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SOME FACTORS IN THE INSTITUTE'S SUCCESS[1]

IT is fifty years to-day since Governor Andrew signed the charter of the Massachusetts Institute of Technology. There are many in the community who have watched the growth of this institute ever since. The dean of those who have been intimately associated with its government is Mr. William Endicott—a tireless worker in its interest. He writes to express regret that he can not be with us to-day, on account of a recent family bereavement, and adds: "It has been one of the greatest pleasures of my life to watch the Tech's triumphant progress from small beginnings to its present assured position as one of the leading scientific institutions of the world." In spite of (perhaps, because of), its youth, and in spite of (if not because of) its earlier struggles and difficulties, it is now absolutely in the front rank—a recognized leader in its chosen field, held in respect and honor everywhere. Why this conspicuous success? It is a question that has often been discussed in the reports of commissioners and other distinguished visitors from abroad, and in the councils of educators at home. Many are the explanations offered—the earnestness and devotion of the faculty, the spirit and energy of the students, the loyalty and organization of the alumni, the completeness of its equipment, the number and distinction of its instructors, the variety of its courses, the thoroughness with which the students'

[1] Address by the president of the Massachusetts Institute of Technology at opening of the Congress of Technology, April 10.

knowledge and ability is tested, the practical character of the instruction, the close touch with industries, the power of adaptation and resources manifested by its graduates, and so forth. These are doubtless all contributory causes and are the causes that naturally suggest themselves to a student not specially versed in the history of the institute.

At this season, when we are celebrating the fiftieth anniversary of its chartering, it seems natural to lay somewhat more emphasis on historic causes.

The more one looks into the matter, the more is he impressed by the fact that although many enlightened men cooperated in launching the institute on its course, the enthusiasm and the guiding power were supplied by one man—Rogers. His choice of Boston as a suitable place for the new venture was made deliberately. Be it remembered that he was not a New Englander, that he was nearly sixty years of age when the institute was founded, and that until then he had spent the greater part of his active life in the southern states. To the serenity of outlook on human affairs that marks the scientist and the philosopher, he added an element of passion (perhaps derived from his Irish ancestors), when he touched the realm of education. Nowhere in the world is the supreme worth of children more thoroughly appreciated than in America; nowhere is the preparation for their future regarded more generally as one of the holy offices; nowhere in America is this sacred duty more clearly recognized and more anxiously discussed than in Boston. So Rogers placed the institute here, not because of the paucity of schools in this neighborhood, but because of their abundance; not because of their weakness, but because of their strength. This, he thought, should be good ground in which to sow fresh educational seed, and ere long his expectations were fully justified. Men of light and leading in the community gave hearty support to the new venture. Governor Banks favored state aid to the institute on the ground that such an institution would "keep the name of the commonwealth forever green in the memory of her children." His successor, Governor Andrew, who signed the institute's charter, was greatly interested, and did all that he could to help. "We ought," he said, "to start out on a broad gauge and inaugurate a great plan looking to the long future of the commonwealth." An imposing array of individuals and of societies petitioned the legislature to aid in forwarding the new scheme. Had Rogers chosen his location less wisely, he might easily have failed to enlist such support. The advantages of his chosen ground became still more apparent at the critical time when men had to be found to carry out the new ideas. He realized that this was the point where he was to gain victory or suffer defeat, and in spite of the exceptional difficulties presented, he soon succeeded in surrounding himself with the right men. The original faculty of ten professors formed a vigorous group, with great reserve of strength, physical as well as mental. They all lived to a ripe old age, and nearly all earned distinction in their own fields. Four of the men are still happily with us, including the professor of analytical chemistry, Charles W. Eliot, whose vigor is not perceptibly diminished after forty years of exacting toil in the presidency of Harvard.

It seems clear, then, that one important factor in the institute's success has been the place of its birth. And if the place was propitious, the time was in some respects peculiarly so. It was a period of upheaval, to be followed immediately by one of rapid forward movement. The charter was granted within a few days of

the breaking out of hostilities marking the beginning of the great war. The national crisis, of course, turned men's thoughts away from science and from education. About a fortnight after the granting of the charter, Rogers attended a meeting of the Thursday Evening Club, and was called upon to speak on some matter pertaining to science. According to a newspaper report of the time "Professor Rogers very gracefully declined to discuss the topic proposed, but made instead a stirring appeal to the club in favor of providing a regiment of our brave volunteers with knapsacks." Such a time seemed peculiarly unpropitious for initiating a new educational movement, and no doubt the war checked the early growth of the institute very seriously. However, after a few years, the nation was ready to turn with undivided mind to the great problems of development, and the seed having been sown earlier in good ground, the institute sprang up rapidly and reaped the harvest of hope engendered by the settlement of the grave moral and political questions to which the war was due. In the quieter field of human activity, the field of thought, the world was experiencing an equally great upheaval. Darwin's great book had just been published, with results of the first magnitude in shaping the lives on which the world of intellect was to move forward for the next half century. Kirchhoff's idea of spectrum analysis was just opening a new era in physics and in astronomy. Faraday was nearing the end of his great career, but his splendid discoveries had not yet borne fruit in the field of practise. His work, however, was having its influence on the mind of Maxwell, the greatest of whose scientific achievements was announced in 1865, the year in which the institute actually began to work. The world was just entering on a period of remarkable activity in the practical applications of science. The scientists were still struggling with the difficulties of cabling. The Boston of those days was somewhat proud of its critical spirit and in 1859 a writer in the Boston *Courier* proved at great length that all the so-called messages through the Atlantic cables were fictitious, mere shams to save the stock for a time. Edison, who was living in Boston in 1868, and whose son is an under-graduate at this institute to-day, was just beginning his wonderful career as an inventor. A few years later, one of the greatest marvels of scientific achievement, the electric transmission of speech, was to be demonstrated in this very city, indeed, in this very hall, by Alexander Graham Bell, through his invention of the telephone.

At such a time, and in such a place, an institution devoted to science and its applications had at least an excellent chance of success. The institute would, however, never have achieved what it has, if other forces had not contributed to its success. Some of these have been mentioned earlier; but there is one of the very first importance, rarely, I think, appreciated at its real value, to which special reference should be made. *There has never been any uncertainty or indefiniteness as to what the institute is aiming at in its scheme of education.* Every serious student of education is struck by the fact that so many schools and colleges drift around, apparently without compass or rudder, with no definite idea as to what port they are trying to reach, or how they should go to reach it. Here, at any rate, is an institution that, *from the very outset,* has had very definite ideas on these matters, whether those ideas be right or wrong. Most of these ideas are set forth in Rogers's "Object and Plan," which forms a charter of the institute not less valuable than that which Governor Andrew signed. At the time of writing it, Rogers was no novice in education. He

was not far short of sixty, and had taught and thought on educational problems since very early manhood. He had discussed some such project as that of the institute for twenty years at least, and his ideas thereon had gradually clarified and crystallized, as can be seen from the record of their development which is accessible to all.

Rogers has sometimes been charged with setting up a school in a spirit of antagonism to existing institutions. There is no ground for such a charge. He was too catholic in his tastes to fail to appreciate the good in others, and in advocating something new, he took the safe ground that there was room for difference in the field of education. He knew, as every educated man must know, that the fear of what is called *useful* knowledge, is exaggerated, and for the most part groundless. He knew, as others do to-day, that the oldest universities all began with a clear recognition of the bearing of their studies on definite callings; and he recognized clearly that it was not a merit but a defect of these schools that most of them had failed to keep pace with the changes in the character of human occupations that time had brought forth. He saw, as Lowell did, that "new times demand new manners and new men" and that new conditions demand new schools. For the guidance of the new school, he laid down a few simple, but far-reaching, principles, which have governed the institute ever since. The first of these is the *importance of being useful.* There is, of course, no necessary antithesis between the individual and the social end in education. However, the laying of the emphasis *is* important, and Rogers laid it unhesitatingly on efficiency in the service of society. In his first address to the students at this institute, he set forth the *value* and the *dignity* of the *practical* professions for which they were to prepare themselves. (Rogers, himself, be it remembered, was a pure scientist, President of the National Academy of Sciences, the friend of Darwin, Kelvin, Helmholtz, and the like.) In earlier discussions with his brother with reference to the plan of the institute, emphasis had been laid on "the value of science in its great modern applications to the practical arts of life, to human comfort, and health, and to social wealth and power." And so when the institute was actually founded the importance of science was kept steadily in view. He regarded the scientific habit of thought as specially valuable in practical affairs and consequently in education he laid greater stress on broad principles and their derivation than on details of fact, and he held that the *spirit* of science was more to be desired than all the gold of scientific knowledge. These are his words: "In the features of the plan here sketched, it will be apparent that the education that we seek to provide, although eminently practical in its aims, has no affinity with that instruction in mere empirical routine which has sometimes been vaunted as the proper education for those who are to engage in industries. We believe, on the contrary, that the most truly practical education, even in an industrial point of view, is one founded on a thorough knowledge of scientific laws and principles, and one which unites with habits of close observation and exact reasoning, a *large general cultivation.* We believe that the highest grade of scientific culture would not be too high as a preparation for the labors of the manufacturer." It will be seen from this that Rogers made no fetish of science, and that he welcomed every really liberal study. Some of the champions of the new school joined in the attack on the older learning; but Rogers had no sympathy with such views. "The recent discussions here and elsewhere," he said, "on the relative value of scientific and classical cul-

ture seem to threaten an antagonism which has no proper foundation in experience or philosophy." And although the study of the classics has never formed part of the institute's courses, history, economics, languages and literature enter into its curricula far more extensively than is generally supposed.

Apart from his appreciation of the value of all sound learning, Rogers saw clearly that the whole controversy as to the relative merits of science and the classics in the field of education missed the mark by placing the emphasis in the wrong place. He understood that when one gets to the root of things in education, the *method* rather than the *subject* is of supreme importance, and his insistence on the value of method in teaching was the cardinal doctrine in his creed and the one that has contributed most to the success of the institute. Doubtless his knowledge of the history of science turned his thoughts in this direction. He must have pondered over the question, as every serious student has done, why throughout the ages the world stood so still in the realm of science. It was not for lack of intellectual power, for no one who has examined the matter can fail to recognize that there really were giants of old. The failure came through attacking the problems by the wrong method. And Rogers concluded that much of the failure in education was due to similar causes. What method, then, is the right one? His fundamental idea here was not original with Rogers. It has been clearly expressed before, but rarely, if ever, adopted definitely as the basis of educational method and applied systematically throughout. The idea is familiar to us all to-day, the idea of *learning by doing*. "How can a man learn to know himself?" asked Goethe. "Never by thinking, but by doing." Add to this the doctrine of Carlyle that "the end of man is an action and not a thought, though it were the noblest," and you have the whole thing in a nutshell. Carlyle is often quoted as having said that the modern university is a great library. He would have been truer to his own doctrine if he had said that the modern university is a great laboratory. "The institute," General Walker was fond of saying, "is a place not for boys to play but for men to work." Boys and men alike learn most effectively by working for themselves, and the *do-it-yourself* method has been, I believe, the greatest factor in the success of this institute of technology.

Whatever be the explanation, there can be no doubt about the fact of its success. It is not merely that the institute is now the largest institution of its kind in this country, and as regards the extent and variety of its courses and equipment, the most nearly complete in the world. It is not merely that it has grown so that there are a hundred students to-day for every one that took the preliminary course scarcely fifty years ago, and that amongst these students there are men drawn by its reputation from the greatest universities of England, France and Germany, as well as from the leading schools and colleges throughout this union. It is not merely that its teaching staff has expanded so that it contains to-day more than two hundred and fifty men, and that amongst its hundred professors are to be found many men of prominence, and not a few of national and indeed international reputation. It is not merely that amongst its graduates, there are men of the front rank as pioneers of knowledge in the field of pure science, nor that its ten thousand alumni have played so great a part in the development of the nation's industry and commerce, and in the preservation of the public health. The most striking fact, when one

considers the institute's youth, is the fact emphasized on an earlier anniversary by Mr. Augustus Lowell and expressed by him in the phrase, "The M. I. T. is *pre-eminently a leader in education.*" Its educational ideals and methods have been studied and almost everywhere the trend to-day is in the direction in which the institute has long been moving.

To celebrate the fiftieth anniversary of the granting of the institute's charter a congress of technology has been arranged. At this congress, which opens to-day, and will be in full activity to-morrow, prominent alumni and members of the faculty are to deal with problems raised in the field of their own specialty. The guiding idea throughout is the gain in efficiency that comes from the application of scientific methods to the treatment of the great practical problems of the day. The business world must be weary of amateur suggestions for the conduct of its affairs and there is danger of damage to a great cause by too much talk. The problem of increased efficiency is no new problem to the man of affairs, and there is much that is thrust upon him in these days that he must have known for years. On the other hand, a sane and serious discussion by men who know their subject and speak from experience must always be welcome, and doubtless in the proceedings of this congress there will be much of interest to the business men who are alive to the necessity of advancement and who are on the alert for suggestions that may be helpful in their own affairs.

A glance at the program will give some idea of the variety of the interests represented, but more thorough study is needed to realize in any adequate measure that the work of this institute touches practical life at a thousand points. What the institute has achieved in half a century has fully justified Rogers's statements when making his first appeal for public support. "I am sure," he said, "that I speak from no impulse of mere enthusiasm when I say that this new undertaking presents an opportunity of practical beneficence in connection with education which is not only peculiar, but without precedent in this country. My experience as a teacher and my reflections on the needs and means of industrial instruction assure me that this enterprise, when fully understood, must command the liberal sympathy of those who aim to make their generosity fruitful in substantial and enduring public good."

R. C. Maclaurin

Henry Pickering Bowditch

Dr. Bowditch was one of the foremost leaders in the scientific development of America. In the establishment of university laboratories for research he was a pioneer and for forty years he exerted a wide and profound influence upon the progress of physiology, of medical science and of university education. It was the man himself which counted, for upon every one his sincerity, his absolute single-mindedness, his intellectual power and his genial spirit made a lasting impression, and created confidence in himself.

Bowditch was born April 4, 1840, at Boston. He descended from the best New England stock. Nathaniel Bowditch, the mathematician, well known to all navigators, was his grandfather. His father was a successful business man, who bought a large estate at Jamaica Plain, upon a beautiful hill, which has a commanding view both of Boston and of the country for many miles around. This hill is intimately associated with Dr. Bowditch in the thought of all who knew him, for he continued as one of a large family colony to dwell on it until his death.

He entered Harvard College, graduated in 1861, and entered the Lawrence Scientific School, but in November of that year he volunteered and became a second lieutenant in