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A LARGER CONTRIBUTION FROM THE STATE

Why it should be given to the Massachusetts Institute of Technology—An Argument for its Increase—The Importance of the Institute to the State and to the Nation

SUMMARY.

(1) The Massachusetts Institute of Technology is the most famous school of its kind in the country and one of the most famous in the world. It has established and maintained the highest standards of efficiency and excellence. It would be a calamity to the people of the state should these standards not be maintained.

(2) They cannot be maintained unless it receives $100,000 per annum from the state or elsewhere.

(3) It needs this increased income because the cost of maintaining leadership in this field of education has greatly increased. In the sixteen years that have elasped since the state first made its annual contribution of $25,000, the annual expenditure has increased by $268,547. This increase has been due in part to the natural growth of the Institute itself, in part to the general rise in prices, but more to the increasing recognition by the commercial world of the value of technically trained men, and to the increase in the number, and the enormous increase in the endowments, of similar institutions elsewhere. These changed conditions inevitably affect the salaries that must be paid for competent instructors, and swell all other items in the expenditure.

(4) The Institute is justified in asking for this support from the state because:

(*a*) It is, and always has been, a state institution, founded by the state and bearing the state's name. The state gave it the land

on which its first buildings were erected, has assisted it financially ever since, and has official representatives on its governing body.

(*b*) Owing to the excess of expenditure on the education of its students over the fees received from them, it contributes *directly* about $200,000 per annum towards the education of young men *rom the state of Massachusetts.*

(*c*) Similar institutions, doing no more important work, are receiving far more support from the state. In this state the value of the Agricultural College to Massachusetts was recognized last year by a grant of $210,425, and for five years this college has received on the average an annual appropriation of $172,510 — *exclusive* of its income from the Technical Education Fund, from which it receives twice as much as the Institute. The number of regular students *from the state of Massachusetts* at the Institute is nearly three times as many as at the Agricultural College. In other states the appropriations have been no less liberal. From the latest report (1910) of the United States Commissioner of Education it appears that the following state grants were made during the year. (The numbers in brackets indicate the increase of the grants over those recorded in the report of the previous year.)

California to its State University $693,201 (+ $34,815).
Illinois $1,265,845 (+ $219,845) to the University of Illinois.
Iowa $445,617 (+ $165,617) to the College of Agriculture and Mechanic Arts besides $394,532 (− $43,635) to the University.
Michigan $772,444 (+ $152,579) to the University and $326,000 (+ $16,200) to the Colleges of Agriculture and Mines.
Minnesota $1,030,536 (+ $1,124) to the University.
New York $193,922 (− $73,205) to Cornell.
Ohio $555,187 (+ $21,523) to the University.
Texas $193,585 (+ $16,300) to its College of Agriculture and Mechanic Arts.
Wisconsin $1,147,988 (+ $320,455) to the University.

(*d*) It has done pioneer work in shaping the educational policy of the country and has made notable contributions towards the advancement of science and the development of the industrial and commercial prosperity of the state and nation. It has done this although its numbers were at first so small that there are only about 650 living graduates who took their degrees more than

twenty years ago. Today there are over 1,500 students in its courses, and great things may be expected from the efficient training of such numbers during the course of the next ten years. The economic efficiency and the further development of the state's manufacturing and transportation industries will depend primarily on the extent to which scientific methods and improvements are introduced.

(*e*) It is the heart of the state's system of industrial education, a system that will be vitally affected by the standards and ideals that the Institute maintains. It has already given directors to such institutions as the Textile Schools, the Franklin Union, the Wentworth Institute, and the Lowell School for Industrial Foremen. It must continue to supply men competent to direct the growth of industrial education, a growth that is expected to be unusually rapid within the next generation. The strength of the Institute is vital to the success of this movement, for if the heart be weak the condition of the whole system is precarious.

(*f*) The Commonwealth of Massachusetts, in accordance with its great traditions and recognized intellectual leadership, is bound to provide for its citizens the best system of higher education that is practicable. On account of the special circumstances of the state, technical education is absolutely vital to its continued prosperity, and especially in this field nothing but the best can be good enough for Massachusetts. Without the aid here asked for the Institute cannot possibly maintain its leadership.

Argument.

The Massachusetts Institute of Technology was incorporated by an Act of the Legislature of Massachusetts "for the purpose of aiding by suitable means the advancement, development and practical application of science in connection with arts, agriculture, manufacture and commerce." This Act was approved by Governor Andrew on April 10, 1861. At this period there were many forces at work to impress on farseeing men the necessity of radical changes in education in order that the country might profit as it should by the discoveries of science and by the application of its method and its spirit to the great practical problems of the day. Some such school as the Institute of Technology would inevitably have been founded somewhere about half a century ago. The fact that it was founded in Massachusetts was due

mainly to the foresight of Rogers who planned it, secured its foundation at the hands of the Commonwealth, and afterwards as its first president controlled its upbuilding with consummate wisdom. He was not a Massachusetts man, nor even a New Englander; when the Institute was founded he had spent upwards of forty years of his life in his native state — Virginia. As a scientist devoted to the cause of education he had become convinced that there was urgent need for an educational institution of a different type from any then existing in this country. He made a careful survey of the field and deliberately selected Massachusetts as the strategic point best suited for the new venture. He was drawn to this state because of the character of its people, their high ideals in educational matters, their insistence on the best that is available as being alone good enough for Massachusetts. He believed that here more easily than anywhere else it would be possible to set up and to maintain the very highest standards of scientific education, and the whole success of the school — as he conceived it — depended on the maintenance of the *highest* standards. In all respects save one Rogers' choice of Massachusetts has been fully justified. The Institute has trained a number of men who are now in the very front rank of science, men who have extended far the boundaries of knowledge and thereby gained a world-wide fame. In addition to this its former students are to be found in positions of power and responsibility in every state of the Union, engaged in the work of developing mines, opening up the country by means of railroads, applying scientific methods to the great problems of transportation, power production and distribution, advancing chemical industries, conserving the public health, and contributing in countless other ways to the increase of the nation's wealth. These men have not come exclusively from any particular class, rich or poor, but the greater number are men whose capital is their character and their power; they have been drawn from a source to which the state naturally looks for new energy, new enthusiasm, and the power to cope successfully with new conditions.

However, it is not merely by its direct influence on its students that the success of the Institute and its value to the state are to be gauged. Its indirect influence has been almost equally notable. It has done pioneer work in education in the breaking down of old traditions and the establishment of new methods. It has

given strength and dignity to the "practical" and "laboratory" method and proved conclusively its value in dealing effectively with large bodies of men. It was "the first school to equip a mining and metallurgical laboratory for the instruction of students by actual treatment of ores in large quantities; the first to establish a laboratory for teaching the nature and use of steam, and a laboratory for testing the strength of the materials of construction in commercial sizes; and the first in America to establish a department of architecture. It was also the first in this country to set up distinct and separate courses of study in electrical engineering, in sanitary engineering, in chemical engineering, and in naval architecture." In Massachusetts we are, perhaps, too near the Institute to have a proper perspective of its importance, but there is no lack of impartial testimony to guide us to the truth. Sir William Mather after a study of the leading schools of the kind in the world held it up as the best model for his own country. Speaking in London of the Massachusetts Institute of Technology he said, "The spirit and energy of the students, their conspicuous practical knowledge, the thoroughness with which their scientific knowledge is tested in the course of instruction, and the power of adaptation and resource they possess on entering workshops and manufactories, railroads, or mines, public works and constructive engineering — all these fruits of the training of this Institute are, so far as I have seen, not equalled on the Continent. I think these are the qualities we need in England." For years the Institute has been visited by distinguished bands of engineers and educators from various parts of the world, and reports to governments or societies in England, France, Germany, Switzerland, Russia, Spain and Japan set forth in flattering terms the high esteem in which the Institute is held abroad. At home it has been subjected to the sincerest form of flattery — imitation — its methods being copied in almost every similar institution throughout the country. Its graduates are eagerly sought for everywhere and the prestige of the Institute is of the highest order.

Financial Handicap of an Engineering School

To this extent the justification of Rogers' choice has been complete. Only in one matter has there been disappointment, and that is in the financial support that the Institute has obtained.

It is true that the state has helped substantially and that there have been liberal private benefactors, the total gifts from private sources having amounted to over five million dollars. Especially, however, within recent years there has been a failure to appreciate the high cost that education of this type demands *if it is to be the best.* Not only does it require much more costly machinery, but more teachers and more highly paid teachers than the older forms of education. The laboratory method, which is the very essence of education of this type, cannot be applied successfully where a teacher has to supervise the work of a large group of students. To increase the difficulty the Institute is in a sense hurt financially by its own success. The value of technically trained men is now recognized in the commercial world, and their services must be more highly paid for when they are sought as teachers than was the case formerly. In addition to this the Institute is no longer alone or nearly alone in the field of technical education. It has to compete for its teachers not only with the world of business, but with numerous educational institutions that have far greater financial resources, many of them being supported by states fully alive to the wisdom of dealing with such institutions in a thoroughly liberal spirit. All these special forces tend to increase the expenses of the Institute, and work in conjunction with the general pressure that is increasing the cost of living everywhere and thereby inevitably increasing the price of labor, intellectual as well as manual. Recently, without adding to the number of its instructors, the Institute in a single year has had to add $23,000 to the salaries it pays, and even now is in constant danger of losing some of its best teachers owing to the greater financial attractions that can be held out elsewhere. The annual payment for salaries is $72,720 greater than it was five years ago, although within that period there has been very slight change in the number of instructors. Since the grant of $25,000 per annum was first made by the state there has been an increase of $171,443 in salaries and of $268,547 in the total annual expenditure required to maintain the Institute in the front rank. The increase in the excess of expenditure over receipts from fees has been $148,788. Unless considerable financial assistance comes from some source the present outlook is serious. Of recent years, in spite of the most rigid economy, there has been an excess of expenditure over income amounting on the average to more than

$30,000 per annum. The grant of $25,000 that has been given by the Commonwealth of Massachusetts for the last sixteen years expires this year; and at the same time there comes to an end an income of over $40,000 per annum guaranteed five years ago by certain friends of the Institute. It thus appears that at least $100,000 per annum will be required merely to maintain the Institute at its present level, without providing for any advances, although new developments in various directions are urgently called for. Were it less hampered financially it might render great service to the state by establishing a number of testing and research laboratories, like its present Research Laboratory of Applied Chemistry, to which manufacturers might, under proper regulations, bring their products to be tested and their problems to be investigated; it might extend such instruction as is now given by its teaching staff in the Lowell School for Industrial Foremen, in which evening courses are carried on for the benefit of working men; it might organize, in various cities in Massachusetts, scientific instruction relating to important specific industries, thereby greatly extending the scope of its influence and of its usefulness. However, the extension of its activities in any such directions, however desirable, cannot be undertaken until its present work has been adequately provided for.

It might be suggested that the Institute should raise its fees, but it should be borne in mind that these fees are now $250 per annum, as high as those of any other similar institution in the country, and higher than all save one. The usual fee in the engineering schools of Eastern universities — such as Yale, Princeton, and Cornell — is $150, while throughout the West and Middle West the fees are generally little more than nominal, $30 or less.

Under such circumstances it is natural for the Massachusetts Institute of Technology to look to the state for further assistance. It has never been a private institution, nor borne any other name than that which it received from the state on its foundation at the hands of the state — the *Massachusetts* Institute of Technology. Its connection with the state is recognized, amongst other ways, by the presence on its governing body of three state officials — the governor and the chief justice of the Commonwealth and the commissioner of education. The state gave it the land on which its first buildings were erected and since then has contributed

half a million dollars towards its general expenses. The state has made it one of the two beneficiaries of the income from the Technical Education Fund established by the United States government. In addition to this the state has shown its faith in the Institute by encouraging young men from Massachusetts to go there with the aid of state scholarships. Unfortunately, the establishment of these scholarships has not lightened the financial load on the Institute. On the contrary it has increased the burden. At the time when the state scholarships were founded the tuition fees at the Institute were $200 per annum and it was on this basis that the sum paid by the state for each scholar was determined. Since then the fees have been raised to $250, so that the Institute gets $50 less from a state scholar than from any other student. Thus the forty state scholarships cost the Institute $2,000 per annum. This sum is, however, insignificant in comparison with the total *direct* financial contribution that the Institute makes annually towards the education of the youth of Massachusetts. The Institute makes every year a report to the legislature in which is set forth a complete statement of its financial condition. An examination of these reports in recent years will show, by the simple process of dividing the total current expenditure by the number of students, that the cost for tuition and maintenance is $390 per student. To this must be added at least $80 per student to cover the interest on capital invested in land, buildings and equipment (*in excess* of what has been contributed by the state) and to make a reasonable allowance for depreciation. Thus the total cost to the Institute is at least $470 per student. Last year 852 students came to the Institute *from the state of Massachusetts.* Eighty of these were state scholars paying $125 per year on what is known as a "half scholarship basis," so that the cost of each to the Institute in excess of fees received ($125 from the scholar and $100 from the state) was $245, or a total of $19,600 for all the scholars. Each of the others cost the Institute $220, so that the total expenditure on their behalf was $169,840. It thus appears that the Institute contributed directly a sum of $189,440 last year — a year that was in no respect abnormal — towards the education of young men *from this state.* In addition to this it paid $26,875 towards meeting the tuition fees of students (outside of the scholarships provided by the state). A large part of this went to students from Massachusetts, although the

grants were not restricted to them as in the case of the state scholarships. If the state should make the annual grant of $100,000 that is asked for, it would contribute half what the Institute is now contributing towards the education of young men from Massachusetts.

What is the true principle that should guide legislatures in determining the amount of their contributions to educational institutions is, of course, a matter that gives room for difference of opinion. It may be well, however, to estimate the support that the Institute should receive from the state on the basis of various principles that have been adopted elsewhere.

The policy of most of the progressive Western states is to give practically free tuition to all students that come from within the state. On this basis the Massachusetts Institute of Technology should receive over $400,000 per annum from the state in order to maintain its courses at their present level. Where a less liberal policy is adopted the state, instead of bearing the whole cost, pays a certain proportion of the tuition fees to encourage students, or a certain proportion of the income from private benefactions to encourage the benefactors, or a certain proportion of the income from productive funds to encourage the trustees in a prudent use of the benefactions that they receive. The proportion supplied by the state varies enormously, as may be learned from a study of the statistics published annually by the United States commissioner of education. There the facts are set forth with regard to all the institutions of higher learning in the Union — between 400 and 500 universities, colleges, and technological schools. Taking the total for all these institutions during the last five years for which published statistics are available it appears that the average annual income is, in round numbers, ten million dollars from productive funds, seventeen million from private benefactions, thirteen million from tuition fees, and thirteen million from the state. If the Institute were to receive the *average* treatment at the hands of the state, then on the basis of productive funds it should get $117,000 annually, on the basis of private benefactions $136,000 annually, and on the basis of tuition fees $325,000 annually.

However, we are not left without clearer guidance as to what should be the policy of the Commonwealth of Massachusetts. The legislature in this state has by its own acts indicated in the

most practical way its attitude toward higher technical education. It has done this by the financial support that it has afforded to a sister institution engaged like the Institute of Technology in work of vital importance to the welfare of the state. Last year it appropriated $100,925 for general maintenance and $109,500 for buildings to the Massachusetts Agricultural College. In the last five years its annual appropriations towards this agricultural college have *averaged* $82,970 for maintenance and $89,540 for buildings, making a total annual appropriation of $172,510 — *exclusive* of what it has granted to the institution out of the Technical Education Fund, from which the Agricultural College gets twice as much as the Institute of Technology. Last year the number of regular students who came *from the state of Massachusetts* to work towards a degree was 293 at the Agricultural College and 852 at the Institute of Technology, nearly three times as many at the latter as at the former. If the appropriations to the two institutions had been proportioned to the number of Massachusetts students at each, the Institute of Technology should have received more than $500,000 per annum.

The contributions that have been made by the alumni of the Institute towards the advancement of science and the development of the industrial and commercial prosperity of the state and nation have already been very great. The mark that the Institute has made in this way and the distinct impress of its methods on the educational policy, not only of this country but of the world, are all the more striking when regard is had to the fact that the numbers at the Institute were very small until recent years. The first graduating class in 1868 contained only fourteen members, and there are only about 650 living graduates who took their degrees more than twenty years ago. The rapid expansion of the Institute has been so recent that more than half its graduates have gone forth within the last ten years. Since the influence of the small band of early alumni has been so marked, it is reasonable to expect much greater things from the large numbers of today and of tomorrow. During the next ten years, allowing for normal growth, at least 5,000 men will come under the influence of the Institute for two years or more. It is impossible to estimate accurately in dollars what additional contribution to the national wealth they will make through the benefit of the Institute's training, how much their spirit of energy and of resourcefulness