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EDUCATION AND THE CULT OF EFFICIENCY

A STUDY OF THE SOCIAL FORCES
THAT HAVE SHAPED THE ADMINISTRATION
OF THE PUBLIC SCHOOLS

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conception of education manifested in the "index of efficiency" represented ominous warnings to American education. Certainly Ayres' book, together with the other developments described in this chapter, helped set the stage for the spectacular debut of the efficiency expert on the American scene in the fall of 1910. The dominance of businessmen and the acceptance of business values (especially the concern for efficiency and economy); the creation of a critical, cost-conscious, reform-minded public, led by profit-seeking journals; the alleged mismanagement of all American institutions; the increased cost of living: all these factors created a situation of readiness — readiness for the great preacher of the gospel of efficiency, Frederick W. Taylor, and his disciples. And school administrators, already under constant pressure to make education more practical in order to serve a business society better, were brought under even stronger criticism and forced to demonstrate first, last, and always that they were operating the schools efficiently.

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REFORM-CONSCIOUS AMERICA DISCOVERS THE EFFICIENCY EXPERT

In the fall of 1910 America was dazzled by a new idea that came out of the nation's capital and found its way increasingly into the country's newspapers and journals. That idea was a new system of industrial management known as "scientific management," or the "Taylor System" after the man generally credited with its origin and development. It was brought dramatically before the public eye through what started out to be an important, but routine, hearing before a government commission. In the years that followed, this new system became known throughout the world, even finding its way into China and the Soviet Union, where it was endorsed by that old friend of capitalism, Lenin.

The occasion for the emergence of the new system was a hearing before the Interstate Commerce Commission in September, October, and November of 1910. The railroads of the Northeast had applied to the Commission for an increase in freight rates to compensate for higher wages granted to railroad workers in the spring of 1910. The merchants of the area opposed this action because it would increase their shipping costs. Each side was represented by teams of lawyers. The trade association, led by lawyer Louis Brandeis, argued that the railroads were being operated inefficiently and that it was possible for them to make a larger profit without raising rates. At a crucial point in the hearing, Brandeis introduced as witnesses a number of engineers and industrial managers who testified that through the introduction of "scientific management" the railroads should be able to *increase wages* and *lower costs*. Some of these men stated that they had actually reduced costs while raising wages from 25 to 100 per

cent. One of the witnesses, efficiency expert Harrington Emerson, who had successfully put efficiency practices into operation for the Santa Fe railroad, estimated that through this system the railroads could save up to one million dollars a day!

Taylor himself, although he was frequently referred to by witnesses who credited him with being the originator of the system, did not appear as a witness. But the impact of the testimony apparently was tremendous, as evidenced by this description of the scene by Ray Stannard Baker:

> To those who heard this testimony there seemed at first something almost magical about the new idea; but as one sober, hard-headed businessman after another testified as to what had been actually accomplished in his plant, when it appeared that Scientific Management had been applied with extraordinary results to widely diversified industries from steel plants to bleacheries and cotton mills and including railroad repair shops, the spirit of incredulity changed to one of deep interest. Another factor in carrying conviction to the hearers was the extraordinary fervor and enthusiasm expressed by every man who testified. Theirs was the firm faith of apostles: it was a philosophy which worked, and they had the figures to show it.[1]

And the *Outlook*, commenting on the "magic power" most aptly described as "scientific management," noted that its effect upon industry "has been compared to that made by the change from the use of hand tools to the use of machinery."[2]

Magic indeed, or at least a panacea for the economic ills that beset America. Here was a means whereby production could be increased, wages raised, and prices lowered. Here was American mechanical genius at its best, solving the problem of competition from Germany, the high cost of living, and the conservation of national resources at one blow. Theodore Roosevelt saw in this last point a great patriotic contribution even though its motivating force was economic self-interest. "Scientific Management," he said, "is the application of the conservation principle to production. It does not concern itself with the ownership of our natural resources. But in the factories where it is in force it guards these stores of raw materials from loss and misuse. First, by finding the right material — the special wood or steel or fiber — which is cheapest and best for the purpose. Second, by getting the utmost of finished product out of every pound or bale worked up. We couldn't ask more from a patriotic motive, than Scientific Management gives from a selfish one."[3]

[1] *American Magazine*, LXXI (March, 1911), 564–65.
[2] *Outlook*, XCIV (December, 1910), 751–52.
[3] Quoted in Frank B. Gilbreth, *Primer of Scientific Management* (New York, 1912), p. 2.

Despite the spectacular nature of the testimony and the effectiveness of Mr. Brandeis' strategy, the testimony dealing with scientific management apparently had little effect upon the Interstate Commerce Commission. The Commission did decide against permitting an increase to the railroads, but the reason was that their earnings had been so high in the past it was felt that they could allow higher wages and still pay adequate dividends. The Commission, mentioning scientific management in only two paragraphs of its sixty-four page report, stated that it was everywhere in an experimental stage, that representatives of labor had testified against it, and that upon this record they could not find that the railroads could make good any part of wage advances by the introduction of scientific management.

Prior to the hearings scientific management was little known in the United States, outside of the field of engineering and perhaps business. In fact, the term scientific management had not been generally used even in the field of engineering. Taylor had used the term, apparently accidentally, a few times, but he had not used it regularly to describe his system. The phrase was coined by a group called together by Brandeis in preparation for his legal efforts at the hearing. At this meeting, held in the New York apartment of H. L. Gantt, one of Taylor's close associates, the terms "Efficiency," "Functional Management," and "Taylor System" were suggested and rejected before the final choice was made. Taylor's biographer, Frank Copley, after describing this conference, states that although Taylor "made bold to use it formally," he disliked it because "it had a pretentious sound" and because he thought that "its connotations would seem academic to most people." Taylor was not present at the meeting but it was attended by two of his close associates and admirers — Gantt and Gilbreth.[4]

The hearings had the effect of propelling the phrase scientific management and the name Frederick W. Taylor into prominence. Almost immediately, Taylor was besieged by newspapermen and editors of magazines eager to capitalize on the widespread interest.[5] He received two offers to publish a paper which he had prepared and submitted to the American Society of Mechanical Engineers, but which that organization had not yet published, one from the *American Magazine* and one from the *Atlantic Monthly*. He decided to publish the work in the *American Magazine*, choosing this journal in preference to the *Atlantic Monthly* partly because of his high regard for Ray Stannard Baker, who was associated with it, and partly because he wanted to

[4] Frank B. Copley, *Frederick W. Taylor* (New York, 1923), II, 372.
[5] *Ibid.*, p. 373.

reach "those who are actually doing the practical work of the world."[6] The first of three instalments of his "Principles of Scientific Management," preceded by a personal sketch by Baker, appeared in March, 1911. Harper's published the three articles in book form in the summer of 1911 and in 1912 published his earlier paper on "Shop Management," which had been presented before the American Society of Mechanical Engineers in 1903.

Even though Taylor and his system of management were not widely known in America prior to 1910, he had already won recognition within the field of engineering. His first formal statement of the system was made before the American Society of Mechanical Engineers in June of 1895 and entitled, "A Piece-Rate System, A Step Toward the Partial Solution of the Labor Problem." This paper was deemed by the editor of the *Engineering Magazine* to be "one of the most valuable contributions that have ever been given to technical literature" and was published in that journal in January of 1896.[7] Five years later, in 1900, Taylor received world-wide recognition for his part in the development of high-speed steel. In 1903, he presented his first complete statement of the system, again before the American Society of Mechanical Engineers, under the title "Shop Management." In 1906, he was elected President of the engineering society and read his third major work "On the Cutting of Metals" as his presidential address.

After 1906, he lectured frequently to industrial groups and to engineering schools, including those of the University of Pennsylvania in 1906 and the University of Illinois in 1908, and to the Harvard Business School in 1909. In 1910, Taylor's system was taught in formal courses in the business schools of Harvard and Dartmouth. By the summer of 1910, therefore, the Taylor system was known, but only within engineering circles and, to some extent, in business, industry, and education.

The railroad hearings in the fall of 1910 changed this very rapidly. The most obvious manifestation of the great change was in the number of books and articles written on scientific management in 1911 and the years immediately following. There were in 1911, according to a list of references compiled by the Technology Division of the New York Public Library, 219 articles on the subject.[8] In the years immediately following there were hundreds of articles and scores of books published on various aspects of scientific management. C. Bertrand Thompson, a lecturer on manufacturing at Harvard University, in his book *The Theory and Practice of Scientific Management*, published

[6] *Ibid.*, p. 381–82.
[7] *Engineering Magazine*, X (January, 1896), 690.
[8] Copley, *op. cit.*, I, 410.

in 1917, has a bibliography of 38 pages with more than 550 references on scientific management and closely related subjects; the vast majority of these references have publication dates between 1910 and 1916.[9]

In the flood of enthusiasm, an attempt was made to apply the principles of scientific management to many aspects of American life,[10] including the army and navy, the legal profession, the home, the family, the household, the church, and last but not least, to education. Harrington Emerson, a scientific management engineer, who had given the spectacular testimony in the railroad hearing, gave an address on "Scientific Management and High School Efficiency" before the High School Teachers' Association of New York City, which was published as one of the association bulletins in 1912. J. M. Rice, a physician-educator, who had done extensive pioneering research in the classrooms of American schools from 1892 to 1904, published a collection of his essays in 1914 under the title *Scientific Management in Education.* The subject was given national recognition at the 1913 convention of the Department of Superintendence when the main topic for discussion was "Improving School Systems by Scientific Management." There were scores of articles, books, and reports during the next decade on economy in education, efficiency in education, standardization in education, and the like. In 1911, a group of seven leading school administrators was appointed to a committee on the economy of time in education. And the World Book Company made available a new series in education under the editorship of Paul Hanus, professor of education at Harvard, under the title "The School Efficiency Series."

Nor was Taylor's influence confined to the United States. Within two years after its publication by Harper and Brothers in 1911, his *Principles of Scientific Management* had been translated into French, German, Dutch, Swedish, Russian, Lettish, Italian, Spanish, and Japanese. And a few years later, it was translated into Chinese. The Taylor system was introduced into French war plants during 1918 upon order of Georges Clemenceau. In France, also, an endowed foundation was established to promote the investigation of scientific

[9] C. Bertrand Thompson, *The Theory and Practice of Scientific Management* (Boston), pp. 270–308.
[10] C. S. Brewer, "Scientific Management in the Army and Navy," *World's Work*, XXIII (January, 1912), 311; Henry W. Jessup, "Legal Efficiency," *Bench and Bar*, IV (March, 1913), 55; J. B. Guernsey, "Scientific Management in the Home," *Outlook*, C (April, 1912), 821; Francis E. Leupp, "Scientific Management in the Family," *Outlook*, XCVIII (August, 1911), 832; Frank B. Gilbreth, "Scientific Management in the Household," *Journal of Home Economics* (December, 1912), IV, 438; Shailer Matthews, *Scientific Management in the Churches* (Chicago, 1912).

management and the Taylor system through courses in higher technical schools, through public lectures, and through sending young French engineers to America to study the system in operation. In Austria, a periodical devoted to the Taylor System, the *Taylor Zeitschrift*, was established.[11] And in the Soviet Union, Lenin, in an article published in *Izvestia* in April of 1918, urged the system upon the Russians.

In these years America was enormously preoccupied with Taylor, scientific management, and the idea of efficiency. Taylor societies were formed and efficiency societies were formed and a National Efficiency Exposition was held, until Taylor himself thought that it was "very much overdone" and that the trouble was that "a great army of cranks and charlatans, who wished to make money out of the new efficiency enthusiasm, joined the society and received endorsement from its secretary, and printed on their cards 'Member of the Efficiency Society' so as to help them gain customers."[12]

Taylor was not alone in feeling that the whole thing was overdone; A. G. Webster of Clark University expressed his weariness in a letter to the editor of the *Nation*, saying, "I am tired of scientific management, so-called. I have heard of it from scientific managers, from university presidents, from casual acquaintances in railway trains; I have read of it in the daily papers, the weekly papers, the ten-cent magazines, the fifteen-cent magazines, the thirty-five-cent magazines, and in the *Outlook*. Only have I missed its treatment by Theodore Roosevelt; but that is probably because I cannot keep up with his writings. For fifteen years I have been a subscriber to a magazine dealing with engineering matters, feeling it incumbent on me to keep in touch with the applications of physics to the convenience of life, but the touch has become a pressure, the pressure a crushing strain, until the mass of articles on shop practice and scientific management threatened to crush all thought out of my brain, and I stopped my subscription."[13]

For this condition Taylor and his associates were partly to blame because they claimed that his principles could be applied to all institutions. It is true that Taylor attacked the "cranks and charlatans" but in his efforts to sell his system to the public as well as to industry he had made extravagant claims, as Robert F. Hoxie's investigation for the U.S. Commission on Industrial Relations was to prove. And Emerson, the great popularizer of the movement and never one to understate his case, not only spoke of the efficiency movement in

[11] Copley, *op. cit.*, I, xx–xxiii.
[12] Copley, *op. cit.*, II, 387–88.
[13] A. G. Webster, *Nation*, XCIII (September, 1911), 238.

glowing terms but continually presented it as a panacea for the ills of mankind. Moreover he gave the movement a moral fervor that had all the earmarks of a religious revival. His writing is so saturated with this quality that it is difficult to select an example. But consider a passage from his chapter on "The Cure of Wastes" in his book *Twelve Principles of Efficiency* printed originally in 1911:

> If man's progress is slow, it is because of wastes — solely because of wastes — wastes of everything that is precious. How inconceivably slow has been human progress — waste of time; how the accumulated stores of nature have been looted, the forests, the fertility of the soil, the minerals below the surface — wastes of national resources; how inconceivably hard our tasks have been made for us! Cursed has been the ground; in sorrow has humanity eaten all the days of its life, thorns and thistles have we reaped and in the sweat of our faces have we worked. Wasted lives, sorrow instead of joy, painful, ignorant effort instead of glad, intelligent activity! . . . Elimination of all wastes may indeed be a Utopian ideal, not to be realized in the life of our planet, but any waste elimination brings its immediate reward.[14]

The Principles of Scientific Management

What was the nature of this new system which was so enthusiastically received and at the same time so bitterly opposed? It was essentially a system for getting greater productivity from human labor; and Taylor, in describing the system, took great pains to differentiate between the basic principles of the system and its mechanics. He pointed out that a person unfamiliar with industry would seem surprised that such a system should be necessary since it would be taken for granted that both workers and management in their own self-interest would be already producing to their maximum. But, he said, this was not the case. In most plants, production was far below what it could have been and should have been, with many plants producing only one-third to one-half of their maximum output.

The reasons for this wasteful situation were, first, faulty management; and second, soldiering on the part of the workers. In most plants the two factors were interrelated causes of low productivity. Management was at fault for permitting workmen to use rule of thumb methods (as he termed them) in plants. These methods, handed down from generation to generation, were sometimes good, sometimes bad, but always unscientific. According to Taylor, there was always one best method for doing any particular job and this best method could be determined only through scientific study. He complained that even the manufacturers of machines such as lathes had not

[14] Harrington Emerson, *The Twelve Principles of Efficiency* (New York, 1913), p. 372–73.

bothered to determine the best running and feeding speeds to be used on different kinds of metals. Workers were at fault because they deliberately did less work than they were capable of doing — in other words, they were guilty of "soldiering." He believed there were two types of soldiering: "natural," the innate laziness of men,[15] and "systematic."

Taylor admitted that the natural laziness of men was serious, but it could be handled by "external pressure." It was systematic soldiering that was the real evil. This he described as the deliberate slowing down of production while, at the same time, giving the appearance of working at full speed. One of the reasons for this type of soldiering, he said, was the mistaken idea workmen had that an increase in their output would result in unemployment, both for themselves and other workmen. This was a fallacy, he said, because increasing production resulted in lower costs and, therefore, lower prices. Lower prices meant greater sales and greater sales meant more work for more men. Despite this fact which, he said, had been proven in the shoe industry as well as others, "Almost every labor union had made, or is contemplating making, rules which have for their object curtailing the output of their members; and those men who have the greatest influence with the working-people, the labor leaders, as well as many people with philanthropic feelings who are helping them are daily spreading this fallacy and at the same time telling them that they are overworked."[16] Taylor then gave his opinion as follows:

> A great deal has been and is being constantly said about 'sweat shop' work and conditions. The writer has great sympathy with those who are overworked, but on the whole a greater sympathy for those who are *under paid*. For every individual, however, who is overworked, there are a hundred who intentionally underwork — greatly underwork — every day of their lives, and who for this reason deliberately aid in establishing those conditions which in the end inevitably result in low wages.[17]

The other major cause for systematic soldiering was faulty management. The workers had learned from bitter experience that if an employer found that a worker could do more work a day he would be forced to do more work for the same pay. It was for this reason that ordinary piece work had failed. Employers used the piece work system as an incentive to get men to show how much they could produce when working at top speed. When they discovered this, they lowered the price per piece, and the workman ended up working at top speed

[15] Frederick W. Taylor, *The Principles of Scientific Management* (New York, 1911), p. 19.
[16] *Ibid.*, p. 17.
[17] *Ibid.*, pp. 17–18.

for the same wages he had received before. For this reason the men decided on the amount of work that should be done and would not permit any worker to do more.

But he said that even under the very best system of management, which he described as a system of initiative and incentive, maximum production was not uniformly attained. Under this system men were given freedom, urged to produce more, and rewarded with higher wages, shorter hours, promotions, and better working conditions. This system was not as good as scientific management because the men who did the work were incapable, either through lack of education or mental ability, of understanding the scientific basis which underlay the job.[18] Therefore, the management must step in and assume new duties and these duties, listed below, constituted the basic principles of scientific management:

> First. They develop a science for each element of a man's work, which replaces the old rule-of-thumb method.
>
> Second. They scientifically select and then train, teach, and develop the workman, whereas in the past he chose his own work and trained himself as best he could.
>
> Third. They heartily cooperate with the men so as to insure all of the work being done in accordance with the principles of the science which has been developed.
>
> Fourth. There is an almost equal division of the work and the responsibility between the management and the workmen. The management take over all work for which they are better fitted than the workmen, while in the past almost all of the work and the greater part of the responsibility were thrown upon the men.[19]

The first three new duties constituted what management was to do step by step under the Taylor system, whereas the fourth duty was really the heart of the whole approach. It was a new role for management — an active role of analyzing, planning, and controlling the whole manufacturing process *in detail*. When Taylor said that there was an almost equal division of the work and responsibility, he was probably literally correct, but the statement was misleading. It certainly had the implication that the workmen would have some share in *all aspects* of the work and some responsibility for *all aspects* of it. However, this was not Taylor's intent. The worker's equal division of work was to do what he was told to do by management and his share of the responsibility was that responsibility to do what he was told. In his system the judgment of the individual workman was replaced by the laws, rules, principles, etc., of the science of the job which was

[18] *Ibid.*, pp. 25–26.
[19] *Ibid.*, pp. 36–37.

developed by management. Taylor justified this on the ground that "one type of man is needed to plan ahead and an entirely different type to execute the work."[20] The whole attitude of Taylor in this respect was described by a mechanic who worked under him. In the discussion of the problems that came up in the shop, Taylor would tell him that he was "not supposed to think, there are other people paid for thinking around here." Apparently this mechanic was a rugged individualist, because he added, "I would never admit to Mr. Taylor that I was not allowed to think."[21]

The Mechanisms of Scientific Management

The first element in the mechanism of scientific management listed by Taylor was time and motion study and the development of unit times for the various components of any job. This Taylor regarded as "by far the most important element in scientific management," and it was the basic element in achieving his first principle of the development of a true science for a particular job.[22] Frank Gilbreth testified on this point by stating that "any plan of management that does not include Taylor's plan of time study cannot be considered as highly efficient. We have never seen a case in our work where time study and analysis did not result in more than doubling the output of the worker."[23] Not only was time and motion study thus conceived by the engineers themselves, but also it was apparently identified in the mind of the average American as the key element of the system. Milton Nadworny notes, "Although scientific management employed many identifiable and characteristic mechanisms, its most prominent tool was a stopwatch, the popular symbol of the scientific management movement. The stopwatch symbolized the new approach to management: 'management based on measurement.'"[24]

When Taylor introduced his system into any shop, his first step was to make a careful, detailed, and exhaustive study of the various aspects of the jobs being done. For example, in a machine shop Taylor would observe, time with a stop watch, and record the times of various motions of a group of the most skilful men in the shop. After studying his data, he would then select a worker he regarded as being potentially a first-class man, offer him a bonus for working faster, and experiment. He would combine what he regarded as the best and fastest movements for each phase of the work that he had observed,

[20] *Ibid.*, pp. 37–38.
[21] Copley, *op. cit.*, I, 189.
[22] Frederick W. Taylor, *Shop Management* (New York, 1912), p. 58.
[23] Gilbreth, *op. cit.*, p. 12.
[24] Milton J. Nadworny, *Scientific Management and the Unions 1900–1932* (Cambridge, 1955), p. vi.

and eliminate all useless motion. The experimental first-class man would then be taught all the proper motions and Taylor would have him repeat the process until he had satisfied himself that the job was being done in the best and fastest manner. This procedure would then be standardized and one by one the other workers would be taught and required to use this system. His belief was that there was one best way of doing any job and this method could be determined only through the scientific study of that job by experts with proper implements, i.e., a stop watch and recording card.[25]

The actual time and motion study was only a part of developing a science of a particular job, although its relative importance depended, to some extent at least, on the nature of the job. Equally important was the study and analysis and improvement of the tools and machines. For example, in his early efforts to increase productivity at Midvale Steel Company in Philadelphia, Taylor soon found that metal-cutting tools needed improvements which involved, among other things, exhaustive experiments on the proper speeds for cutting various metals. He spent some twenty-five years experimenting in this field, and he carried out more than forty thousand recorded experiments.[26] As a result of these efforts he made important contributions to technology and received world-wide acclaim.

Frequently, in the attempt to increase productivity, Taylor encountered difficult technical problems which he himself could not solve. When these problems involved higher mathematics, his response was to call upon experts. Thus it happened that he and Carl Barth, a Norwegian mathematician, became close associates, and Barth was consulted on many occasions by Taylor. In the summer of 1899 Taylor was attempting to solve some of the difficult calculating problems involved in the operation of lathes in the machine shop at Bethlehem Steel, and in December of 1899, a slide rule developed by Barth was put into operation in the machine shop.[27] Through its use, an ordinary lathe-hand with little knowledge of mathematics could solve the most complicated mathematical problem necessary in a matter of minutes. It was this kind of result that Taylor claimed could never be achieved under even the best of the ordinary systems of management.

[25] Taylor, *Scientific Management*, p. 25. Strangely, Taylor opposed the use of motion pictures in time and motion study, believing the stop watch to be adequate. Frank Gilbreth did the pioneer work in this field and as early as 1912 devised a system that he described as micromotion study. Until his death in 1924 Gilbreth "waged an intensive campaign" for the acceptance of his system, and in the early twenties both he and his wife Lillian criticized the "unscientific pretensions of the proponents and advocates of the stop watch method." Nadworny, *op. cit.*, p. 108.
[26] Copley, *op. cit.*, I, 246.
[27] *Ibid.*, II, 35.

After a careful, intensive study of a particular job, the second element in the mechanism of scientific management was introduced, that of standardization. Actually, this process was interrelated with the time and motion study since in each step of the job analysis certain tools and work motions were adopted and made a standard part of the job, and these standard elements were necessary in determining the best and fastest way of doing the job.[28] The tools and motions thus standardized on the pilot analysis were then introduced for all similar jobs in the plant. Taylor pointed out that these standards were not absolute or immutable, and he urged a continual search for better and faster methods. But until improved methods were discovered, the implements and practices that had been found best were to be the standard. When improved methods were developed, they would replace the older methods and would then become the standard. Taylor's idea was that every aspect of the job from the minute details for operating machines to the selection of "first class men" should be standardized.[29] He claimed that since these standards had been determined objectively and scientifically they not only eliminated any chance of soldiering but also prevented clashes between workers and employers over what constituted a fair day's work.[30]

The third element in the mechanism of scientific management, and one that Taylor described as "perhaps the most prominent single element," was the task idea.[31] Taylor believed that it was necessary and desirable for management to set definite tasks each day for each worker, and in seeking justification for this practice, he turned to the schools:

> There is no question that the average individual accomplishes the most when he either gives himself, or some one else assigns him, a definite task, namely, a given amount of work which he must do within a given time; and the more elementary the mind and character of the individual the more necessary does it become that each task shall extend over a short period of time only. No school teacher would think of telling children in a general way to study a certain book or subject. It is practically universal to assign each day a definite lesson beginning on one specific page and line and ending on another; and the best progress is made when the conditions are such that a definite study hour or period can be assigned in which the lesson must be learned. Most of us remain, through a great part of our lives, in this respect, grown-up children, and do our best only under pressure of a task of comparatively short duration.[32]

[28] Taylor, *Shop Management*, p. 123.
[29] Taylor, *Scientific Management*, p. 65.
[30] Taylor, *Shop Management*, p. 40.
[31] Taylor, *Scientific Management*, p. 39.
[32] Taylor, *Shop Management*, p. 69.

Under scientific management each man's task was worked out by the planning department. Each worker received an instruction card which described in minute detail "not only what is to be done, but how it is to be done and the exact time allowed for doing it."[33] The task for an individual worker was theoretically regulated to get the maximum output from a man without injuring his health. If the job were found to be injurious to the worker's health the task had to be revised. Taylor stated that if the worker was "overtired by his work, then the task has been wrongly set and this is as far as possible from the object of scientific management."[34]

The second half of the task mechanism was the bonus plan. Taylor claimed that his development of the bonus plan resulted from "a series of experiments made upon workmen."[35] These experiments proved, he said, that it was impossible to get men to work at a high rate of speed for any length of time unless they were paid more than they received for an easier pace and, furthermore, they had to be assured that the pay increase was permanent.[36] This latter condition was necessary because employers had often offered workers higher wages as an inducement to step up production in order to find out what the men could produce. Then the men were forced to produce at this level for the wages they had received before and, what was worse, they frequently worked themselves out of a job. That this condition existed even in the plants where scientific management had been introduced was discovered by Hoxie in his investigation of the actual operation of the Taylor system for the U.S. Commission on Industrial Relations. Reporting on the bonus systems as he saw them, he noted that there was "a strong tendency then, under all these systems of payment, to keep the workers going at top speed as long as the work lasts, and then to send them home or lay them off; or where this is not done, they are put temporarily on day work. In the one case, continuity of employment is sacrified, in the other stability of income."[37]

There were other aspects of the bonus plan that Taylor emphasized. One of these was that the bonus or reward, to be effective, had to be given immediately after the work had been done. And with "more elementary characters" such as young girls or children, the reward, or evidence of achievement which indicated reward, might be necessary as "often as once an hour."[38] Taylor believed that many workmen were incapable of looking very far ahead and, therefore, they

[33] *Ibid.*, p. 39.
[34] *Ibid.*, p. 137.
[35] Taylor, *Scientific Management*, p. 121.
[36] *Ibid.*
[37] Robert F. Hoxie, *Scientific Management and Labor* (New York, 1921), p. 83.
[38] Taylor, *Scientific Management*, p. 94.

would not work hard for a bonus at the end of six months. For this reason he thought that profit-sharing plans were ineffective. On the other hand "if they see a definite opportunity of earning so many cents by working hard for so many minutes, they will avail themselves of it." [29] But there was also the negative side, and rewards in the form of better pay were only half of his plan for getting men to achieve the task assigned by management. The other half was punishment for failure to complete the task in the established time. This punishment took the form of lowered pay and, if the failure continued, of eventual discharge. As he said, "All of those who, after proper teaching, either will not or cannot work in accordance with the new methods and at higher speed must be discharged by the management." [40]

The fourth element was what Taylor called functional foremanship. After a job has been studied scientifically and all of its aspects had been standardized and tasks had been assigned, it was necessary to teach the new methods to the men and to see that the job was done by the men in the right way. According to Taylor, this was so because "Human nature is such . . . that many of the workmen, if left to themselves, would pay but little attention to their written instructions. It is necessary, therefore, to provide teachers (called functional foremen) to see that the workmen both understand and *carry out* these written instructions." [41] The number and type of foremen who would be used under the Taylor System depended on the size of the shop or plant, and to some extent upon the nature of the work being done. But in every instance the principle was that of extreme specialization. Management should arrange the work so that each man should have as few functions as possible to perform and Taylor's goal was that "the work of each man in the management should be confined to the performance of a single leading function." [42]

Taylor criticized the arrangement prevailing in most shops, which he called the military type, not on the ground that it was authoritarian, but because it expected too much of one foreman. Under this system, one man was in charge of one entire shop, and Taylor believed this man was likely to be a jack-of-all-trades and a master of none. Under his system, this single military-type foreman would be replaced by "eight different bosses." [43] These functional foremen who were the "expert teachers" chosen for their knowledge and skill in special fields were, first, the inspector, who helped the worker understand his instruction card and drawings; second, the gang boss, who taught the worker how to set up the work in his machine and how to make all of his personal motions in the quickest and best way; third, the speed boss, whose job was to see that the machine was run at right speed, that the proper tools were used, and that the machine turned out the product in the least possible time; fourth, the repair boss, who attended to the adjustment and maintenance of the machine; fifth, the time clerk, who kept written records of output and of pay due the men; sixth, the route clerk, who supervised the routing of the work from one part of the shop to another and determined the order in which work would be done; and seventh, the disciplinarian, whose job it was to "interview" the worker in case he got into difficulty with any of his other bosses. [44] These foremen were to be in the shop at all times, instructing, helping, and checking on the men. Each foreman had to be able to demonstrate that he could practice what he taught if this were necessary.

[39] Taylor, *Shop Management*, p. 84.
[40] Taylor, *Scientific Management*, p. 83.
[41] Taylor, *Scientific Management*, p. 123.
[42] Taylor, *Shop Management*, p. 99.
[43] *Ibid.*

One last major element of the mechanism of the Taylor System needs to be described and that is the planning department. Taylor's idea was that "the shop and indeed the whole works, would be managed, not by the manager, superintendent or foreman, but by the planning department." [45] The job of the planning department, through its scientific time and motion study, was to develop the science of the job, which involved the establishment of many rules, laws, and formulae to replace the judgment of the individual workman. [46] This planning and developing the science of the job was done even with elementary laboring jobs. At Bethlehem Steel, for example, a labor office was established for the work in the yards where "every laborer's work was planned out well in advance, and the workmen were all moved from place to place by the clerks with elaborate diagrams or maps of the yard before them, very much as chessmen are moved on a chessboard. . . ." [47]

Taylor was criticized on the ground that under his system there were too many unproductive persons, i.e., planners, functional foreman, and clerks, eating up the profits of the plant. He answered this criticism by showing what he said were the results of his system. The figures he gave, which indicated the success of his work at the end of his third year in the yards at Bethlehem, were as follows: *The number of yard laborers had been reduced from approximately 500 to 140; the average number of tons moved per man per day was increased*

[44] Taylor, *Scientific Management*, pp. 124–25. Taylor does not mention the eighth foreman's role.
[45] Taylor, *Shop Management*, p. 110.
[46] Taylor, *Scientific Management*, p. 37.
[47] *Ibid.*, p. 69.

from 16 to 59; the average earnings of these men were increased from $1.15 per day to $1.88; and the average cost of handling a ton of material was reduced from 7 cents to 3 1/3 cents, and this figure included the costs of wages of foremen, clerks and time study men and all other costs of his system. Overall, he claimed that in a six months' period when all of the work in the yard was under his system, the company was saving at a rate of between seventy-five and eighty thousand dollars per year.[48]

There were other elements in the mechanism of scientific management — in fact, Taylor listed thirteen. Some of these, such as the slide rule and instruction cards for workers, have been discussed under the four elements already described, while one other, his mnemonic system for classifying and numbering tools, was an extension of the standardization process. Likewise, the differential rate plan was a variation of the bonus plan. Other elements, such as his routing system and his cost accounting, were important but not central in his system.

In describing his system in his writing Taylor used three major examples. One was the bricklaying experimentation done by Frank Gilbreth. A second was the work done by Taylor himself at a ball-bearing plant in Fitchburg, Massachusetts. The third was a part of his work done in the yards at Bethlehem Steel from 1897 to 1900. This third example, which involved the lifting and loading of pig iron, was given a central part in his last book, where it was described and discussed in detail. The pig iron example will be described here because it was given such a prominent place by Taylor in both of his books and was considered by him to be an excellent example of the nature and operation of his system of scientific management.

Schmidt, Pig Iron, and First-Class Men

According to Taylor, Bethlehem Steel had been having difficulty in the 1890's selling its pig iron for a profit and as a result had stored some 80,000 tons of this material in piles in the company yards. When the Spanish-American War started, the price of pig iron rose and Bethlehem began to sell its surpluses. The job of moving this pig iron gave Taylor "a good opportunity to show the workmen, as well as the owners and managers of the works, on a fairly large scale the advantages of task work over the old fashioned day work and piece work, in doing a very elementary class of work."[49] This work had been done before, of course, and Bethlehem had a regular gang of

[48] *Ibid.*, p. 71.
[49] *Ibid.*, pp. 41–42.

pig-iron handlers. Taylor reported that when he arrived there were some 75 men in this group and they were, he said, "good, average pig-iron handlers"; they worked under an "excellent foreman who himself had been a pig-iron handler"; and the work was being done as fast and as cheap as it was in other plants.[50]

The job itself was very simple. It consisted of lifting a pig of iron which weighed 92 pounds, carrying it some 30 or 40 feet and then up an inclined plank into a railway car, and depositing the pig of iron on the floor of the car. When Taylor began his work the men were loading an average of 12½ long tons per day. This meant that each man was lifting, carrying, and loading some 304 pigs in his ten-hour day, some thirty pigs each hour, one every two minutes. He had been warned that these men were "steady workers, but slow and phlegmatic, and that nothing could induce them to work fast."[51]

His first step was to make a time and motion study of the job. Because he was busy with other work, Taylor placed an "intelligent, college-educated man" who was not familiar with pig-iron handling, although "he understood handling workmen," in charge of the study. This person, who apparently had been trained in engineering, was not familiar with Taylor's methods and therefore had to be taught "the art of determining how much work a first-class man can do in a day."[52] This was done by dividing the work into its elements, and then timing each element with a stop watch. With the pig-iron handlers these elements were described as follows:

> (a) picking up the pig from the ground or pile (time in hundredths of a minute); (b) walking with it on a level (time per foot walked); (c) walking with it up an incline to car (time per foot walked); (d) throwing the pig down (time in hundredths of a minute), or laying it on a pile (time in hundredths of a minute); (e) walking back empty to get a load (time per foot walked).
>
> In case of important elements which were to enter into a number of rates, a large number of observations were taken when practicable on different first-class men, and at different times, and they were averaged.[53]

As a result of this study, it was determined that a first-class man should be able to handle 48 tons of pig iron per day instead of 12½. This figure seemed so high, even to Taylor, that he checked and rechecked his figures, but finally decided that they were correct. Once he and his associates were sure, Taylor felt that it was their duty as "managers under the modern scientific plan" to see that the pig iron

[50] *Ibid.*, p. 42.
[51] Taylor, *Shop Management*, p. 48.
[52] *Ibid.*
[53] *Ibid.*, pp. 48–49.

was loaded at the rate of 47 to 48 tons per day.[54] But this was not all, for Taylor said, "It was further our duty to see that this work was done without bringing on a strike among the men, without any quarrel with the men, and to see that the men were happier and better contented when loading at the new rate of 47 tons than they were when loading at the old rate of 12½ tons."[55]

The problem of determining the amount of work a first-class man could do in a day was solved quickly by Taylor after the time and motion study had been done, because of a series of experiments he had conducted in human fatigue over a period of years preceding his work at Bethlehem Steel. By combining the knowledge of the time a first-class man could stand under strain, and the speed with which the various motions required on the job could be performed, he arrived at his figure of 47½ tons to be set as the task to be achieved. Under this schedule, the worker would lift, carry, and load 106,400 pounds per day compared with 28,000 pounds per day on the regular basis. At this new rate, the worker would handle 1,156 pigs instead of 304 in a ten-hour day. And the worker would handle 115 pigs per hour, or almost two each minute, as compared with 30 pigs per hour, or one every two minutes, under the old plan. The bonus that was "scientifically" decided upon for this task was a 60 per cent increase, or, from $1.15 per day to $1.85 per day.

After the "science of the job" had been developed, the next step was to select a first-class man and induce him to work at the desired speed, then to train him for the job. Taylor and his associate spent three or four days watching the gang of 75 pig-iron handlers. Four were selected who "appeared to be physically able to handle pig-iron at the rate of 47 tons per day."[56] After a careful study was made of these four, including a study of their "character," "habits," and "ambition," one was selected. Taylor describes this man and his characteristics and then the way in which he was handled under scientific management as follows:

He was a little Pennsylvania Dutchman who had been observed to trot back home for a mile or so after his work in the evening about as fresh as he was when he came trotting down to work in the morning. We found that upon wages of $1.15 a day he had succeeded in buying a small plot of ground, and that he was engaged in putting up the walls of a little house for himself in the morning before starting to work and at night after leaving. He also had the reputation of being exceedingly "close", that is, of placing a very high

[54] Taylor, *Scientific Management*, pp. 42–43.
[55] *Ibid.*, p. 43.
[56] *Ibid.*

value on a dollar. As one man whom we talked to about him said, "A penny looks about the size of a cart wheel to him." This man we will call Schmidt.

The task before us, then, narrowed itself down to getting Schmidt to handle 47 tons of pig-iron per day and making him glad to do it. This was done as follows. Schmidt was called out from among the gang of pig-iron handlers and talked to somewhat in this way:

"Schmidt, are you a high-priced man?

Vell, I don't know vat you mean?

Oh yes, you do. What I want to know is whether you are a high-priced man or not.

Vell, I don't know vat you mean?

Oh, come now, you answer my questions. What I want to find out is whether you are a high-priced man or one of these cheap fellows here. What I want to find out is whether you want to earn $1.85 a day or whether you are satisfied with $1.15, just the same as all those cheap fellows are getting.

Did I vant $1.85 a day? Vas dot a high-priced man? Well, yes, I vas a high-priced man.

Oh, you're aggravating me. Of course you want $1.85 a day — everyone wants it! You know perfectly well that that has very little to do with your being a high-priced man. For goodness sake answer my questions, and don't waste any more of my time. Now come over here. You see that pile of pig-iron?

Yes.

You see that car?

Yes.

Well, if you are a high-priced man, you will load that pig-iron on that car tomorrow for $1.85. Now so wake up and answer my question. Tell me whether you are a high-priced man or not.

Vell — did I got $1.85 for loading dot pig iron on dot car tomorrow?

Yes, of course you do, and you get $1.85 for loading a pile like that every day right through the year. That is what a high-priced man does, and you know it just as well as I do.

Vell, dot's all right. I could load dot pig-iron on the car tomorrow for $1.85, and I get it every day, don't I?

Certainly you do — certainly you do.

Vell, den, I vas a high-priced man.

Now, hold on, hold on. You know just as well as I do that a high-priced man has to do exactly as he's told from morning till night. You have seen this man here before, haven't you?

Well, if you are a high-priced man, you will do exactly as this man tells you tomorrow, from morning till night. When he tells you to pick up a pig and walk, you pick it up and you walk, and when he tells you to sit down and rest, you sit down. You do that right straight through the day. And what's more, no back talk. Now a high-priced man does just what he's told to do, and no back talk. Do you understand that? When this man tells you to walk, you walk; when he tells you to sit down, you sit down, and you don't talk

back at him. Now you come on to work here tomorrow morning and I'll know before night whether you are really a high-priced man or not. . . ."

Schmidt started to work, and all day long, and at regular intervals, was told by the man who stood over him with a watch, "Now pick up a pig and walk. Now sit down and rest. Now walk — now rest," etc. He worked when he was told to work, and rested when he was told to rest, and at half past five in the afternoon had his 47½ tons loaded on the car. And he practically never failed to work at this pace and do the task that was set him during the three years that the writer was at Bethlehem. And, throughout this time he averaged a little more than $1.85 per day, whereas before he had never received over $1.15 per day, which was the ruling rate of wages at that time in Bethlehem. That is, he received 60 per cent higher wages than were paid to other men who were not working on task work. One man after another was picked out and trained to handle pig-iron at the rate of 47½ tons per day until all of the pig-iron was handled at this rate, and the men were receiving 60 per cent more wages than other workmen around them.[57]

Taylor apparently anticipated that this manipulation of Schmidt and especially the cavalier manner in which it was done would evoke some criticism so he defended his actions: first, on the ground that Schmidt was a pretty dull fellow anyway; and second, on the ground that his procedure was the only one that would work since it was effective "in fixing his attention on the high wages which he wants and away from what, if it were called to his attention, he probably would consider impossibly hard work."[58]

After getting Schmidt up to this level of achievement, which a more thoughtful man than Schmidt might have considered a groove or even a deep rut, Taylor's *duty* was to teach and train the other pig-iron handlers. One after another of the men were given the opportunity of improving themselves as Schmidt had done. If they failed they "were either persuaded or intimidated into giving it up."[59]

Those who hold the view that in the western world we are on the downward path from a golden age somewhere in the distant past will probably sigh nostalgically and say that men cast from Schmidt's mold are gone forever. They will be even more disposed to do this when they learn that he not only was not a giant of a man but actually weighed only 130 pounds![60] But, as usual, cruel facts are the killers of the dream, and the fact is that even in those days only one man in eight was able to handle 47½ tons of steel per day. Other readers, with more human interest, will want to know what happened to Schmidt the man. Did he continue to be a first-class man for Bethlehem Steel and scientific management? Or did he eventually die of exhaustion after having reached his peak so quickly? Taylor reports that Schmidt stayed on the job all the time that he (Taylor) was at Bethlehem, "and some years later was still at the same work."[61] Taylor claimed that all the men who succeeded and worked under the task and bonus system became "not only more thrifty but better men in every way; that they live rather better, begin to save money, become more sober, and work more steadily."[62] For Taylor to point out that these men worked *more steadily* was, perhaps, under the circumstances, unnecessary. And some pundit might remark that they saved money and were more sober because they were too tired to spend or drink.

[57] *Ibid.*, pp. 43–47.
[58] *Ibid.*, p. 46.
[59] Taylor, *Shop Management*, pp. 50–51.
[60] *Ibid.*, p. 50.

Unfortunately for posterity, Taylor did not answer what, to many, will seem the most interesting questions of all about Schmidt. These were whether, after raising his output from 12½ to 48 tons, he continued to trot back and forth to work and, most important of all, whether he ever finished building the walls of his little house.

In some respects it was unfortunate that Taylor placed so much emphasis and gave such a prominent place in his writing to his work with the pig-iron handlers at Bethlehem Steel. Schmidt, the living embodiment of Taylor's ideal of the first-class man and the epitome of human efficiency, came to be a well-known and controversial figure. Labor leaders and humanitarians were shocked and then indignant at the way he had been treated. It got so bad that Taylor stopped using Schmidt, and some of the proponents of scientific management refrained from using Taylor's name in connection with the system. A few years after this controversy over Schmidt, rumors were circulated that Schmidt had died, presumably from overwork. A year or so later, labor leaders brought the matter up again and Taylor, harassed and distraught, hired a person to locate the famous pig-iron handler and get the facts. Finally the man was located, and Taylor had him examined by a physician who declared him to be healthy and thriving.[63]

Nor was the fear of and hostility toward the Taylor system limited to the United States. It will be remembered that Taylor's work had been translated into French and so enthusiastically received by industrial managers there that a foundation had been established to further his system. But the workers were not quite so enthusiastic. In February of 1913, an article on the Taylor system appeared in the French sporting journal, *L'Auto*. This article received wide attention

[61] *Ibid.*
[62] Taylor, *Scientific Management*, p. 74.
[63] Copley, *op. cit.*, II, 55.

and after being "passed from hand to hand among the workers" made the Taylor system the focus of "the liveliest indignation." The article concluded with this interesting account:

The Taylor System is pitiless; it eliminates the unfit and those who have passed the age of the greatest muscular activity. Here we are reminded of a story formerly related by Fraser.

On visiting Pittsburgh, the English engineer, struck by the fact that he encountered only young and vigorous workers, asked the American who was guiding him, "Where are your old workers?"

At first the American did not answer; but finally, on the insistence of Fraser, he offered him his cigar case and said casually, "Have a cigar, and while we are smoking we will go visit the cemetery."[64]

Taylor's handling of Schmidt was unfortunate because it caused Taylor himself so much unpleasantness and because it gave a distorted picture of both the man and his system. The man was an outstanding, creative engineer, as well as a fine scientist. In his work with metals he exhibited the creative imagination, the persistence, and the singleness of purpose of a scientist. *When educational administrators attempted to bring his system into the schools, they showed no real interest in, or ability to carry out, such painstaking research.*

Nevertheless there was a genuine basis for the hostility that developed. For Taylor, as the leader of the scientific management movement, had not only openly criticized unions but had given his critics ample cause for questioning his belief in the dignity of man as well as his concern for man's welfare, when he wrote: "Now one of the very first requirements for a man who is fit to handle pig-iron as a regular occupation is that he shall be so stupid and so phlegmatic that he more nearly resembles in his mental make-up the ox than any other type."[65] And speaking of Schmidt, he said: "He merely happened to be a man of the type of the ox, — no rare specimen of humanity. . . . On the contrary, he was a man so stupid that he was unfitted to do most kinds of laboring work, even."[66] It was this kind of language, added to his description of Schmidt's work, that led to the fear, anxiety, and antagonism of labor and to the indignation of humanitarians.[67]

[64] Quoted in H. Dubreuil, *Robots or Men* (New York, 1930), pp. 65–66.

[65] Taylor, *Scientific Management*, p. 59.

[66] *Ibid.*, p. 62.

[67] An example of the hostility of labor was the following statement by Samuel Gompers in the *American Federationst* (XVIII, 116) in February, 1911, in an editorial entitled "Machinery To Perfect the Living Machine": "So, there you are, wage workers in general, mere machines — considered industrially, of course. Hence, why should you not be standardized and your motion-power brought up to the highest possible perfection in all respects, including speed? Not only your length, breadth, and thickness as a machine, but your grade of hardness, malleability, tractability, and general serviceability, can be ascertained, registered, and then employed as desirable. Science would thus get the most out of you before you are sent to the junk pile."

There were other factors which eventually brought about strong opposition to his system. One was that the claims for the new system were so extravagant that they could not possibly have been realized and some disenchantment was inevitable. Taylor had warned against the tendency to accept his system as a magical cure-all but could not stem the enthusiasm.[68] But he had also been guilty of claiming a universality for his ideas which went far beyond their applicability. Another development which helped to generate hostility toward his system was the appearance (also recognized and criticized by Taylor) of many self-styled efficiency experts. According to Hoxie scientific management as a movement was

cursed with fakirs. The great rewards which a few leaders in the movement have secured for their services have brought into the field a crowd of industrial patent-medicine men. The way is open to all. No standards or requirements, private or public, have been developed by the application of which the goats can be separated from the sheep. Employers have thus far proved credulous. Almost anyone can show the average manufacturing concern where it can make some improvements in its methods. So the scientific management shingles have gone up all over the country, the fakirs have gone into the shops, and in the name of scientific management have reaped temporary gains to the detriment of the real article, the employers and the workers.[69]

Finally, it is clear that much of the difficulty was inherent in the complexities of the human problems involved in modern industry — problems that men like Taylor, Gantt, and Gilbreth only dimly perceived in the early years. Excellent engineers that they were, they were not prepared by their training to cope with such problems.

This, then, ends the account of Frederick Taylor and his system of scientific management and begins the story of the influence of his ideas on varied aspects of American education. His ideas were adopted, interpreted, and applied chiefly by administrators; and while the greatest impact was upon administration, the administrator, and the professional training programs of administration, the influence extended to all of American education from the elementary schools to the universities.

[68] The *Nation* in a most insightful editorial had warned against considering scientific management as a magical formula, pointing to the "infinite care," the "infinite persistence," and the "laborious research" which was required (Vol. XCIII [May 11, 1911], p. 464). Taylor responded with a letter in which he indicated his approval of and his appreciation for these views. *Nation*, XCIV (June 15, 1911), 602.

[69] Hoxie, *op. cit.*, p. 117.

3

CRITICISM AND RESPONSE IN THE EARLY YEARS OF THE EFFICIENCY ERA

In the fall of 1910 the efficiency expert made his grand entrance into American society. His debut was a tremendous success and had the effect of propelling Frederick Taylor into national prominence and helping to make the country efficiency-conscious. In the years that followed the words "efficiency" and "scientific management" appeared so frequently in the press that, if Professor Gabriel is correct in stating that "An age is known by its catchwords," it is appropriate to label this period in American history as an "Age of Efficiency."[1]

The rapid spread and acceptance of the ideas associated with scientific management were due in part to conditions which existed in American society (e.g., the rising cost of living, the years of publicity given to conservation and the elimination of waste, and the reform attitude of the public) and in part to the fact that "scientific management" had captured the imagination of the American people. Its enthusiastic reception was, of course, both manifested in and generated by the popular press. But in the process of publicizing "scientific management" writers not only claimed the advantages of its application to all institutions, but they also presented it as a system which could be applied not only by experts but by anyone with common sense. This simplified, non-technical characterization of Taylor's system along with the numerous examples of applying it contributed to its popularity and encouraged people without adequate training to become "efficiency experts."

Taylor was partly responsible for the notion of universal applica-

[1] Ralph Henry Gabriel, *The Course of American Democratic Thought* (New York, 1940), p. 336.

bility, for he had said that his principles could be "applied with equal force to all social activities: to the management of our homes; the management of our farms; the management of the business of our tradesmen, large and small; of our churches, our philanthropic institutions, our universities, and our governmental departments."[2] The same claim was made with greater enthusiasm by Harrington Emerson who, in addition, placed less emphasis on the need for expertness and scientific training in applying scientific management and in achieving efficiency.

But the major assurance that scientific management had universal applicability and could be applied by anyone with common sense came from the popular journals. In July of 1911, shortly after Taylor's articles had been published, the editors of the *Saturday Evening Post* told their readers that there was "nothing fundamentally new about scientific management" and that the important thing was the development of a "persistently critical attitude." With this attitude, said the *Post*, "faults and wastes may be discovered almost anywhere." Significantly, the title of the editorial was "Scientific Management for All."[3] Two months later readers were told that scientific management was neither new nor complicated and that it was in fact "as old as truth itself" and "as simple as the alphabet." "In the ordinary store or office," said the author, "you can apply it yourself. . . . Any average man, with faculties reasonably analytical, can make time-studies and can learn to know goods."[4]

Perhaps as a result of this propaganda, the field of management had become top-heavy with theorists, some of whom were honest and well-intentioned and some outright fakes. This dilemma, said Forrest Crissey, writing in the *Saturday Evening Post*, left several courses open to the factory manager who had become "converted to this modern gospel." One was to hire an efficiency expert and take his chances. Another was to "become his own efficiency expert."[5] After giving detailed instructions on how this could be done, he concluded by pointing out that after all "the keynote to scientific management is cutting costs and that includes the elimination of wastes." The whole thing, he said, "is nothing less than organized common-sense applied to making cost go down instead of up. And it is by far the most effective agency to that end that yet has been discovered."[6]

[2] Frederick Taylor, *The Principles of Scientific Management* (New York, 1911), p. 8.
[3] *Saturday Evening Post*, CLXXXIV (July 29, 1911), 8.
[4] Edward Mott Woolley, "Cutting Out the Motions in Business," *Saturday Evening Post*, CLXXXIV (September 9, 1911), 28.
[5] "The Selfmade Efficiency Expert," *Saturday Evening Post*, CLXXXV (November 2, 1912), 10.
[6] *Ibid.*, p. 58.

Other popular journals began to feature articles in which suggestions were made for applying the new system. In August of 1911 an article by Francis E. Leupp entitled "Scientific Management in the Family" was published in the *Outlook*. Mr. Leupp suggested that the family be carefully organized with a planned division of labor so there would be no overlapping of functions, and he recommended that someone be made responsible and held accountable for each household task. He also suggested that understudies be trained for each role so that in case of illness or death each job would be taken over quickly. This practice, he said, had been used in "factories and accounting offices, railways, and mining enterprises," and there was no reason why "it should not be extended to the family adminstration."[7]

The response to Leupp's article must have been favorable for in December of 1911 the editors of the *Outlook* began a series of articles on "Home Efficiency." In announcing the series the problem was introduced with some pertinent questions such as: "Does your home pay? Does it make a fair return on the investment of time and strength and money that is put into it? As a factory for the production of citizenship is it a success?"[8] Perhaps the most interesting article in the series appeared in April of 1912. It was written by John B. Guernsey and appropriately entitled "Scientific Management in the Home." "Cannot the management of the average household be conducted as a business proposition?" he asked. His answer was that it could and he claimed, in the tradition of Harrington Emerson, that "enormous economies" could be achieved thereby. As a part of the application of Taylor's ideas Guernsey suggested that the "management" work out ten or twelve standardized meals each with a standard content, a standard procedure, and a standard time. On the question of time studies he demonstrated how they could be used in the making of biscuits, which process he broke down into eighteen operations with the time allotment (in seconds) provided for each step. For those servants who developed into efficient first-class workers, and who, for example, did not waste seconds gazing out of the window while putting the biscuits into the oven, he suggested an appropriate reward.[9]

This article evoked some sharp criticism from readers, one of whom pointed out that for the ordinary family to adopt his scheme would be "about as practical as coupling a steam locomotive to a baby carriage," while another was incensed at the inhumanity of

[7] *Outlook*, XCVIII (August 12, 1911), 836.
[8] *Ibid.*, XCIX (December 2, 1911), 807.
[9] *Ibid.*, C (April 13, 1912), 821–25.

preventing a servant from enjoying the aesthetic experience of gazing out of the window for 102 seconds.[10]

At the same time scientific management was being adapted to the home and family, it was also being applied to the churches. One prominent clergyman, Dr. Shailer Matthews of the University of Chicago, praised Taylor's work as a "practical philosophy destined to replace haphazard, traditional methods."[11] Church workers, he said, had to be taught to "work under direction according to plans" even if this meant the loss of some initiative, for this was what the "philosophy of efficiency demands."[12] Efficiency also demanded, Matthews said, that churches keep proper records:

> A really efficient church should have application blanks for membership which cover pledges to render service, cards for the assignment of particular tasks to the various members, blanks on which they shall report, and a card catalogue, always kept up to date, of church membership and of past members of the church or congregation. . . . If this seems to make the church something of a business establishment it is precisely what should be the case. We have too long regarded the church as capable of performing its possible services to the community without the most elementary means of administration.[13]

When Matthews made some of the same comments before a group of Presbyterian ministers in the fall of 1912, his speech evoked a critical response from the *Nation*. The editorial, entitled "Efficiency Tests for Clergymen," began by asking "As the modern efficiency expert pursues his devastating way, the troubled question is more and more frequently heard: 'Who of us is safe?'" The college professor, said the *Nation*, was no longer immune, for he had been asked to punch time clocks and justify his efforts by daily records. Now the clergy were being subjected to the same treatment. According to the press reports, Matthews had criticized the clergy for their shocking waste of time and, added the *Nation*, "they seem to have as many unnecessary motions as the old-style bricklayer." The editor, speculating on the consequences of his advice, sketched out a theoretical time card which a minister might fill in as follows:

> 9:30 to 10:27, visited the widow and the fatherless in their affliction.
> 10:27 to 11:03, bound up three broken-hearted.
> 11:03 to 12:15, at the hospital. Spoke to ten patients. Repeated twelve verses from the Scriptures. Offered three prayers. Recited four hymns.
> 12:15 to 12:32, lunch.

[10] *Ibid.*, CII (September 14, 1912), 74.
[11] Shailer Matthews, *Scientific Management in the Churches* (Chicago, 1912), pp. 1–2.
[12] *Ibid.*, p. 37.
[13] *Ibid.*, pp. 57–58.

12:32 to 3:10, made a round of the classes in sewing, cooking, athletics, and inspected two companies of boy scouts.

3:10 to 5:20, kept office hours, seeing five book-agents, three applicants for charity, two clerical impostors, a delegation from the Daughters of the Revolution, and six persons with suggestions about enriching the church services and improving the sermons.

Summing up the whole day, I humbly reckon my efficiency percentage at 97.3.

The editor softened his criticism by disclaiming any intention of burlesquing the work of the clergy and by admitting the need for conducting church activities "in a business way." But he warned against the application of efficiency tests in areas of human life where they did not belong. "What way is there," he asked, "of making an arithmetical estimate of the services of Father Damien, or of any clergyman who goes fearlessly where infection or plague is raging?"[14]

An account of the spread of scientific management into American life could go on at great length, but the pattern was much the same whether the analysis was made of the army, the navy, (and in fact many of the governmental agencies or divisions) or of the various professions such as law, medicine, and engineering. Naturally, the greatest impact was upon business and industry. But the new industrial philosophy had received, as one writer in a popular journal put it, "worldwide notice" and had been "discussed from a thousand angles," even finding its way into popular fiction.[15]

In addition, the total impact of scientific management was augmented and was itself made more pervasive by its close association with the more general notion of efficiency which was constantly being stressed by such leaders in American society as Theodore Roosevelt, who, in an address to students which received attention in the popular press, said,

You must be efficient, you must be able to hold your own in the world of politics, the world of business, able to keep your own head above water, to make your work satisfactory, to make it pay. If you do not, you cannot do good to others. You must be efficient. You must never forget for a moment that, so far from being a base theory, it is a vital doctrine, a doctrine vital to good in this country.[16]

Mounting Criticism of Education 1911–13

The publicity given scientific management and the great claims made in its behalf intensified the public's feeling that great waste

[14] *Nation*, XCV (October, 1912), 402–3.

[15] James H. Collins, "Figuring the Net Value of Efficiency," *Saturday Evening Post*, CLXXV (March, 1913), 9.

[16] *Outlook*, CIV (August 2, 1913), 751.

existed everywhere, and at the same time offered a means of eliminating it. One result was that a new wave of criticism was directed against many institutions, especially those large enough to be suspected of gross managerial inefficiency and those supported by public taxation. The schools, particularly in the larger cities, met both of these criteria. Beginning early in 1911 hardly a month passed for two years in which articles complaining about the schools were not published either in the popular or in the professional journals. Gradually the criticism grew in volume, reaching a peak in the spring, summer, and fall of 1912. In these months a series of sensational articles were published in two of the popular journals with tremendous circulations, the *Saturday Evening Post* and the *Ladies' Home Journal*. As the criticism mounted, the efforts of educators increased accordingly to meet the demands.

As early as February, 1911, one superintendent from Iowa wrote that "much criticism" was being directed against the public schools and he testified that the charge was "our system is inefficient and impractical." He placed the responsibility for the "present criticism" on commercial interests who, he said, looked "only for immediate earning capacity." He was against changing the curriculum and insisted that courses in science, history, mathematics, and language constituted the best possible program for American students. Yet, even in defending the schools, he made a concession to the critics by stating, "what we need is more efficient management of the old system instead of something new."[17] The more typical attitude of schoolmen was taken in March by M. C. Wilson of the State Normal School at Florence, Alabama. Noting that there were "signs of discontent," he stated that "one hears many protests from the business house, the factory, the farm, and from every form of industry. . . ." Then he not only joined the critics by agreeing that the school did not fit children to earn a living but also contended that the school failed in moral training and in academic work. Perhaps, he said, it was time to ask whether educators should "discard the old machine for a lighter and a more efficient one?"[18]

In May of 1911, as the final instalment of Taylor's series was appearing in the *American Magazine*, educators were given a preview of the vicious criticism they were to experience the following year. Simon Patten, well-known economist-reformer, writing in the influential *Educational Review* demanded that schools provide evidence of

[17] E. T. Armstrong, "Is Our Present High School System Inefficient?" *American School Board Journal*, XLII, 3–4.

[18] "Some Defects in Our Public School System," *Educational Review*, XLI (March, 1911), 238–44.

their contribution to society or have their budgets cut. "The advocate of pure water or clean streets," said Patten, "shows by how much the death rate will be altered by each proposed addition to his share of the budget. . . . Only the teacher is without such figures." Why, he asked, should New York spend its money on schools instead of on subways, parks, and playgrounds? Why should it "support inefficient school teachers instead of efficient milk inspectors? Must definite reforms with *measurable results* give way that *an antiquated school system may grind out its useless product*?" Patten challenged educators to answer his question by showing results that could be "readily seen and measured."[19]

Patten was irritated by the fact that many educators had remained aloof from the struggle to improve the worst abuses of industrial America and had limited their participation to a pious but safe concern for something they called character-building. Undoubtedly too, there was too little attention given in the schools (as Dewey frequently claimed) to the study of America in the twentieth century. But regardless of these facts his criticism was an intemperate, anti-intellectual attack in which he both misunderstood and grossly oversimplified the educational process. He did not recognize that the social sciences were not at this time sufficiently developed to give valid and reliable measurements of educational outcomes. And in addition to pushing educators prematurely toward attempts to show results quantitatively, his criticism played into the hands of those who wanted to use the schools to train clerks and factory hands as well as those who were seeking excuses to economize regardless of the consequences. In both his demand for tangible results and his threat of cutting funds he hit educators where they were most vulnerable.

In the summer and fall of 1911 the popular journals printed a few articles on the schools which indicated that public criticism was mounting. For example, the *Ladies' Home Journal*, in an editorial entitled "What Is the Matter?" reported that their letters from readers indicated that dissatisfaction with the schools was increasing and, said the editor, "on every hand the signs are evident of a widely growing distrust of the effectiveness of the present educational system in this country."[20] The publicity given the efficiency movement began to have its effect. In Providence, Rhode Island the school board was criticized by the press for declaring a holiday on a Monday preceding Decoration Day to allow students a four-day vacation. This action, said the newspaper, cost the taxpayers five thousand dollars, not in actual ap-

[19] "An Economic Measure of School Efficiency," *Educational Review*, XLI (May, 1911), 467–69. (Italics mine.)
[20] Vol. XXVIII (June, 1911), p. 5.

propriation, but in terms of loss of possible returns on the money invested. The board's action was described as "poor business" and "not scientific economy."[21] Later in the year the Des Moines school board was "found guilty, by the local press, of extravagance and loose business methods on a dozen or more counts."[22] It had become quite clear, as one educator put it, that educators were being "compelled to face a powerful adverse public criticism — a criticism not of the existence or public support of the schools but rather of their efficiency."[23]

Then in February, 1912, school administrators were, one might say, bearded in their own den when this criticism was carried by a lay speaker into the meeting of the Department of Superintendence of the National Education Association held in St. Louis. They were accused of being inefficient, and they were given suggestions for remedying their faults. The speaker, George H. Chatfield, secretary of the Permanent Census Board in New York City, early in his speech reminded his audience that "the efficiency of our school system is questioned" and he added that "not within memory has the attention of schoolmen focused so persistently in this direction." Critics were everywhere and investigations of school systems were increasing. Since the fundamental doctrine of these innovators was the "elimination of waste," he reminded the administrators of the new developments in industry in which "new processes, new labor-saving devices, new methods of planning, more detailed instructions, more exacting records" were being used and production was being doubled and even tripled. Citing several examples of the detailed records kept by certain industrial concerns, and the profits achieved thereby, he urged schoolmen to follow in their footsteps. How else, he asked, could the educator justify himself "when the businessman complains of his product."[24]

As the school superintendents boarded their trains at Union Station in St. Louis to return home, they had reason to be apprehensive, and they probably gave considerable thought during the trip to ways and means of making their schools more efficient. Undoubtedly, some of them entertained fond hopes that the criticism would subside and part of the tension would be relieved. If they did, they were soon to realize that this was only wishful thinking. But it is doubtful that even the most pessimistic among them was prepared for the onslaught of the next nine months.

This assault came from the two popular journals, the *Ladies' Home Journal* and the *Saturday Evening Post* which not only had circula-

[21] Reported in *American School Board Journal*, XLIII (July, 1911), 2.
[22] *Ibid.* (December, 1911), p. 26.
[23] N.E.A. *Proceedings* (1911), p. 519.
[24] N.E.A. *Proceedings* (1912), pp. 387–90.

tions in the millions, but were journals which catered to and were read largely by those middle-class groups who had led the progressive movement and had become reform-conscious in the preceding decade. The *Post* began the serious lay attack with an article published early in March entitled "Our Medieval High Schools — Shall We Educate Children for the Twelfth or the Twentieth Century?" The author attacked the colleges which he said had "Miltonized, Chaucerized, Vergilized, Schillered, physicked and chemicaled the high school." Then he criticized the high schools for their emphasis upon "culture" and what he called a "gentleman's education." Educators in these schools, he said, were agreed that such education "should be of no use in the world — particularly in the business world" and that it should not be "desired by the mob."[25] This article was followed a week later by another entitled "Medieval Methods for Modern Children" in which the author broadened her criticism to include administration. "At present," she said, "there is inefficiency in the business management of many schools such as would not be tolerated in the world of offices and shops."[26]

These criticisms, although the titles were barometric, were mild in comparison with those which appeared in the *Ladies' Home Journal* in the summer of 1912. The attacks began with an editorial entitled "The Case of Seventeen Million Children — Is Our Public-School System Proving an Utter Failure?" The editor pointed out that the people of the United States had invested nearly a billion dollars in their schools and spent four hundred million dollars each year, and he concluded that "surely for so huge an outlay the returns should be stupendous." But what were the returns, he asked? Then he cited statistics on the small number of children who finished high school, on the number of illiterates (conceding, however, that two-thirds of these were Negroes, for whom little or no education had been provided, and immigrants), and on the relatively low (twenty out of twenty-five million) number of children in school. Despite these deplorable facts, said the editor, "our education is really preparing our children for a life of scholasticism — the stress is on a critical pursuit of literature and a dilettante acquaintance with the arts and sciences."[27]

The attack continued with an article entitled "Is the Public School a Failure? It Is: The Most Momentous Failure in Our American Life Today." The author, Ella Frances Lynch, a former teacher who claimed to have spent months of careful investigation in preparing her

[25] William Hughes Mearns, *Saturday Evening Post*, CLXXXIV (March 2, 1912), 18–19.
[26] Maude Radford Warren, *ibid.*, CLXXXII (March 12, 1912), 11–13, 34–35.
[27] *Ladies' Home Journal*, XXIX (August, 1912), 3.

article, stated that "the American public-school system, as at present conducted, is an absolute and total failure." Then she asked,

> Can you imagine a more grossly stupid, a more genuinely asinine system tenaciously persisted in to the fearful detriment of over seventeen million children and at a cost to you of over four-hundred-and-three million dollars each year — a system that not only is absolutely ineffective in its results, but also actually harmful in that it throws every year ninety-three out of every one hundred children into the world of action absolutely unfitted for even the simplest tasks in life? Can you wonder that we have so many inefficient men and women; that in so many families there are so many failures; that our boys and girls can make so little money that in the one case they are driven into the saloons from discouragement, and in the other into the brothels to save themselves from starvation? Yet that is exactly what the public-school system is today doing, and has been doing.

The public school system, she said, was not something to be proud of but "a system that is today a shame to America."[28]

After this attack it would be difficult to believe that there would be anything left to say but the critical articles continued to be published. In September the *Journal* introduced an article by Frederic Burk, president of the San Francisco State Normal School, entitled "Are We Living in B. C. or A. D.?", with the "momentous failure" headline it had used previously.[29] The same issue of the *Journal* carried an article by William McAndrew, principal of the Washington Irving High School in New York on "The Danger of Running a Fool Factory," in which the author claimed that American education was "permeated with errors and hypocrisy."[30]

The *Journal* capped its contribution to American education in a November issue in which it presented a series of comments by leading Americans. James E. Russell, dean of Teacher's College, was quoted as saying that "our educational system is wasteful and inefficient." Boris Sidis of Harvard University said:

> We desiccate, sterilize, petrify and embalm our youth. Our children learn by rote and are guided by routine. The present school system squanders the resources of the country and wastes the energy and the lives of our children. The school system should be abolished. Our educators are narrow-minded pedants, occupied with the dry bones of textbooks and the sawdust of pedagogics, who are ignorant of the real, vital problems of human interest.

And the indictment was completed by H. Martyn Hart, dean of St. Johns Cathedral in Denver, who, in the spirit of the times, blamed the schools for society's ills and traced it all to inefficiency:

[28] *Ibid.*, pp. 4–5.
[29] *Ladies' Home Journal*, XXIX (September, 1912), 5–6.
[30] *Ibid.*, p. 7.

The people have changed but not the system; it has grown antiquated and will not meet our present needs; it has indeed become a positive detriment and is producing a type of character which is not fit to meet virtuously the temptations and the exigencies of modern life. The crime which stalks almost unblushingly through the land; the want of responsibility which defames our social honor; the appalling frequency of divorce; the utter lack of self-control; the abundant use of illicit means to gain political positions; are all traceable to its one great and crying defect — inefficiency.[31]

There the *Journal* ended its attacks. Early in 1913 it began a series to point out what could be done to correct the evils it had exposed, and the editor urged parents to see that reforms were introduced.[32]

The Vulnerability of School Administrators

The sudden propulsion of scientific management into prominence and the subsequent saturation of American society with the idea of efficiency together with the attacks on education by the popular journals made it certain that public education would be influenced greatly. But the *extent* of this influence was increased by the vulnerability of the leaders in the schools — the superintendents — to public opinion and pressure.

As early as 1900 the professional survival of school superintendents depended on their ability to appease their most powerful and vocal critics. In that year Superintendent Aaron Gove of Denver, speaking before the Department of Superintendence of the National Education Association, said that the reasons why superintendents lost their jobs were "well in sight." He stated that

Neither scholarship nor executive ability alone had been found ample for permanent occupation. . . . The school superintendent who, with competent counsel added to his own expert ability, constructs a course of study, condemns the work of a poor teacher, objects to the engagement of inferior talent, frowns upon the purchase of unnecessary apparatus, or, what is even more threatening, recommends the substitution of a better text-book for a poor one, understands full well that, however unanimous may be the support of his board, many taxpayers, as well as mercantile and commercial interests, are sure to take a hand either to forward or prevent the execution of whatever plans he may devise. The inevitable letter to the press, over the anonymous signature of "Taxpayer" is a reminder that the people propose to allow their representatives on the school board to act their will only when it coincides with that of the individual opinion. . . . And so one has a right to assume that, in addition to the power and skill of the superintendent of great industries, the superintendent of schools needs another qualification — that of mollifying and educating a great and not always prudent or well-informed constituency.[33]

[31] *Ibid.* (November, 1912), p. 9.
[32] *Ibid.*, XXX (January, 1913), 3.

Year by year after 1900 public opinion became a more powerful force as newspapers and popular journals featuring sensationalism and exposure reached an increasingly larger audience. And even though criticism of the schools was *relatively* light before 1911 the power of public opinion and the influence of pressure groups was felt increasingly, and the security of educators declined accordingly. By 1909 the situation was such that a leading administrator wrote, "The professional life of the American schoolmaster is beset by uncertainty. Except in very few cities we are laboriously building houses of cards which no matter how much care and effort we have expended, we may tomorrow surmount with one careless addition that falls flat and tumbles the whole structure to ruin."[34]

Less than two years later in January, 1911, when the efficiency movement was barely underway, the most influential journal in educational administration, the *American School Board Journal*, commented editorially on the professional insecurity of school administrators:

True it is, that the tenure of the school superintendent is an uncertain one and that his position is attended with vexatious conditions. These upheavals are so frequent and the discussions which find their way into the public press, so painful to the victim and disturbing to the school system, as to excite more than ordinary interest. . . . That the official life of the superintendent is a short one has been amply demonstrated. Where he changes from village to small city, from small city to large city he is still in the momentum of promotion, but the crisis is reached where a cold blooded decapitation confronts him. Much more serious becomes the fate of the new man who has reached a high position in school superintendency labors and who is threatened with premature retirement.[35]

[33] N.E.A. *Proceedings* (1900), 221. Additional testimony of the power of public opinion and the vulnerability of schoolmen was given to the same group the next year by John Dewey: "Consider the way by which a new study is introduced into the curriculum. Some one feels that the school system of his [or quite frequently nowadays her] town is falling behind the times. There are rumors of great progress in education being made elsewhere. Something new and important has been introduced; education is being revolutionized by it; the school superintendent, or members of the board of education, become somewhat uneasy; the matter is taken up by individuals and clubs; pressure is brought to bear on the managers of the school system; letters are written to the newspapers; the editor himself is appealed to to use his great power to advance the cause of progress; editorials appears; finally the school board ordains that on and after a certain date the particular new branch — be it nature study, industrial drawing, cooking, manual training, or whatever — shall be taught in the public schools. The victory is won, and everybody — unless it be some already overburdened and distracted teacher — congratulates everybody else that such advanced steps are taken." *Ibid.*, 1901, 334–35.
[34] William McAndrews, "When the Schoolman Fails," *Educational Review*, XLII, 18.
[35] Vol. XLII, p. 10.

This was in January, 1911. In the next two years as the efficiency mania spread and the criticism of education grew, the job security of school superintendents decreased. It will be recalled that the storm of criticism reached its peak in the late summer and early fall of 1912. In June of 1913 the editor of the *American School Board Journal* reported that "no recent year has seen such wholesale changes in superintendencies and other higher school positions as the present year — 1913. In the Middle-west there has been a perfect storm of unrest culminating in wholesale resignations, dismissals and new appointments."[36] Clearly the journals had reaped a harvest for their efforts.

Administrators Respond to the Demands for Efficiency

As early as February, 1911, educators began responding publicly to the demand to apply scientific management to the work of the school. The occasion was the annual meeting of the Department of Superintendence of the National Education Association, and the administrator who initiated the response was J. George Becht, principal of the State Normal School in Claxton, Pennsylvania. Becht told his audience that the nation had been seeking a more scientific basis for the "common arts of life" for the past twenty-five years. This basis had been found, he said, through the pioneering efforts of Frederick W. Taylor, who had shown what miracles could be achieved "by applying the principles of scientific management to the activities that range from carrying a hod to the highest expressions of physical labor." Becht then gave some of the details of the bricklaying experiment and indicated how many useless motions had been eliminated. He also reminded his fellow administrators that the "standard literary journals" were "giving over their columns" to promote the idea that educators should utilize these new methods and thereby become more efficient. Becht optimistically interpreted the layman's widespread discussion of educational practice as "one of the most hopeful signs in the educational firmament."[37]

The effort to introduce scientific management into the educational field gathered momentum at the annual meeting of the N.E.A. held in the summer of 1911. Charles H. Keyes, the president of the National Council of Education, urged the appointment of a committee (which was constituted) on the subject of "Tests and Standards of Efficiency of Schools and School Systems." Keyes told his audience of prominent educators that there was a "very pressing demand" for educators to apply the scientific efficiency procedures that were being used so effectively in industry. In response to "hostile criticism," he said, educators had initiated a few surveys, but this effort involved bringing in outside schoolmen, ostensibly "experts," who worked with the local schoolmen who also had some claim to expertness. But the outcome was merely an expression of "expert opinion," since education had no "scientifically established standards" such as existed in other fields.[38]

[36] Vol. XLVI, p. 28.
[37] N.E.A. *Proceedings* (1911), p. 221.

Perhaps the most significant and direct effort to introduce and apply the principles of scientific management into the schools in 1911 was made in the fall of that year by the High School Teachers Association of New York City. This group, under the leadership of its president, William T. Morrey, devoted three years to the task of studying "Efficiency in the High Schools through the Application of the Principles of Scientific Management," as these had been "enunciated in the industrial world."[39] The association began its effort by inviting the well-known efficiency expert, Harrington Emerson, to speak at its December meeting on the topic, "Scientific Management and High School Efficiency."

Emerson told his audience that while teaching at the University of Nebraska he had discovered certain fundamentals of organization which were applicable in "all institutions of learning" and "throughout all life." Those "universal" fundamentals he enumerated as follows: each animal or individual must breathe, eat, sleep, and keep its temperature variation within narrow limits or the organism would die. He concluded this paragraph by stating that "one can spend a lifetime and not know all there is to know about any individual animal or insect."

After telling his audience that they knew more about teaching than he did, he told them that he would discuss only those fundamentals of education which were similar to all other activities. These essentials, he said, could be applied "not only to school life but to everything human." Then he turned to the problem of efficiency and began by describing what efficiency was not. First, he said, strenuousness was not efficiency and he pointed out that a man could go faster on a bicycle than he could on foot. Second, efficiency was not system, and he cited an example of a doctor in the Spanish-American war who had filled out the wrong forms, did not receive his medicine, and lost his patient. Finally, efficiency was not the intensive use of such "crude instruments as land, labor, and capital." He summed up this section by asking his audience "Is your work as teachers strenuous? If so it

[38] *Ibid.*, pp. 340–41.
[39] *Efficiency in High Schools: Studies, 1911–14, in the Application of the Principles of Scientific Management to High School Problems* (A Collection of Bulletins of the High School Teachers Association of New York City), p. vii.

is not efficient." "Is your work as teachers systematized? If it is it cannot be efficient." "Does it depend on your school buildings, on the toil and labor of many teachers, on your books? If it does it cannot be efficient."

At this point Emerson shifted his attention to industrial plants and told the educators how he brought the benefits of scientific management to them. He said there were four essential elements necessary for efficiency in every plant. These were: first, definite and clear aims; second, an organization capable of attaining these aims; third, equipment adequate to achieve the aims; and fourth, "a strong executive who is able to carry them out." This last condition (which apparently referred to the aims) must have sounded very pleasant to the administrators in the audience. Then Emerson discussed his twelve principles of efficiency. This section of the speech, although not without its humorous aspects, was so unbelievable (considering the occasion and the audience) that it deserves a verbatim account:

> In these matters plants are generally defective, and the conditions cannot be rapidly changed. Assuming, however, that we find a satisfactory condition, we next apply the twelve principles of efficiency.
>
> Take, for instance, a bank burglar. I tell him that the first principle is that of a *high ideal.* I ask him if his ideal is compatible with the first principle of efficiency, a high ideal.
>
> The second principle of efficiency is *common sense,* good judgment. I ask him if it is compatible with common sense to choose as a profession bank burglary.
>
> The third principle of efficiency is *competent counsel.* I ask him where he got counsel to the effect that the business of breaking into banks is a good one.
>
> The fourth principle is *discipline,* which means the welfare of society. I ask him whether breaking into banks is compatible with discipline. Discipline plays a part only when the burglar is caught red-handed and sent up.
>
> The fifth principle is the *fair dealing.* I ask him whether breaking into a bank is a fair deal.
>
> If at the very start of his business a man neglects the five first principles, how can we apply for him the other *practical principles*:
>
> (6) *Standard records.*
> (7) *Planning.*
> (8) *Standard conditions.*
> (9) *Standardized operations.*
> (10) *Standard instructions.*
> (11) *Standard schedules.*
> (12) *Efficiency reward.*
>
> Then we come down to organization, and we apply to each part the same test of the twelve principles. We apply it to the aim. We apply it to every man and to every movement, and after we finish with the organization we apply the same twelve principles to the equipment — to each machine, to all the materials, to all the methods. Then we go to the executive, and we apply to him the twelve principles.
>
> By the time we have made this survey, the whole organization looks to us like a sieve. There are holes in it everywhere, some of them large, some of them small. The first thing to do is to stop the larger leaks, then we stop the lesser leaks, and we keep busy until all the leaks are stopped. Trying to increase the efficiency of a plant with a sieve-like organization is like carting water in a pail filled with holes. You cannot carry it very far. This is the manner in which the principles of efficiency are initially applied.

By this time it would seem reasonable to assume that the audience was thoroughly confused, but Emerson was to challenge their credulity even further, for he dropped the twelve principles and said no more about them. Instead he told his audience that the rest of the problem would be considered under "three simple categories." These were: materials or supplies, personal services, and general charges. For each of these categories there were four different efficiencies and these, he said "stand to one another in a dependent sequence and this results in efficiency being tremendously low in the end." Before dealing with these new efficiencies, however, Emerson gave examples of what he meant by dependent sequence. If, he said, a man lost half of his fortune on Wall Street one day, and the next day lost half of what remained, and the next day lost half of that "he would very soon come to a very small number of dollars." What possible connection this idea had to anything that had been said previously was not clear and Emerson didn't explain. Instead he listed the four new efficiencies. They were efficiency of price, efficiency of supply, efficiency of distribution, and efficiency of use. He illustrated how these efficiencies worked by citing examples of items such as railroad time tables which were too high in price, too numerous, poorly distributed, and not efficiently used. This resulted, he said, in great waste.[40]

If there was any resentment on the part of the members of the association at Emerson's speech it did not appear in the *Bulletin.* On the contrary, in the January edition the secretary of the group wrote that it was not often "that we are privileged to feel so close a kinship between our problems and those of the world of business surrounding us."[41] And President Morrey did his very best to make some sense out of Emerson's speech in his report to the association in November of

[40] High School Teachers Association of New York City, *Bulletin* No. 32 (January, 1912), pp. 3–9.
[41] *Ibid.*
[42] *Bulletin* No. 35 (November, 1912), pp. 2–4.
[43] *Bulletin* No. 36 (December, 1912), p. 44.

1912, and he advocated continuing efforts to apply his principles.[42] As a result, subsequent meetings were devoted to efficiency in administration and efficiency in the recitation.

In the end not much was accomplished. A recommendation by the Efficiency Committee to introduce a system for rating the efficiency of teachers was tabled,[43] and attempts to introduce double and triple shifts into the high schools were strongly opposed.[44] Apparently the only effort to apply the principles of scientific management that was in any way successful was made within the department of biology in one of the New York high schools. The conclusions which were reached by members of the department, as a result of this effort, were presented to the association by a Mrs. Pingaey. The following abstract of her speech was printed in the Bulletin:

A Purpose or object of "Scientific Management."
1. To increase the efficiency of the laborer, i.e., the pupil.
2. To increase quality of product, i.e., the pupil.
3. Thereby to increase the amount of output and the value to the capitalist.

B Comparisons between schools and mercantile establishments:
1. The teacher obviously corresponds to planning department, superintendent, manager of a factory.
2. The elements in the enterprise (the workmen, the raw material, and the finished product) are combined in the pupil. The other elements (tools, etc.), are the text books, charts, and apparatus.

C The teacher should study and know thoroughly all these materials.

D The final responsibility must be put on the pupil, and he should be trained and made to feel this responsibility. The teacher's system of grading a pupil helps him to realize the amount of his progress.

E Difficulties in the way of making exact applications of scientific principles:
1. So many different elements are combined in one (i.e., the pupil).
2. The raw material (pupil) is affected by so many outside conditions.
3. Poor raw material cannot be exchanged for good.
4. Teacher never sees or deals with a finished product.[45]

This speech was apparently followed by another in which specific recommendations were made for the classroom teacher. These included the use of printed outlines, seating plans, recitation cards, attendance sheets, and other "labor saving devices." The teachers were advised that "Perfected business methods mean that better quality of work should be obtained with less expenditure of energy."[46]

By 1912 evidence of the increasing impact of the public criticism

[44] *Bulletin* No. 44 (May, 1914), p. 190.
[45] *Bulletin* No. 36 (December, 1912), p. 47.
[46] *Ibid.*

of the schools and the growing influence of business and industry upon all aspects of education was abundant. In their February annual meeting (at which they heard the lay criticism of Chatfield) the superintendents listened to the suggestions and self-criticisms of the profession. They were told that "the impulse of this awakening to the call for efficiency is felt everywhere throughout the length and breadth of the land, and the demand is becoming more insistent every day. . . ."[47] And they were warned by another educator that "the schools *as well as other business institutions* must submit to the test for efficiency."[48] At the same time they were being told by an administrator in an article in the *American School Board Journal* that there was a "tremendous lot of waste in school administration," and that "if it is worth while in the business world to devote careful, painstaking study to the number of motions necessary to laying bricks, handling pig iron, or painting a structure, it is not worth far more to conserve human endeavor in developing the human product."[49]

These warnings may have been unnecessary, for the program of this meeting indicated that the superintendents were already responding. For example, one entire meeting was devoted to "The Determining of School Efficiency," and speeches were given by administrators in other meetings on such topics as "Waste and Efficiency in School Studies" and "The Standardization of Janitor Service." In the same month, Franklin Bobbitt of the University of Chicago, in an article published in an educational journal, connected the platoon school organization developed in Gary, Indiana with scientific management.[50]

As might have been expected, the program of the annual meeting of the National Education Association, held in Chicago in July, 1912, was sprinkled with topics relating to business efficiency. At one of the general sessions an address was given on "What the Public May Expect in Dividends: Material, Civic, and Social," and practically every department or division had at least one meeting or address connected with efficiency. For example, a major meeting of the National Council of Education was devoted to the question "By What Standards or Tests Shall the Efficiency of a School or System of Schools Be Measured?" In the Department of Secondary Education a speech was given on "Progress in Standardizing the Measurement of Composition." The Department of Normal Schools had one address on "Standards of Measuring the Efficiency of Normal-School Students," and

[47] N.E.A. *Proceedings* (1912), p. 427.
[48] *Ibid.*, p. 492. (Italics mine.)
[49] Walter I. Hamilton, "Some Waste Motion in School Administration," XLIV (February, 1912), 23–24.
[50] "The Elimination of Waste in Education," *Elementary School Teacher*, XII (February, 1912), 260.

another on "Securing and Maintaining Efficiency in the Teaching Force of Normal Schools." The Department of Business Education was concerned with topics such as "Efficiency in the Business Department of the High School." Even the Department of Science Instruction had an address entitled "A Study in Adolescent Efficiency" and the Library Department had one on "Educational By-Products in Library Work." Perhaps the most surprising feature of the entire program, however, was an address in the Department of Music Education on "The Principles of Scientific Management Applied to Teaching Music in the Public Schools." Even more surprising was the fact that the speaker, C. A. Fullerton of Iowa State Teachers College, had obviously studied Taylor's writing very carefully and manifested a much clearer conception of the real nature of scientific management than any other educator I have encountered.

Fullerton began by lauding scientific management, stating that it was "One of the most significant movements of the present generation. . . ." By applying its principles, he said, "the quality of the laborer is improved, the quantity is greatly increased, and [showing that he accepted Taylor's testimony uncritically] the laborer is in better condition after his day's work." He then went on to describe Gilbreth's work and the revolution that had been brought about in the bricklaying trade, and he mentioned Taylor's contribution in increasing the productivity of shovelers. Then, again indicating that he took Taylor at his word or at least agreed with it, he said that the new system could be applied with equal effectiveness to higher types of human activity. The question was, he said, whether scientific management could be applied by music teachers to enable them to increase their efficiency. He answered this question in the affirmative, and he believed that the more educators studied Taylor's system the more they would be "convinced that it has a great deal to offer for the improvement of all educational work." He granted that educators were dealing with "immortal souls instead of bricks and steel," but he thought this fact was "no argument in favor of false and clumsy methods." Although he was not as willing as some other educators to concede the backwardness of education, he did join the majority in placing it behind industry. "We are," he said, "clearly running our schools on a lower plane of efficiency than we are some of our factories. As a nation we cannot afford to do this." Then he added a prediction. "As sure as daylight follows the dawn," he said, "this higher standard of efficiency will be applied to all phases of education, including religious education, and the sooner the better."

He turned his attention then to the application of the principles

of scientific management to teaching music. He conceded that the task would not be easy but he believed this was not sufficient "reason for backing away from it." To illustrate his point he discussed the problem of determining the "best method for teaching sight-reading." This was, he said, an "inviting problem for the efficiency expert" but a difficult one, for

> it includes all that there is in a bricklaying problem and much more, for technical skill is only part of the object sought. One reason why better progress has been made in reducing the technique of the factory to a scientific basis than in the technique of public school music is that success in the technique of the factory is measured by dollars and cents and the results are not questioned. It is not so easy to measure success in the development of an art — and the appreciation of beauty. Technical skill in the factory means the ability to turn out so many articles per day. Technical skill in music means the ability to perform music, but its value depends on the power to interpret music in an artistic manner and also on the taste used in selecting music that is worth performing.[51]

In this passage as well as in the rest of his speech, Fullerton's insight went beyond that of other educators who attempted to apply scientific management to education. He realized that the problems in education were vastly more complex. He realized that exceptional knowledge and training would be required of the expert. He realized that a great deal of time would be required. And he realized that the essence of the Taylor system was its intensive and persistent study of problems, and he stated that this was the important contribution that men such as Taylor and Gilbreth had made to education. Whether his ideas on improving music teaching were reasonable or not, he put his finger on the problem. As we shall see, the administrators who attempted to apply scientific management to education did not have the training necessary to study education, nor did they perceive the time and effort such study would require. And, of course, they did not have the time or money for painstaking, thoughtful, thorough research.

Although educators were making efforts in 1912 to respond to the demands being made upon them, their critics were not satisfied. In the autumn of 1912 the attacks in the popular journals subsided, but other critics appeared. Two of the most important of these were men who were not professional educators but were active in educational work. They were important not only because they were men of considerable status and influence but also because of the nature of the recommendations they made.

[51] N.E.A. *Proceedings* (1912), pp. 1017–20.

The first of these men was James P. Munroe, who was a kind of industrialist-educator. He was, in 1912, president of the National Society for the Promotion of Industrial Education, chairman of the Massachusetts Commission for the Blind, chairman of the Committee on Education of the Boston Chamber of Commerce, and secretary of the Corporation, Massachusetts Institute of Technology. In addition to holding these positions, he had written extensively on education and had served as editor of *Walker's Discussions in Education.* His criticisms and suggestions were made to educators in a book published late in 1912 and significantly entitled *New Demands in Education.* Since Munroe was prominent in the Boston area his ideas were almost certainly well known to Frank Spaulding, who was superintendent at Newton, Massachusetts and one of the men who led in the effort to adapt scientific management to education. The similarity between Munroe's recommendations and Spaulding's ideas will be apparent when Spaulding's speech to the Department of Superintendence of the N.E.A. in February, 1913, on applying scientific management to education, is presented in chapter four.

Munroe opened his book by stating: "The fundamental demand in education, as in everything else is for efficiency — physical efficiency, mental efficiency, moral efficiency."[52] After a scathing indictment of the American schools, whose inefficiency, he said, resulted in a "colossal and needless waste of human energy," he asked:

> What is to be done? What every other business does when it finds itself confronted with possible bankruptcy through preventable waste, losses, and inferiority of output. It calls in engineering and commercial experts to locate causes and to suggest reforms. We need 'educational engineers' to study this huge business of preparing youth for life, to find out where it is good, where it is wasteful, where it is out of touch with modern requirements, where and why its output fails; and to make report in such form and with such weight of evidence that the most conventional teacher and the most indifferent citizen must pay heed.
>
> Such engineers would make a thorough study of (1) the pupils who constitute the raw material of the business of education; (2) the building and other facilities for teaching, which make up the plant; (3) the school boards and the teaching staff, who correspond to the directorate and the working force; (4) the means and methods of instruction and development; (5) the demands of society in general and of industry in particular upon boys and girls — this corresponding to the problem of markets; and (6) the question of the cost, which is almost purely a business problem."[53]

[52] James Phinney Munroe, *New Demands in Education* (New York, 1912), Preface, p. v.

[53] *Ibid.*, pp. 20–21.

The other individual who prodded (or pushed) educators toward taking action to achieve efficiency was William H. Allen, director of the Bureau of Municipal Research in New York City. Allen was an efficiency advocate of long standing and had written a book on *Efficient Democracy*, which included a chapter on efficiency in education. His advice to the educational world was given in a speech to the Wisconsin Teachers Association in the fall of 1912 and was printed in the *American School Board Journal* — a journal so influential that one schoolman described it as the school administrator's "Bible."[54] Allen told his audience what they undoubtedly already knew when he stated, in the first paragraph of his speech, "efficiency is in our vocabulary. It is almost a shibboleth." He added that while a "few reactionaries claim that we cannot measure efficiency, the rank and file of us know that there are so many things we can measure, that we do not need to worry about the fewer things which we cannot measure." Therefore, he stated, the first important step had been taken — people wanted efficiency. Unfortunately, he said, everyone wanted it for someone else and no one was willing to take action in his own school or classroom. "We like," said Allen, "to use the word and to proclaim our allegiance to the newer ideals of scientific management; but saying 'efficient' and being efficient are two different things."[55]

Clearly this apostle of the gospel of efficiency had no intention of permitting educators to respond to their critics by simply *talking* about efficiency. He demanded that they stop talking and begin acting. More than this, Allen characterized and held up to ridicule eight kinds of schoolmen who for one reason or another were not enthusiastically adopting the efficiency measures. These men turned out to be not only stupid but also weak, dishonest, and of course undemocratic. These views were supported by the editor of the *American School Board Journal*, who commented at the end of the article that Allen had pictured "conditions so accurately that every school superintendent and school board member who reads it, may well ask himself: To which of the eight classes of schoolmen do I belong."[56]

There were two events, both of which occurred in February of 1913, which indicated that administrators were acting promptly to appease their critics. One was a major session devoted to "Improving School Systems by Scientific Management" at the annual meeting of the most powerful group of educators in America — the Department of Super-

[54] Ward G. Reeder, *The Business Administration of a School System* (Boston, 1929) p. vi.

[55] "Next Steps in School Efficiency," *American School Board Journal*, XLV (December, 1912), 15.

[56] *Ibid.*, p. 57.

intendence of the National Education Association.[57] The other was the publication of the Twelfth Yearbook of the National Society for the Study of Education, Part I of which was devoted to the application of scientific management to city school systems. The significance of the meeting of the superintendents was heightened by the fact that the first two speeches were delivered by men who had to be classified as among the most prominent in American education. The publication by the National Society was perhaps even more significant, for the society's membership consisted of the leading educators in America, and its yearbook was certainly the most prominent professional publication at that time. It is difficult to see how the leaders in education could have done more to acknowledge the urgency and importance they attached to the need to apply scientific management to the schools.

[57] The professional importance and significance of this annual meeting of the Department of Superintendence may be judged from the words of an editorial in *American School Board Journal*, written specifically about the Cincinnati convention the next year: "The meeting of the Department of Superintendence is the big annual event to which every superintendent who is alive to the responsibilities of his office and the opportunities of his profession must look forward to as the convention which will determine for him educational policies and offer solutions for administrative problems. It is a school for superintendents, a clearing house where educational ideas are exchanged, where difficult questions are answered; it is a post-graduate course for superintendents who would stand in line for promotion in their profession and who would keep up with the everchanging, growing and rising standards in school work.

The Cincinnati convention reminds one very much of important conferences which are held each year in a number of professions and industries. Great business corporations send their presidents and superintendents for the direct benefit which they expect to derive. Every manufacturer knows how these gatherings fix trade policies, make possible a better understanding between houses, reduce abuses and evils of competition, have a tendency for making prices and credits more stable, improve manufacturing methods, etc." "The Cincinnati Convention" L (February, 1915), 30.

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AMERICAN EDUCATORS APPLY THE GREAT PANACEA

The superintendents arriving in Philadelphia in February of 1913 for their annual meeting and greeting the colleagues they had not seen for a year may well have sought solace from one another, for 1912 had been a trying year. They had received enough criticism and enough advice to last a lifetime, and the question they undoubtedly asked eagerly of each other was: "What is to be done?" It is also probable that they studied the program topics and the speakers carefully in the hope that a prophet would appear to lead them out of the wilderness. The chances are that they were most expectant about the session devoted to scientific management, for, after all, if this new system could work such miracles in industry, perhaps it could help solve their problems in education. Besides, they had been advised, urged, and even warned by businessmen and by some of their leaders to use the new panacea.

The meeting opened in the usual way with greetings from the mayor and the host superintendent of schools, and the visiting administrators probably were grateful that no unpleasant note of criticism was sounded. They were brought back to earth quickly, however, when their representative who had been appointed to present their official response to the welcome, O. T. Corson, former president of the N.E.A. and editor of the *Ohio Educational Monthly*, immediately began discussing the widespread criticism of the schools. Some of this criticism, he said, was due to ignorance or prejudice but he was strongly tempted to believe that some of the criticism of the *Ladies' Home Journal* type was "part of a business policy, both keen and conscienceless, which recognizes that increased revenues may result from sensational attacks