease. It cares for the sanitation of the campus and buildings. By various methods, it aims to educate all of the students in matters of public health and personal hygiene. In particular, it cares for the individual student when he becomes sick. It maintains a dispensary service where the young man or young woman may go at any time of the night or day for treatment of any ailment, or for the dressing of any wound. It puts a heart into the University. It removes fear when there is no occasion for fear. It aims to develop men and women who are superbly fit for the work of life. It provides a student's hospital where the sick may be given the best of care. At present this very important organization is temporarily housed in the basement of Pillsbury Hall. It is no expense to the state, for each student pays two dollars each quarter for all these varied forms of service, including the hospital. In order adequately to house the Health Service, it is essential that the sum of $200,000 be made available at once for a health building.

THE MEDICAL SCHOOL

The first great need of the Medical School is additional hospital facilities for instruction in medicine, surgery, and nursing and for research in these and allied fields. It has been shown by repeated surveys and reports that the hospital facilities are inadequate, and that we are falling behind medical schools in neighboring state universities in this respect. It will be recalled that the Board of Regents appointed a special committee last year, consisting of Dr. Frank Billings, of Chicago; Dean Victor C. Vaughan, of the University of Michigan; and Dr. John M. T. Finney, of Johns Hopkins University, three of the most distinguished men in the world in the fields of medicine and surgery, to survey the Medical School and to report on the needs of the school. This report in full has been sent to your Commission. But by way of emphasis, we wish to call attention to that part of the report relating to the expansion of the hospital:

The clinical branches.—Your Committee will first express its opinion concerning the clinical facilities, hospitals, and hospital teaching as they now exist and are utilized in Minneapolis and St. Paul. The University Hospital on the campus at Minneapolis seems to be serving its purpose admirably, so far as its capacity admits, but it is too small. The Committee finds that in the main the undergraduate medical curriculum is well arranged for the training and education of students to become general practitioners,—the chief function of a medical school. The lack of a sufficient amount of clinical material on the campus, either in the out-patient department or in the hospital, is at present a serious hindrance to

complete and satisfactory clinical instruction and training of the student body. In the opinion of your Committee, the University Hospital should be enlarged so as to furnish approximately four or five hundred beds. The Committee feels that with the number of students, as running at present, approximately four or five hundred beds and an out-patient department, with the required room and equipment to establish a diagnostic clinic on the campus, would furnish adequate facilities for all undergraduate teaching. A larger hospital is, in the opinion of your Committee, not desirable, at present at least. The maintenance of a hospital at the present time is expensive and it would be easily possible to build a University Hospital which would be a burden to the University and the maintenance of which would be so costly that the laboratories would necessarily receive inadequate support. In the opinion of your Committee, the University Hospital should be open to those patients who may be sent to this institution under the provisions of the laws of the state. In the opinion of your Committee, such patients should always have preference in admission to the University Hospital. This Hospital might also be utilized, if there be no other provision, for the care of sick University students. The University Hospital should also be opened to patients brought or sent to it by practitioners in the state. The University Hospital has a splendid opportunity to aid the physicians of the state in the diagnosis and treatment of cases in which the physician in charge needs advice or help. Under no circumstances, in the opinion of your Committee, should patients be admitted to the University Hospital without the approval of the physician who has charge of them. There must be no competition between the University Hospital and the private practitioner; on the contrary, the University Hospital should be helpful to the private practitioner, should aid him in the diagnosis of his cases, and advise him in regard to their treatment.

The question of the admission of pay patients into the University Hospital is a perplexing one, and one about which your Committee hesitates to express a decided opinion. The hospital expenditure for the indigent should be paid by the state or by the county from which they come. Some of this class may come from state institutions, while others may be sent directly from their homes by county commissioners of the poor, by judges of the probate court, or by some other county official designated by the law of the state. Any legally qualified physician in the state should have the privilege of bringing or sending to the hospital any private patient if he desires to do so. Patients of this class may be sent to the University Hospital for diagnosis alone, or for diagnosis and treatment, but in all cases it should be understood that they remain the patients of the physician sending them to the hospital. Patients of this class vary greatly in their financial ability to pay. Some can easily pay a per diem covering hospital expense, but are unable to pay more. This class is a large one. Many belonging to it are on the verge of pauperism, but in the University Hospital they may be relieved of their disabilities and returned to their homes as self-supporting, self-respecting individuals. Others might easily pay a consultation fee or a fee for treatment, if the family physician desires the patient to receive treatment, and if such fees are accepted they should be regulated by the fees ordinarily charged by consulting physicians and surgeons of standing in Minneapolis and St. Paul. The University Hospital certainly should not underbid private physicians in rendering medical and surgical or consultation service, nor should the University Hospital exceed in its charges those generally demanded by first-class consultants. Any accumulation of money from such fees, which, in your Committee's opinion, will always be small, might be legitimately used to improve hospital facilities or to reduce any expense incurred in conducting the clinics. In no case and under no circumstances should the salary of a teacher in the Medical School be determined by the consultation or other fees that patients coming under his charge may pay. A state university is an educational and not a commercial institution and the members of its faculty through all the grades should be educators and not promoters.

In this connection attention is called to the bill passed by the last Legislature creating a general hospital located at the University of Minnesota. The hospital is to consist of such units or pavilions as may be designated from time to time. Patients will come or be sent to it under existing laws. The hospital authorities are charged with the responsibility of keeping an accurate accounting of the cost

and treatment of all indigent patients and of filing a report covering the cost at stated intervals with the State Auditor, who, after auditing the account and finding it correct, will refund the sum of the cost and who in turn will then collect one half the cost from the counties from which the patients come. This is not only a wise provision from the point of view of distributing the costs of the care and treatment of such cases fairly and equitably, but a wise provision educationally because it carries the conception, lessons, and importance of health into every community. Indeed, every taxpayer and every home will eventually manifest more concern in health matters.

The comprehensive building plan provides for two hospital pavilions and a nursing service building. To these there must be added psychopathic and orthopedic units in the course of time. These should be small—large enough perhaps to accommodate sixty or seventy patients, and should be a part of the University system for instructional and research purposes, and also associated and affiliated with the system under the control of the State Board of Control, so that the right types of cases could be brought readily from other units of the state system to the University and, in turn, returned by the University to them. Minnesota is a laggard in the matter of providing proper instructional facilities for her young doctors in these fields and as a consequence she is a laggard in providing for the scientific study and treatment of such cases. Other states less able are sweeping by her in these regards.

The other medical units represent additions to buildings already in existence, and are included in the comprehensive building plan. The total sum necessary to complete the Medical School will reach $1,400,000 or $1,500,000. Large as this sum necessary to provide for the Medical School may seem, it is less than Michigan, Illinois, Wisconsin, or Iowa are putting into their medical units.

THE COLLEGE OF SCIENCE, LITERATURE, AND THE ARTS

The College of Science, Literature, and the Arts has two pressing building needs, a new physics building and a new botany building. The present physics building was completed in 1902, nineteen years ago, at a cost of $66,199. The building when first completed was large enough to take care of the enrolment at that time which numbered 199. Since then the enrolment has grown steadily until it now approximates 900. Each student is expected to spend six hours a week in his class. This has produced an almost impossible situation which has been made possible only by the ingenuity of the instructors in arranging schedules and oft-times in reducing or entirely eliminating important work.

A comparison of the size of the physics laboratory at Minnesota with that of other universities emphasizes our difficulty and need.

Size of physics laboratory at	Feet	Enrolment 1920-21
Princeton	150x240	...
Yale	155x222	...
Illinois	165x174	725
Iowa	73x232	479
Wisconsin	180x200	1,250
Minnesota	68x115	894

The Physics Department is clearly working beyond capacity. The new laboratory at Minnesota should be at least 180 x 205 feet.

The subjects of astronomy and physics are so closely related in theory and practice that a close coöperation is of mutual advantage. As an evidence of this the developments in solar research and spectroscopy may be cited.

In view of the necessity for the construction at an early date of a new observatory and a new physics laboratory, the question of housing the two departments in the same building becomes urgent. It is conceded by all conversant with the real situation at Minnesota that the provision of a student observatory and the limitation of astronomical research to certain possible lines is judicious.

A research observatory must be in the country away from the cities. This would deprive the undergraduate of astronomical facilities and curtail the general instruction in astronomy. There is no satisfactory location on the campus for the erection of a ground observatory on account of the inevitable encroachment of buildings. By placing the observation part of the astronomical equipment on the roof of the proposed physics laboratory a clear sweep of the sky in all directions will be secured. As examples of observatories placed on the roofs of buildings, the Yerkes, the Lick, and the United States Naval Observatory may be cited.

The cost of erection of a joint observatory and physics laboratory will be much less than the cost of erecting separate buildings. About the only departure in the construction of the proposed physics laboratory would be the strengthening of the two rear corners and the termination of each in a dome.

The botany situation is if anything even more deplorable than that of physics. This department was forced to give up its space during war times to accommodate the Students' Army Training Corps and on account of the growth of the University it has never been possible to restore the rooms to the department. Before the war it had 20,000 square feet of floor space; to-day it has 10,000 square feet, scattered over four buildings. This prevents departmental unity and militates against the efficiency of the instruction. Materials must be moved about from building to building. This involves expenses and waste of time and, in case the weather is severe, endangers the most delicate instruments.

Both of these buildings are contained in the comprehensive building list; physics to be in a separate building and botany to be housed in one of the new units of the other buildings.

THE DEPARTMENT OF AGRICULTURE

The most immediately pressing building needs of the department are a plant industry building and a dairy building. The plant industry building was in the original list, but the dairy building represents a new need.

For several years the apparent need for the plant industry building has been pointed out in the annual report of the Dean of the Department of Agriculture and of the President of the University. The general conception of this building is that "it should be of the same general type of architecture as the administration and agricultural engineering buildings, should have three stories and an above ground basement, should be in the form of three sides of a hollow square, in order to provide for the addition of a fourth side if at some future time expansion should be-

come necessary, and to permit the assignment of certain definite wings to particular divisions, so that the plumbing and other equipment can be properly installed during the erection of the building." In it should be located the divisions of Biochemistry, Agronomy, and Farm Management, Plant Pathology, and Horticulture, for the following reasons: There are many plant problems which require the united attack of two or more of these divisions. Wheat rust furnishes a good illustration. It is the problem of the plant pathologist to study the disease and discover methods for its control, but the plant breeder in agronomy may assist by developing rust resistant strains of wheat, and the biochemist makes his contribution by determining whether or not the strains newly developed possess desirable milling qualities. Moreover these divisions can economize by making common use of certain types of men such as chemists, bacteriologists, physiologists, and geneticists. Each division must have greenhouse space and it would undoubtedly be economical to get all of this space organized into one system contiguous to the building in which the divisions are housed.

By moving the divisions mentioned above into a new building they would have space which they badly need, while relief would be given to other divisions which are now much over-crowded. At present soils and biochemistry are crowded into a building that is adequate for soils only; horticulture and forestry are in a building that is not large enough for both; the Division of Agronomy and Farm Management is badly handicapped in the space allotted to it in the administration building. Plant Pathology should be moved because it properly belongs in the plant industry group. Part of the building it now occupies could doubtless be used to advantage as a University Farm branch of the students' union. There might, in addition to the students' needs, be sufficient space for the Publications Division which is now somewhat crowded in the administration building. By moving the divisions of Publications, Agronomy and Farm Management, and the students' union quarters out of the administration building more space could be given to the library where conditions are now in a deplorably congested state; also to the divisions of Extension and Education and to the Photographic Service.

The dairy industry is growing very rapidly in the state, and consequently many demands are being made upon the Dairy Division of the University. The manufacturers of dairy products expect to get their trained men from the group that registers in the dairy short courses. The University does not have the facilities for adequately training these men and the dairymen of the state clearly recognize this fact and deplore it in outspoken terms. There are also arising very important problems for investigation which require equipment that the division does not have. At these points the University has a most serious responsibility to meet, for there is an ambition on the part of the dairymen of the state to have Minnesota butter rank as the best in the great markets of the United States. If the University fails to measure up to the responsibility placed upon it at these points, it will be regarded as a retarding factor in the realization of this ambition. The building now occupied by the Dairy Division was built in 1891, thirty years ago. Its total cost, including an addition erected later, was $42,500. Its arrangement is almost wholly unsuited to the needs of the division and its condition is so bad that it is doubtful from the standpoint of economy whether an attempt should be made to remodel it for any purpose, but most assuredly not for dairy manufacturers' equipment and work.

The need for a new dairy building has been recognized for several years by all who are intimately acquainted with conditions on the University Farm campus. The dairymen in the state realize the need to such an extent that they are likely to begin public agitation for it at any time. With the need so patent to all who investigate conditions and with the importance of the industry which such a building would serve so marked, the state can not afford to delay erecting and adequately equipping this building or a building for both dairying and animal husbandry.

It must not be understood that agriculture is in need of these two buildings only. They are the most pressing needs of agriculture. But provision must be made for a number of other buildings of a minor character at the various substations. These can be taken care of gradually as the needs become urgent if the Legislature in its wisdom will continue the building fund appropriation beyond the ten-year period for which it is available.

THE SCHOOL OF CHEMISTRY

The new addition to the chemistry building now being completed, it will be large enough to house chemical engineering for some time to come. Consequently no new building for this unit will be provided in the near future.

THE COLLEGE OF ENGINEERING AND ARCHITECTURE

In addition to the electrical engineering building, plans for which are under way, there will be erected a new mechanical engineering building as soon as possible. The present quarters have long since been outgrown.

It is conceivable that with the development of highway and hydraulic engineering, laboratories may eventually be needed in these fields.

THE COLLEGE OF EDUCATION

The comprehensive building plan provides for a new training school for the College of Education. The College of Education trains teachers for the high schools, superintendents, principals, supervisors, and teachers of the special subjects. A training school affords observation and practice facilities and opportunities for research. It is the laboratory of the college, and stands in the same relation to the College of Education that physics does to engineering or anatomy to medicine.

It will be observed if one checks the original list that we have now referred to all of the buildings and additions to the original plan, except the animal industry building. This building is greatly to be desired, but it probably should wait on the others. But as has already been intimated, no one can foresee with any considerable degree of infallibility in what order the building needs of the University may arise. For example, it is perfectly obvious to anyone connected with the administration of the institution that a new gymnasium cannot long be delayed, nor can a better and larger armory for the Military Department be long postponed.

DORMITORIES

One of the most serious problems of the University is that of providing satisfactory living quarters for the students. The attention of the Legislature has been called upon a number of occasions to the need of dormitories. Only one large dormitory has been erected at the main campus. This building will accommodate about

three hundred girls. The need of other dormitories is obvious to the most casual student of University life. Minnesota has more than three thousand women students and four thousand men students in residence at the main campus. Between forty and fifty per cent of the students reside outside the Twin Cities. A large share of those whose homes are in the Twin Cities are forced to travel such great distances, because they are unable to find suitable rooms in the vicinity of the University, that they suffer a permanent handicap in their work. Practically every available residence near the University rents rooms to students. The supervision of the life of a widely scattered body of students is almost impossible. There is probably no other thing that would contribute so much to the genuine wholesomeness of the life and spirit of the University as dormitories would. There should be at least one erected annually for the next ten years. The state should provide the capital outlay for these buildings. The buildings, in turn, should be made self-supporting.

If the state could loan the money to the University for the erection of dormitories at the rate of one a year until the needs of the University were fully met, it is conceivable that a charge could be fixed that would provide for upkeep and overhead, and that approximately two per cent could be laid aside annually as a sinking fund with which to reimburse the state for the original outlay, and that the charge upon the students would be no greater, probably less, than they are now paying. The gain to the institution would be enormous in improved morale, better studentship, and a finer social life. A state university should take the leadership in this matter. The citizens of a far-seeing state should see that it takes the lead in it. A state that permits its own sons and daughters, even encourages them, to go elsewhere because they will be better cared for, rather than better educated, has not yet acquired a proper appreciation of its responsibilities. Character is as important as intellectual training; indeed, there are many who firmly believe that it is more important. Character is the sum total of all the experiences one has had. The experience that one receives during the formative years of one's life is probably the most potent. A state university should be a great character-building institution. Minnesota is such an institution, but will never quite discharge her full obligation to the students until the state provides her with proper dormitory facilities.

EQUIPMENT

One of the constant needs of the University is equipment. Some of the materials are what might be called expendable materials. They are used up from day to day in the classroom and must be constantly replaced. But other materials are of a more permanent character. They last for years. But eventually they wear out or must be superseded by newer and better materials or instruments. It is sheer folly to attempt to educate students with outworn instruments or obsolete machines. If the students are to be equipped for the generation in which they live they must be provided in their training with the instruments and machines in current use. Some of the permanent equipment of the University should be replaced every ten years; other types may be made to serve a much longer period. A careful analysis of the equipment needs of the University shows that we must be prepared to spend in the near future about $300,000 for equipment. The largest single item in this sum is $100,000 for the College of Engineering. It will be recalled that the Regents

requested a special appropriation of $140,000 of the last Legislature for the purchase of equipment for this college. The purchase of some of the machinery included in this $140,000 could not in justice to the students be delayed any longer and consequently provision was made for its purchase this year. The amount needed to complete what the college must have is $100,000. Whether we shall be able to provide any share of this when next year's budget is prepared is problematical.

The second largest item for equipment comes from the School of Business. This school will have a very large increase in students in the next two years. There are now nearly eight hundred students in pre-business courses. When these students have transferred to the School of Business, additional equipment will be necessary. It is estimated that the equipment for a thousand students will cost $60,000.

The third largest item comes from the Department of Agriculture. Between $50,000 and $60,000 will be required very soon if this department is to keep up to date in the matter of equipment. Anyone who is at all familiar with the amazing development of all sorts of farm and dairying machinery will readily appreciate that the sum of $60,000 is a modest request.

The remaining items represent the equipment needs of all other colleges and schools of the University. About $20,000 will be needed soon for the replacement of wornout equipment in the Medical School.

Not all of the $300,000 is needed at once. The University will be able to meet the situation quite satisfactorily if it is provided with an additional equipment fund of $75,000 a year for four years.

From the foregoing survey, it is clear that the three most important needs of the University are additional staff, buildings, and equipment. Some provision should be made to enlarge the staff, particularly in the upper ranks. In a comparative sense, Minnesota is losing ground by not being able to increase the number of her associate professors and full professors. For several years now she has been merely holding her own in this respect, while the number of students has been almost trebled since 1916. The sum of $382,000 a year which was requested of the last Legislature for additions to the staff is as exact a statement of this need as can be made at this time. Careful consideration has been given to the possibility of reducing the size of this request, and it has been found that but little if anything can be done. Should no money be provided by the Legislature for this purpose, the only recourse of the University would be that of employing additional instructors at the expense of some other needs of the institution.

So far as the building situation is concerned, three recommendations are urged: (1) that the present building tax provision be extended beyond the ten-year period for which it is available until the building needs of the University are fully and adequately met; (2) that before the ten-year period has expired, and during the last two years of it, the $750,000 deducted from the comprehensive building program fund be restored; (3) that careful consideration be given to the need of dormitories, and, some plan, if possible, be devised that will enable the Regents to proceed with the erection of dormitories in a comprehensive and statesmanlike manner.

Both new equipment and that required for replacement can be provided by a special appropriation of $75,000 a year extended over a four-year period.

THE ALL-YEAR UNIVERSITY

There is one other matter that should receive the most earnest and serious consideration of the Commission, and that is the desirability of maintaining an all-year University. The University is now in operation three full quarters of twelve weeks each. In addition, it maintains a Summer Session of six weeks. Last summer there were 2,600 students in attendance. These students paid the full instructional cost of maintaining the Summer Session. As a consequence, the fees were higher than the fees charged during the regular year. About 680 students requested the establishment of "continuation courses," i.e., courses extending beyond the six-week period, agreeing to pay the full cost of instruction. Had it been possible for the University to announce courses of eleven or twelve weeks in length, there probably would have been more than twice as many students in attendance during the second half of the Summer Session.

The arguments for keeping the University open for at least four full quarters of the year are obvious to anyone who reflects upon the matter. But it can not be done without additional money. Ohio enters upon this plan July 1, 1922, after having made a careful study of every aspect of the problem. She estimates that between twenty and twenty-five per cent must be added to the budget for instruction if the plan is to be successful. Deducting what we may reasonably expect in the way of fees from students registered in the summer quarter, the plan at Minnesota would require a sum of about $200,000 a year.