PRINCIPLES OF SCIENTIFIC MANAGEMENT (TAYLORISM)
WITH APPLICATIONS TO CERTAIN PHASES OF
PUBLIC SCHOOL ADMINISTRATION

A Thesis Presented for the
Degree of Master of Arts

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Approved By:
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INTRODUCTION

The Problem

The problem with which this thesis deals is: (1) to discover such underlying principles and practices of scientific management as have been found practical in the organization and operation of industry. (2) If possible, to glean from those discovered principles and practices such ones as are applicable to education. (3) To apply the chosen principles and practices to some of the major problems of educational administration, for the purpose of illustrating how their application may be used in helping to solve the problems met by the school administrator.

Importance of the Problem

At present, society is in a process of rapid change. Institutions and procedures that for a time seemed stable are found inadequate for the service demanded of them. The social mind is in a perturbed state. Men have begun to question the social order. We have seen industry make a phenomenal growth since the opening of the twentieth century, not only in the extent, quality and variety of its products, but in its methods as well. The remark is frequently heard in the street, that business (by which they mean industry) has grown so fast that we have not been able to keep pace with it. Those of the street account for it in this wise:
that they (meaning industry) organize their operations on a scientific basis. There is probably no clear conception of what a "scientific basis" is, but in their minds this is the thing that accounts for the gigantic growth of industry. If this be correct, and we are assuming considerable truth therein, we are led to ask, Why should this be so? What is really happening in industry that is not effecting other institutions also? If industry and its methods have destroyed the social equilibrium, some investigation is necessary in order that the equilibrium may be reestablished.

Need for the Present Study

As education is one of the institutions that has been left behind in this march of the thing we shall call progress, and further, as it is probably the most vital instrumentality for correcting the maladjustment, it is quite necessary for education to discover, if at all possible, principles and practices that might aid in bringing education abreast of the social order. The place of education should be on the crest of the wave of civilization, not in its trough.

Sources of Data

The chief sources of data on science management to be used are in the various papers, publications and texts on scientific management, that have been left to us by Dr.
Frederick W. Taylor, founder of scientific management, and his contemporary engineers, C. B. Thompson, Frank B. Gilbreth, and Harlow S. Persons. For the history of industry, the chief sources were the publications of Leon C. Marshall and H. C. Metcalf; for the growth of private and public property, those of Paul Lafarque and R. H. Tawney. Many other sources of data were used. These may be found in the bibliography at the close of this thesis.

Development

In Chapter I will be given the evolution of the tools of production, land, labor and capital, with a short history of the growth of both private and public property. These are given with the intention of creating the setting for management in industry.

The place and purpose of management in industry will be portrayed in Chapter II, with especial emphasis given to its foundations - biological, sociological, psychological, economic and philosophic.

In Chapter III scientific management will be considered with reference to its principles, practices and techniques. Application of these principles and practices to three major educational problems, organization for control, finance, and housing and equipment will be given in Chapter IV. The problem of personnel, on account of its importance, is considered in a separate chapter from those named above. This
is to be found in Chapter V. However, only a few of the personnel problems will be given consideration.

The field of education is so large that space and time permits application of scientific principles and practices to only a few of the problems. These will be selected on a purely arbitrary basis, and are used only as illustrations of how scientific principles and practices might be used in the solution of many of the problems in educational management.
CHAPTER I

EVOLUTION OF THE TOOLS OF PRODUCTION

Man's Relation to Nature

In the discussion of any enterprise, whether public or private, having to do with the welfare of society, there is always present a language that is peculiar to the subject. Certain terms occur and reoccur at frequent intervals. The field which this study covers has much to do with the factors of production, land, labor, and capital, and perhaps the entrepreneur. In order to bring out the meaning of these terms, place each in its proper position, and clarify the thinking in the field, a short history of the development of the factors in production will be given, and sharp lines of demarcation will be established where possible.

In the beginning the earth was created. At a later date man was created from the earth. To this we can all agree regardless of the theories each of us may hold as to just how and when the earth and man were created. From his birth until he again reposes in Her bosom, man draws either directly or indirectly from the earth all the elements for his growth, for all the powers or energies of motion which he has, and for sustenance of life itself. Without Her, man's powers of doing things, of moving about, seeing, feeling, wishing, being aware of, reproduction, etc. would be no more virulent than a vacuum. This perhaps gives some
idea of the importance of the part that the earth, or Nature if we wish to so call it, has played in this stage production of life into which man was ushered some hundreds of thousands of years ago. All that man is, and all that he can hope to be is a result of the interactions of the materials and forces of Nature. He cannot break beyond the bounds of the circle that his environment circumscribes about him.

Factors in Production

(a) Land, a Factor in Production. What do we mean by the term land? All of the free gifts that Nature has placed here that can in any way be useful to mankind may be designated as land. The earth is a great storehouse of materials having infinite possibilities for gratifying the wants and desires of the human race. They extend from the greatest depths to which man can successfully penetrate the geologic stratum, to the greatest height of the atmosphere, and even beyond. Every cubic foot of atmosphere is a possible source for materials that will vitalize man himself as well as all other living things. Included in this category of resources are, climate, soil, minerals, topography, flora, and fauna. These are relatively speaking constants and are the setting from which man started his cultural development.

Further investigation reveals that the earth is a great storehouse for power which is useful to man. Winds blow for his sails and for his mills; water sets wheels in motion
for his factories, and for the transportation of his freight; electricity keeps his mills in motion and carries his messages. Beasts of burden he found and utilized, as he did with the expansive force of steam, and powers of combustion in chemical reactions for engines. Magnetism, elasticity, heat from the sun, rainfall, gravity and others were his for the harnessing. Even the stars in the heavens were his compass for centuries. All of these gifts of nature we know as "land."

(b) Labor, a Factor in Production. Many things in Nature were ready for man's consumption, such as various fruits, berries, roots, bark, etc., but even then man had to exert himself before they were available to him. He had to stir himself about to find them. They were not at his finger-tips. The limb that he afterwards used as a weapon may have been furnished ready for use, but man had to put energy into it before it returned some utility to him in the form of food, or it had to be transported elsewhere before it furnished him shelter. He must first stalk the fowl of the air or the wild beast of the forest before a feast is provided for himself and family. What man really does is to bring Nature's products into position where they are able to satisfy his wants. The fish of the sea are not his for the wishing, but must be brought to his fireside. Part of the labor of securing the fish may be mental in figuring out a process of procuring the fish, but it was perhaps
energy well spent. Hence, the requisites of production are
two: appropriate natural objects and labor. It is true
that certain things at first seem to be utilities without
the use of labor. For example, a cave. But caves must
first be found, and appropriated before they can be used.

As was stated under the previous topic, Nature furn-
ishes more than material objects. She furnishes various
forces which we use for power, such as gravity, forces of
expansion and contraction. Understanding the part these
forces play in production will be necessary before we can
thoroughly understand the significance of labor in produc-
tion. On the screen can be seen pictures of women in primi-
tive society grinding grain between millstones. When man
hitched the upper stone to a windwheel or to a water wheel,
what happens as far as land and labor are concerned? Does
labor still furnish the power? Evidently not. The powers
of nature are doing the work. Labor's part in the process
was purely placing the materials of nature in proper posi-
tion and Her forces continued to function, relieving man of
that particular labor. Even the physical force that man
used in placing these devices came from nature, and when
his supply of physical and neural energy is exhausted he
must go back to Her to replenish the store. Professor Leon
C. Marshall clearly sets forth the function of labor:

If we examine the action of man upon nature,
we shall find that the powers of nature, or in
other words the properties of matter, do all the
work, when once objects are put into the right position. This one operation, of putting things into fit places for being acted upon by their own internal forces and by those residing in other natural objects, is all that man does, or can do, with matter. He moves a seed into the ground; and the natural forces of vegetation produce in succession a root, a stem, leaves, flowers, and fruit.... He moves a spark to fuel, and it ignites, and by the force generated in combustion it cooks the food, melts or softens the iron, converts into beer or sugar the malt or cane juice, which he has previously moved to the spot. He has no other means of acting on matter than by moving it.

Labor, then, in the physical world, is always and solely employed in putting objects in motion; the properties of matter, the laws of nature, do the rest.¹

But, with all the seemingly small part that labor plays in the field of production, it is a necessary and certainly a very important part. A definition of the term "labor" may help to a better interpretation of it. According to one modern writer:

Labor is any human effort which is undertaken not as an end in itself (that would be play) but as a means to an end.

The end is the expectation of a reward of some sort. This is labor, but some consideration is necessary in order to differentiate human effort from natural forces. As will be seen later, this demarcation is necessary; otherwise, the share in production to which each factor is entitled could not be equitably determined.

As illustrations of different kinds of labor, we might mention the work done by the professional man, the shop-owner, the manager, the skilled workman, and the unskilled workman.

(c) Capital, A Factor in Production. In primitive times, the immediate surroundings of man determined his occupation. If wild game was plentiful, the man was a hunter. If fish were more abundant, he was a fisherman. If press of population became too great for successful hunting or fishing, he tamed the wild beast and became a herder. At all times he followed the line of least resistance for procuring a sufficient supply of goods for self-preservation. But catching the fish and the beasts with his hands did not fully provide for the needs of the family. He discovered that by the aid of a branch from a tree or certain bits of rock he could increase the length of his reach, multiply the strength of his bow, and thus give himself greater control over Nature's supplies. Here was the cradle of capital.

Capital is "any economic good that is used to further production." The club of Neanderthal man was capital as it furthered his production by giving him more food and shortening his periods of fasting. The new method helped to satisfy his natural wants. This development of the tools of production for capital use was exceedingly slow. Almost countless years glided by ere the step was made from the limb of a tree to even the first crude hoe from the fanbone
of a deer.

The wild beast that was captured and kept in captivity by prehistoric man for use at another time of the year when food could not be obtained, was not capital goods. This was purely delayed consumption of an economic good. But when kept for breeding purposes to reproduce their kind, they furthered production of utilities and thus became capital. It is a far cry from this state of affairs to the utilization of capital as we know it today and as exemplified in the giant liners, power shovels, traveling cranes, oil burners, radios, television, etc.

One caution is offered here because of a common misconception. Money is not capital, necessarily, but can be turned into capital. Money invested in title to real estate is not capital except that portion of it which covers improvements. Land itself in this case is entitled to a share in production rather than the money which represents the amount invested therein.

(d) Growth of These Factors: In primitive society capital goods were very limited. Man appropriated a few articles of land's materials, such as clubs, stones, etc., to aid him in making a living. Thus was acquired title to the tool or weapon, and the problem of the division of the spoils of the chase (distribution of the share in production) did not enter. Man owned the tool so he received capital's share in production. He furnished the labor, both
mental and physical, so was entitled to that share also. And due to lack of population on the one hand and a superabundance of land on the other, there was no one who wished to dispute with the individual for land's share in production. To illustrate, the Cro Magnon received not only labor and capital's share as he furnished the one and possessed the other, but also he received land's share, as none disputed its appropriation by him. Such a state existed until encroachment of population and warlike power of tribes appropriated to tribal use and ownership tracts of desirable pastures or hunting grounds. In this state of civilization, land's share in production was used for the common weal of the tribe. As one would suspect, during this regime, capital goods which the individual could own himself grew in quantity. The chief form of capital was that of herds of various domesticated animals.

The Growth of Private Property

(a) Early Growth of Private Property. Long before the time of recorded history, Palaeolithic and Neolithic man roamed about as savages in search of the necessities of life. They had no landed property, either personal or private. They barely appreciated personal property in the things they appropriated, such as clubs, ornaments, skins, stones in a woven basket, etc. These at death were not inherited; some were buried with the user. These people
competed with wild nature, had tamed none of the animals, and in fact had not tamed each other to any great extent.

Many centuries passed. Man lived in clans in a nomadic state. Here survival of the clan necessitated communal ownership of the food and various crude implements. Protection for all was the highway to survival, for in numbers there is strength. When a savage ceased to be nomadic, even for a short period, and built a house, it was not his, but belonged to the tribe. This held true following the introduction into the social order of the metronymic family. Long-houses were built. In these were stored the provisions. There seems to have been individual ownership of these provisions, but communal use; certainly a very loose property ownership, but yet a beginning. Within the family there was recognized the rights of property, but not the rights of inheritance.

When tribes, such as the Iriquois, ceased living in long-houses, and built separate dwellings, there was individual ownership for the time being, but common use; and anyone could come in and eat such food as was therein without leave from anyone. All property really belonged to the tribe; their philosophy being that the Great Maker placed the game and the vegetation here for all and not for the individual. Hence, hospitality was a duty and not a virtue. When one moved from the house he had built, someone else was allowed to appropriate it; usually a relative, but this was
not always the case.

Only as a country became populous did it become necessary to divide the land among the tribes. The earliest distribution was with respect to territories of pasture and chase. Savages limited their boundaries by neutral zones, on which ground tribes met and exchanged articles of trade. Even in that stage, the territory belonged to the tribe as a trust from the Great Maker. If they sold the land, they only sold the rights of those then living. The rights of the yet unborn were not transferred nor could they be. In that stage man was a hunter and possessed loosely his arms; woman was a housekeeper and possessed household utensils.

When agriculture was first introduced, women did the most of the work in the field, while man hunted. Therefore, the first division of the land was allotted to woman. So long as the matriarchal family lasted, inheritance came from the mother, but the offspring inherited the land in trust for the communal welfare. This was just what the mother had held.

As man was the protector of the family against aggression from without, the very nature of the situation gave to him many rights over the group, which all recognized. He became a sort of autocrat. Also wife stealing by men on plundering raids resulted in lowering the position of woman. As a result the patriarchal family took the place of the metronymic or matriarchal. Still in this epoch of human
history man held land only as a political right for the benefit of the group. Collective ownership was still extant, but was perpetual from generation to generation. The Patriarch had a duty to hold the land, produce on it for the family, and turn it over to his descendants. He must have despotic powers in order to protect and efficiently conduct the institution. He did have such powers. Laws and customs grew up to protect these "rights." Under this collective ownership the leaders always conducted the trading for all—an example of cooperative bargaining. The Italians discovered this when they conquered the Arab tribes of Africa and attempted to drive sharp bargains with the natives.

As populations increased and trade and industry became greater, this collective bargaining did not suit the bourgeois who were beginning to come into the picture. Only by free individual trade could they hope to wax fat at the expense of the individual. They succeeded in breaking down collectivism by getting across the idea of the division of the family land holdings among the various households which made up the patriarchal family. One of these ideas was "that each should profit by the fruits of his own labor." This was the beginning of the end. Individualism came to replace collectivism, and the capitalist entered the field in full armor. Soon was seen gardens enclosed by walls; and the idea that every man's house was his castle became the philosophy of the day. Under this regime, instead of
all having an average standard of living as they did under collective ownership, some waxed fat and those who could not or would not maintain themselves became very poor. The capitalistic system is built on individualism and individual ownership, with free competition; and has as attendant elements the above named conditions of rich and poor. So we at times wonder whether capitalism is worth the price we are paying.

(b) The Feudal System. The feudal system was one of the transition stages from communal ownership to that of individual ownership in land, although the Lords claimed at times as a matter of expediency, absolute ownership of the land. Illustrations are to be found where they even drove those who lived thereon, off the demesne en masse. The Lord of the Manor gave protection to his flock, but this gave him no "right" to the land other than the brigand's right. The idea of three days that his subjects were to work on his demesne was not original, but came from the collective ownership that had been handed down from the old paternalistic family. As will be seen, this epoch in development had a material influence not only on private property and capitalism, but also on labor as well.

The Manor plan was a system of caste, and in it the division of labor between the different ranks of industry (some industries ranked higher than others) and between individuals of the same rank was so thorough and uncompromising
that the real interest of the producer was sometimes in danger of being sacrificed for the sake of increasing the addition that his work made to the aggregate production of material wealth. The integrating process was not properly functioning because the bright individual was sacrificed for caste. The most intelligent must still cobbled shoes if that was his caste.

During the later stage of feudalism things began to happen rapidly in enterprise. Labor began to raise its head above servitude and organized the guild system. The undertaker (a form of manager) and the middle man as a risk taker came into the field. The guilds were organized on an apprenticeship plan, usually for a term of seven years. The laborer was highly skilled, owned his tools, and also the finished product which was usually sold locally. The laborer could confidently look forward to becoming a journeyman and finally a master craftsman who was free to buy and sell.

With the growth of trade and increase of population there arose a group of risk takers or entrepreneurs who discovered the kind of goods the trade needed, then, at first, contracted with the master craftsmen for manufacturing the goods, and paid them only for the labor. The "paying for labor only" was the beginning of labor's downfall for soon the work was farmed out to any home that could do the necessary work - spinning, weaving, and such. The few simple tools that were needed were usually furnished by the
undertaker. This system continued until the guilds as unions were almost broken. The worker's tools were passing from his hands, leaving only his labor to market. But many craftsmen as individuals continued to own their own shops and manage them. The shops were small, but the owner purchased or grew his raw materials, owned his tools as well as the finished product. He too was a risk taker and was entitled to a profit for that function.

In about the same period, undertaking arose in another field. Lords of the manors would rent not to exceed five units of land to an undertaker or manager who would take the risk, hire the labor, - plowing and tending - and hope for a profit at the end of the year. For this risk he was entitled to a share in production.

(c) The Industrial Revolution. The Industrial Revolution wrought a very rapid change in methods of production, ownerships, and relationships in enterprise. These changes were brought about largely by several inventions, chief among which were the steam engine, spinning and weaving machines, and machines for making machinery. The latter was of vital importance as it was responsible for the taking of the process of manufacturing from the home. The home, due to its modest size, was able to house neither the many nor the large machines that were necessary. Thus began the factory system with its large scale production, and concentration of population in towns near at hand. Here labor
lost entirely the tools of production. The risk of ownership of neither the materials nor the finished product was taken by him. Direction of his interests left the factors in production with which he had previously been intimately interested and associated. There was only left for him wages on which he might center his attention. Only wages was his due at the end of the day's labor.

Due to the increased size of both the manufacturing plant, and the quantity of finished goods, capital as well as more raw materials were required in greater and greater quantities, and with more regularity.

The Growth of Public Property

Public corporate ownership of property as we know it did not exist among primitive men. As has already been stated, the land was held in common by the tribe or by the patriarchal family. Their only title to it was perhaps occupancy. They held it either by force or by virtue of the fact that no other stronger tribe desired it sufficiently to justify the danger incurred in its subjugation. This was communal ownership of land. The patriarch could own private personal property and grow rich, but the government was not concerned in ownership of such property.

During the Dark Ages military leaders at the head of their bands would conquer the territory of others and would take possession of all lands in the name of their country or
their sovereign. The crown would hold this land and levy taxes on the subjugated people for government and private use. Inheritance of this title went to the throne heir; or to any successor who might take possession of the throne. Kings would sometimes, by pure brigandage take possession of the manors of recalcitrant Lords within the realm. This property was semi-private. The only interest the public had therein was, that the successor to the throne inherited such lands and attachments. Through all of this time individualism was growing, and had reached a point where the rights of the public were made secondary in importance. However, the underlying principles of the feudal tenure as well as the principles governing holdings under civil law furnished abundant bases for reservation by the Monarch of the rights which were incident to a proper government of his kingdom, its defense, and the safety and contentment of his people.

The Englishman like the Roman was proud of his independence, and vigorously asserted his right of property as absolute and inherent, and constantly resented any attempted intrusion by the king upon the rights granted by the Magna Charta.

Blackstone, speaking of this period, says:

So great moreover is the regard of the law for private property that it will not authorize the least violation of it; no, not even for the general good of the whole community. If a new road were made through the grounds of a private person, it might perhaps be extensively beneficial to the public; but a law permits no man, or set of men, to do this without consent of the owner of the land. In vain it may be urged that
the good of the individual ought to yield to that of the community; for it would be dangerous to allow any private man, or even any public tribunal to be judge of this common good, and to decide whether it be expedient or not. Besides, the public good is in nothing more essentially interested, than in the protection of every individual's private right. The legislature alone can and frequently does interpose and compel the individual to acquiesce. But how does it interpose and compel? Not by absolutely stripping the subject of his property in an arbitrary manner, but by giving him full equivalent for the injury thereby sustained.

Note in the last two lines quoted above that the right of Eminent Domain is beginning to come to the front. It is one of the highest powers of the state itself, and interferes most seriously and often vexatiously with the ordinary rights of property. The law of Eminent Domain in America, as elsewhere, contains the important guarantee that all private property taken in the exercise of that power shall be paid for. In the Fifth Amendment of the Constitution of the United States we find these words: "Nor shall private property be taken for public use without just compensation." Again we find in the Fourteenth Amendment that it forbids the taking of private property "without due process of law."

In a democracy there is not so much objection to Eminent Domain. No longer does the public contest the right of its representatives to conserve its interest. No longer is there fear of adverse personal interest of a selfish monarch who might wish to extend his power regardless of the resultant benefit to the public weal. The people have taken the place of the king. With this fear gone, there is no sound
reason for doubting that Eminent Domain is essential to public welfare under democratic sovereignty. The United States exercises the right over all property in which there never was proprietary interest, and why not? Even the national government may condemn property in hands of a state in its corporate capacity. This is dominion by delegation, by the state first to the national, second to municipalities, and third to corporations exercising franchises in the supposed interest of the people. At present, only the courts shall decide whether or not such franchises are for the public good or use.

As yet, the public has entered the field of industry but little, but the signs of the times indicate the trend toward government ownership for the common weal. Of course it will come through an evolutionary process, but in time the cycle will have completed itself.

The Changed Philosophy Underlying the Economic and Social Changes

The aim of life was changed with the division of land among individuals. The essence of the change was the disappearance of the idea that social institutions and economic activities were related to common ends which gave them their significance and which served as their criterion. People ceased to regard social and economic institutions as amenable to moral criteria as they had in times past considered them means of achieving their common aims of life. Individual
weal in industry and government as well as in religion was the new philosophy of life that had slowly crept into the minds of the masses.

As the idea, that the purpose or aim of any social activity was group welfare, ceased and individualism ascended the throne, there gradually disappeared the idea of social purpose or function of any institution. What was left was purely the materials of society rather than society itself. Society became a sort of giant stock-company in which political power and the receipts of dividends were "justly" assigned to those who held the most numerous shares. The current of social activity did not converge upon common ends, but was dispersed through a multitude of channels created by the private interests of the individuals who composed society. The result of such ideas in a world of practice was a society which was ruled by law, but which recognized no moral limitations on the pursuit by individuals of their economic self-interest.

This was the philosophy of individual "rights" as set forth by John Locke. The idea of social obligations as a purchase price for these so-called rights formed no portion of their theory. They thought it rank injustice that a citizen should pay one-tenth of his income in taxation to an idle government, but quite reasonable that he should pay one-fifth of it in rent to an idle landlord. According to this theory it was assumed that private property in land
and the private ownership of capital, were natural institutions, and that somehow or other social welfare must result from their continued exercise.

In practice this doctrine has been qualified by particular limitations to avert particular evils, and to meet emergencies; but such limitations have existed only in particular cases. The general validity of the doctrine was regarded, even up to the time of the World War, as being beyond question. This point of view maintained that not only was property held as an absolute right by the individual without obligations, but also that societies act both unwise and unfairly who try to limit economic enterprise, or to impose obligations as a condition of tenure of property. "May I not do what I like with my own?" was the answer given when particular limitations were suggested. The Laissez Faire, or let-alone policy was the order of the day. The rights of Eminent Domain were fought for years because of this philosophy, and the municipalities in order to get tracts of land for common weal must pay through the nose or do without.

This doctrine had a great influence on taxation. In England in 1909 the Budget included a small land tax. This created quite a storm because it involved the doctrine that property is not an absolute right but that it may properly be accompanied by special obligations, which doctrine in its final analysis would destroy the sanctity of absolutism by
making ownership conditional. Society in general has begun to question this individualistic philosophy, and is beginning to wonder whether or not welfare is not somehow tied up with group. This accounts for the increased use of the right of Eminent Domain in nearly all parts of the world today.

Summary

All production starts with man and the resources of Nature that surround him. As man goes up the social scale, Nature's contribution, which we call "land," and man's efforts to sustain himself, which we call "labor," combine to produce another type of goods used to further production. This last, in economic vernacular is styled "capital." It increased rapidly in quantity when man passed to the agriculture and grazing stage of civilization. With the press of increased population came partition of land to the individual, thus establishing private property in land.

During the later stages of the feudal system, labor became highly skilled through the guild system. The capitalist and the risk taker entered the field of industry. These two, together with the enormous changes wrought by the Industrial Revolution, almost entirely relieved labor from the tools of production.

Ownership of property has successively passed the free land in the beginning to communal ownership by the tribe, thence to individual stage with its absolutism in title to
land. Coming into the picture now is a form of group ownership by a corporate government through the right of Eminent Domain. The tendency is toward a greater use of this power for the public welfare, and we might add that this policy will perhaps extend in the very near future to very rigid control if not absolute ownership of the major utilities.
CHAPTER II

MANAGEMENT AND ITS FOUNDATIONS

The previous chapter has developed the setting from which management as a factor in production emerged. With continued growth in industrial enterprise, the star of management will continue to wax larger and larger. Even if our present individualistic, capitalistic regime is replaced by corporate government ownership or control, the complexity of production will not be simplified, but will continue to increase, and the need for even better trained managers will still obtain.

Management proper as it first emerged as a separate entity was the function in enterprise concerned with the execution of policy, within the limits set by administration, and the employment of the organization for the particular object set before it. Practically speaking, however, management in a general sense includes not only administration, but also organization. The term organization means, according to Sheldon:

The process of so combining the work which individuals or groups have to perform with the faculties necessary for its execution that the duties, so formed, provide the best channel for the efficient, systematic, positive, and coordinated application of the available effort.¹

Organization is therefore the creation of a machine

¹Sheldon, Oliver. The Philosophy of Management, Sir Isaac Pitman and Sons, London and New York, 1930, p. 32.
from both material and human effort, for the purpose of carrying out the policy of administration. This is rapidly becoming one of the functions of management. We may say that the field of management is ever broadening. It is absorbing the financial function, which once belonged to the capitalist; and it is gaining ascendancy over the organization for general control in industry. The figure on the next page will perhaps more clearly portray the field of management.

The Purpose of Management

Wherever persons are grouped together for a purpose, leadership is necessary to determine policy, to establish spheres of authority, and to organize and control effort. Scientific management has not been autocratically superimposed on enterprise, but has naturally grown out of the situation as a necessary adjunct for more efficient handling of the materials of production and the human elements involved. If materials are handled properly in the matter of their physical states and their spatial relations to each other, production is not only increased in quantity but in quality as well. This is evidenced by the long production lines in the automobile factories where each does the part for which he is particularly fitted. If labor is placed where it can do the work for which it is most fitted, this will not only increase production but human happiness as well. Such recombining of materials and human effort is an
Figure 1. The Functions of Management*

<table>
<thead>
<tr>
<th>PREPARATION:</th>
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<tr>
<td></td>
<td>Equipment</td>
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<tr>
<td>ADMINISTRATION AND ORGANIZATION</td>
<td>PRODUCTION:</td>
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<td>Transport</td>
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<td>FINANCE</td>
<td>FACILITATION:</td>
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<tr>
<td>Capital requirements, financial accounts and audit, cash, ratings, taxation and insurance.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DISTRIBUTION:</td>
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efficiency step and is the function of management.

However, any doing-away-with waste is a step forward in efficiency. The word "waste" is an inclusive term and is intended to mean not only inefficient use of raw materials and materials in process, but also of time, equipment, and human energy. Waste is one of the besetting sins of the present generation and unless it can be eliminated to a greater and still greater degree, our standard of living will not advance as it should. Ultimately, with the increased press of population, this will be reflected in the plane of our civilization. Especially is this true if the waste of human energy continues. If human effort is exerted in a type of work for which it is not suited, production will not be up to what it should be. As a consequence the remuneration to the worker is not sufficient to furnish a standard of living that is in keeping with his ability if properly directed. Such a condition results in a decrease in human happiness and a change in the social views and aims of the worker.

It has been found, on investigation, that a continued drain from the stream of human energy definitely lowers the moral tone. This is one of the things that management must prevent as it is a very vital element in the maintenance and growth of any civilization. The truth of the above statement has been strikingly exemplified in the writer's home community where the coal mining industry is in anything but a healthy condition. This state has existed for more than
five years, and with it has come a very noticeable lowering of the plane of general conversation, of moral tone, and of the type of entertainment that is enjoyed, and the social activities in which the people participate.

Management, an Art and a Science

Inasmuch as management has to do not only with material things but also with human effort, only in part can it be said that management is a true science. Sheldon says:

It is rather the Art which employs that science. The science is an essential preliminary to the practice of the Art.¹

We know that science is yet in its swaddling clothes, but added increments will continue to attach themselves to it. Instead of simplifying things, the additions increase its complexity and the art will continue to be a more and more difficult activity to perform.

Professionalization of Management

The increased complexity of enterprise as suggested in the previous paragraph requires of management a far greater technical knowledge and a fuller measure of human understanding than was required in earlier days. Effort must be made to develop finer techniques in research and scientific method, and these in turn used to fix temporarily at least higher

standards in production. Plans must be made for a better understanding of the human element in enterprise. Latent possibilities must not be left dormant. It is sheer waste of human energy to allow, as Gray styles them, "Mute inglorious Miltons, ... or village Hamdens" to slumber in enterprise. Leaders may be born, but there is inborn in none the technical skills and psychological understandings necessary for the present day manager. He must acquire these either through apprenticeship, which is a rather difficult task, or through study and professional training.

That there is a social and economic necessity for training of prospective managers is evidenced by the following present-day manifestations:

1. Courses in colleges and universities that cover the underlying or basic principles of scientific management in general.

2. Professional organizations with their research and bulletin service.

3. High grade professional magazines.

4. Constant raising of the standards of professional qualifications for managerial positions.

The Foundations of Management

In any undertaking or in any function, whether of industrial enterprise or of governmental agency, if the roots for its growth do not run deeply into the social structure
and into man's physical nature, not for long can that undertaking or function sustain itself against the adverse condition - public disapproval, which is soon to show itself. If such institutions as religion or the family did not entangle its roots through the social structure, their existence could not be justified and long since, they would have passed from the social heritage. This rule holds true for management. Are its foundations on the bedrock of civilization sufficient to justify its retention? Some investigation is warranted.

(a) Biological Foundations. What men do, what men think, and how they act are partly determined by biological inheritance. What the germ plasm brings to man determines his capacity for learning to think, for tenacity of purpose, and for latent ability to concentrate, compare, and judge.

A transmitted quality that is distinctive from that of other animals is the power to learn, which rises above instinct, and continues through the entire life span. The part of scientific management is to see that this learning goes on purposively.

That all men are created equal is wide of the mark, all will agree. Some are born with one talent, some with two, and some with ten; and it does not follow that the one with two talents has the same talent as the person with the one. Some have talent for leadership while others have only talent for the simplest kind of routine. Certainly the born leader should not be lashed to a purely mechanical position, where
his talents would be wasted not only for himself but for the
group as well. Percherons are not entered in races; neither
are Kentucky thorobreds hitched to binders. Shall management
handle labor less efficiently than our livestocks are
handled? At every turn there is possibility for conserving
latent human energy, and management is not living up to its
responsibility unless it makes a serious effort to adjust
the individual to the sphere of action for which he is bi-
ologically fitted. Dr. Overstreet says in one of his public
lectures:

A human being has no excuse for existing un-
less he puts a really productive contribution
into the world.¹

If such is the case, enterprise has no excuse for bind-
ing an individual to a station that will not permit his con-
tribution to be the greatest that his talents will permit.

(b) Sociological Foundations. The social inheritance
is a portion of the environment into which all are ushered
at birth and to which each reacts on a basis of a combina-
tion of his biological and social inheritances. Stated an-
other way, each individual reacts to his environment differ-
ently from any other, because that which is inherent in him
does not take the stamp of social surroundings the same as
another of different quality and texture. This is signifi-
cant, even though it does complicate the situation. But

¹Metcalf, Henry C. Scientific Foundations of Business Admin-
istration, Williams and Wilkins Company, Baltimore, 1926,
p. 261.
there are certain universal factors which are fairly uniform in their influence upon the individuals. The major of these are language, religion, politics, industry, education, and mental attitudes of others. We are largely moulded to the patterns that surround us. There are few bolsheviks in the group. For example, if those about us are unselfish, honest, cooperative, so will we tend to be; if on the contrary, they are selfish, dishonest, and non-cooperative, we too will adjust ourselves to the surroundings. That we can control to a certain degree our biological inheritance is a feature concerning which scientific management is little interested. But that it is possible to control our social environment is of vast importance. By the use of this truism it is possible for the manager to so organize the enterprise that desirable attitudes will be inculcated. Only by such procedure can full cooperation be had between employer and employee, in efficiently performing the needed operations.

Another social factor affecting enterprise is the relation that the finished product has to society, and the attitude of that society to the product. There is no hope for any enterprise, whether public or private, to succeed unless the outturned product satisfies the natural and acquired wants of the people. Witness the enforcement of the prohibition laws, or the decrease in the sale of bicycles. The educational factor enters for it matters not how valuable the product may be, the mass minds must be moulded to
recognize it.

(c) **Psychological Foundations.** Due to the close ties or interrelationships between the biological, sociological, and psychological, a sharp line of demarcation cannot be made. However, this line need not be established for practical purposes. Some claim that psychology has not been nor cannot be a true science in that it cannot be measured mathematically. It is true that it deals in such abstract terms as interests, urges, motives, morale, love, hate, etc., and these cannot be measured numerically. But we do claim that they can be measured comparatively. It can be demonstrated in the laboratory by precise scientific method whether an employee reacts favorably or unfavorably to a given fixed condition; whether an interest is created or not. Whether or not certain reactions are desirable for efficiency in materials and in human effort can also be discovered. This is scientific method, and these knowledges are necessary. For example, study the effort of the American government to maintain public morale as well as morale of the army. It was unnecessary to know the exact numerical degree; but what was needed to be known was, whether it was low, fair or high. Again note the banker's attempt to establish confidence to avoid financial crises; or note the growth in the field of psychiatry. The agitator understands the principles of psychology and uses them in inciting the mob. These illustrations furnish sufficient evidence of the use that may be made of psychologic
principles. Especially might management utilize these principles in harmonizing human situations within industry, or other enterprise.

Management must understand the inner urges of man in order to make place for their utility. Some of the greatest forces in the social order are psychological ones. Among such are the following:

1. The desire for creative, self-expression.
2. The desire for self-preservation.
3. The desire for group experience.
4. The desire for adventure into new fields.
5. The desire for social approval.

Some of the problems that have psychological implications will be given further consideration under personnel service.

(d) Economic Foundations. The economic factor is considered more as an attendant element, the purpose of which is to create an environment that is in keeping with the mental states of the individual. It has to do with conservation of peace and happiness of mind, as well as with the prevention of waste of human energy.

The economic status of a people, to a great extent, determine their social life, their philosophy of enterprise, their attitude toward their work and toward the other factors of production. Their economic status physically encloses them within a certain sphere of activity as effectively as
the steel enclosure of a cell block encloses the prisoners. Security of the things and stations in life that satisfy natural and acquired wants, while being primarily a psychologic factor, nevertheless hinges on the economic factor. If the productive process can be controlled and directed in such a way that the worker may be helped financially and socially, it will tend to increase his efficiency and to aid in his integration in the situation in which he finds himself. Unless a worker is satisfied in his work, interest wanes or at least does not grow, with the resultant waste of time of both equipment and human effort. The laborer will not be satisfied unless conditions are created where he has full opportunity to develop and use his full capacity while at the same time maintaining his interest. This can only be done in a situation that allows him to earn a wage sufficient to maintain for him and his family a standard of living in keeping with his station in life.

(e) Underlying Philosophy. Scientific management had a very modest beginning in certain divisions of the production department in industry. It has now expended its sphere of action to include finance, organization and control, administration, production and distribution of enterprise. A broad field is to be covered; and policies must be initiated. Hence, one of its first duties is to discover what the enterprise is all about. The importance of purpose is brought to our attention by the following questions and the answers
therefore: Where is the center of gravity of the enterprise? What is the purpose, the aim? Evidently the center of gravity is the out-turned or finished product. For the auto manufacturer, it is the best car in a given class for the money; for the artist, the finest possible painting (but not for the money); for the school, it is the child moulded into a good citizen. These statements are true for industry regardless of whether or not the ultimate aim is centered on profits for the capitalist or on the greatest prosperity for both the worker and the capitalist. Enterprise must produce what is in keeping with the wishes of society; else its products will not move in the marts of trade.

During the last century the philosophy of life has centered on the individual. This accounts in large measure for industry's ultimate aim being "profits for the capitalist." However, our philosophy is in the mould. More and more is group welfare coming to replace the old regime. Production by enterprise must not be out of harmony with the present philosophy. It may be agreed that the philosophy of enterprise may not be a true philosophy, but it must not be a false philosophy. It must be one that will, at least not lead astray. Society is concerned with what its membership does and will not support either financially or morally production that runs counterwise to its beliefs and wishes.

Enterprise must, for the present, and at least for some time in the future, regard one of its chief aims as "the
greatest prosperity" not only for the capitalist and the workmen, but also for the general public as well. All three of these interested parties must be taken into consideration in order to determine precisely just what the finished product of enterprise is to be, as to size, shape, type, quality, etc.; whether of a Rolls-Royce, a wonder top, a doctor, or a gold-headed cane. The philosophy in enterprise must determine the design of all production. This will be discussed under techniques.

Summary

It has been brought out that production by enterprise must be deeply grounded in the social order and in man's physical make-up if it is to survive the march of time; that the social inheritance together with the psychological elements of man help to determine what he needs and what are his desires. The welfare of society under the present regime is so closely allied to the economic status that almost all of our acts and institutions are circumscribed by financial conditions. It has also been pointed out that underlying philosophies are large factors in controlling our enterprises of various kinds. We might point out here that the philosophies are really phases of the social order, and might well have been placed under the sociological foundations.
CHAPTER III

SCIENTIFIC MANAGEMENT IN INDUSTRY: ITS FUNDAMENTAL PRINCIPLES AND TECHNIQUES

Scientific Management Defined

Whether scientific management is something new or is merely a new name for old principles and mechanisms of organization and management is unimportant. Both its principles and its mechanism should be understood before further development of it is made either in industry or in education.

Scientific management is said to represent the third stage in the development of organization. The first stage was represented by the non-systematized business. A few survivals are still to be found among the smaller industrial plants today. Management grew up with the plant. Few improvements were introduced. Methods were almost entirely traditional. Profits were large, hence there was little inducement for improvements.

The second stage of organization is that of systematized business. Quoting from Person, this stage:

is represented by the systematized business, characteristic of the last two decades. During the period following the civil war, improvements in transportation destroyed isolated markets, brought more intense competition and reduced the margin between raw material cost and selling price. This compelled managers who might otherwise have remained bound by tradition, to seek by improved methods and organization a reduction of the costs of manufacturing processes. Chemistry was called in for by-products. Business became larger, printed and written instructions came to replace
personal oversight, and instruction by the manager, and systems were devised to effect the smooth working of routine. Cost accounting, the sextant and compass of the business man, was more highly developed and more generally adopted, and this required the systematization of processes. Systematic management is not Scientific Management, because in the former tradition remains dominant. Improved methods are acquired by experiment it is true, but not by the precise laboratory method of observation and measurement of a large number of units. New methods become known by imitation rather than by teaching; and the reduction of a cost once accomplished, it is common to accept the result as final rather than a step only towards greater improvement.¹

It is said that scientific management is the third stage in the development of organization and management. In this stage, reliance is not placed on tradition or theory, but on principles that have been evolving for years, and the application of these principles. Results show greater productivity, greater profits, higher wages and reduced prices to the consumer.

The Four Fundamental Principles of Scientific Management

According to Frederick W. Taylor, the founder of scientific management, there are four general underlying principles of this new stage in management. He says that these should be thoroughly understood, and that they should not be confused with the attendant mechanisms which some take to be the substance of scientific management.

First: The method of scientific management is the method of a true science. The organization engineer

¹Person, Harlow S. Scientific Management, First Conference at The Amos Tuck School, Dartmouth College, 1912, pp. 4-5.
"objectifies" a plant to be organized; he enters as an outsider bound by no traditions and prejudices of its management, holds it up for inspection, studies it as a whole and by parts, compares it with other plants with which he is familiar, and observes the defects therein that the inside manager does not see. In this process the truly scientific method of analysis into units and experimental recombinations of them is followed; not superficially, but exhaustively until enough data is collected from which trustworthy laws may be derived. This observation is not confined solely to machines and material; it is applied also to men; and, for illustration, laws of fatigue and recovery from fatigue are discovered because these have a decided effect on the efficiency of the worker. In accordance with laws thus derived, standards of productivity are established and the methods of their attainment set forth in rules. In this observation and experimentation and in the derivation of laws there is no assumption of finality. Reduction of cost is not the end. The scientific manager assumes always a probability of further important discoveries of new laws, so observation and experimentation do not cease.

The second general principle of scientific management is that there should be, and as a result of the laws derived by observation and experimentation, may be, a scientific selection of machines, material, and workmen. For instance a laborer may be, due to either his physical or mental
state, entirely unfitted to perform a given function in one
department, but there may be in another department a work
for which he is particularly fitted and in which he can be
happy in his work and at the same time develop his inherent
capacities.

The third principle of this new management is: that
when once a workman is discovered and assigned to the per-
formance of the function to which he is adapted, the manage-
ment should provide continuous instruction for him. From
this point of view the factory should become a school; the
workman should be instructed how to use the most efficient
method with the greatest skill.

The fourth principle is that of intimate cooperation
between management and men, and a redistribution of respon-
sibilities. For instance, under the older form of manage-
ment, the men had the responsibility of not only getting
their materials but also of selecting them and determining
the method of performance. The workability of the new man-
agement, says Mr. Taylor, depends upon such sympathetic
cooperation. There must be a mutual recognition of the
possibility of mutual helpfulness. This recognized, there
must be a readjustment of duties, for under many older sys-
tems of management there is required of a workman such di-
versified tasks as to make impossible his highest efficiency.
The manager, under the present system, requires of the work-
man simply the accomplishment of a certain result. To the
workman is left, as stated above, the determination of the method as well as the actual performance. Under scientific management the experts in the planning room determine the method and leave to the workman freedom to apply all his energy to actual performance.

These four general principles constitute, according to Mr. Taylor, the philosophy of scientific management. The devices employed to give effect to these principles constitute the mechanism. The philosophy and any particular mechanism are not to be considered equally important. In Mr. Taylor's own words, "Scientific management fundamentally consists of...a certain philosophy which can be applied in many ways, and a description of what any man or men may believe to be the best mechanism for applying these general principles and should in no way be confused with the principles themselves."¹ But certain parts of the mechanism now advocated by the organizing engineers are of great importance because they seem to be necessary to the application of the principles and because one of them in particular is opposed by many employees. In their judgment, indirect results are produced which are harmful to their productive group.

**Aims and Purposes of Scientific Management**

Scientific management aims to produce at least five

¹Person, Harlow S. *Scientific Management*, First Conference at The Amos Tuck School, Dartmouth College, 1912, p. 7.
results, all of which must be obtained before such management can be said to be established. To obtain these results, specific devices must be employed. Quoting from Person:

First, industrial processes must be reduced to units before scientific observation and experiment are possible. The most important device for this purpose, the time-study, aims to reduce the operations of workmen to fundamental motions and to ascertain, for example, the shortest, longest and average time required for each motion. From experiment with these data a standard time for the performance of each operation is derived.

Second, this standard time in which a given operation is to be performed having been ascertained, it must be set before the workman as something to strive for. To accomplish this the device of the task, sometimes called standard time, is used. With each order which goes into the shop, is advice concerning the average time which should be required to produce each unit of product and which represents the standard of efficiency.

Third, the workman must be instructed in how to achieve this standard. He must have at hand a sympathetic, expert director who is teacher rather than boss. The device of functional foremanship is intended to effect this. The functional foreman teaches all the workmen who have to perform a given function, e.g., set a tool in a lathe, exactly how to perform that and no other function. He is an expert workman become teacher. The foremanship of scientific management, therefore, requires in a given plant as many foremen as there are functions to be performed there. The foreman of the usual organization, on the other hand, is the boss of all the men in a given room with respect to all functions performed there. He may be expert in one or more of the functions, but seldom in all, and too frequently considers himself driver rather than teacher. This foremanship requires in a given plant as many bosses as there are departments.

Fourth, scientific management aims to relieve the workmen of responsibility for determining how a process is to be performed, especially if the
method is one which may be exactly, i.e., scientifically, determined, and to leave him free for the development of manual dexterity. This is accomplished by the planning and routing room, a managerial department which works out and sends with each production order precise specifications for the operation. If it be an assembling job, for instance, the parts to be assembled, their relative positions around the workman at the beginning of the job, the order in which they should be brought together, etc., are specified. The workman does not need to plan; he proceeds at once to performance.

Fifth, the workman must be inspired to accept the new methods; to strive to acquire dexterity in carrying out specifications sent him. Workmen, like managers, and like other large bodies of men, have fixed habits from which it is difficult to turn. How inspire the workman to make the change? The result is accomplished by a differential wage system, a device which gives him at once, in a way perfectly obvious, a share of the increased productivity, instead of compelling him to wait for the slower, less obvious, redistribution of shares which would work out under the usual system of payment by the hour or day. These differential wages systems vary, although they are in principle the same, primarily according to the proportion of the increased productivity apportioned to the workman. One system gives the workman, say 30 per cent, of increased returns; another gives him practically all.²

(a) Criticisms of Scientific Management. Mr. Taylor, Mr. Thompson, and other scientific engineers have discussed in their lectures and papers the various criticisms of scientific management that have been made by organized and unorganized labor. Mr. Harlow S. Person has collected these indictments and has set them forth in his Scientific Management and attempted to answer them. He says that there are

²Person, Harlow S. Scientific Management, First Conference at The Amos Tuck School, Dartmouth College, 1912, pp. 8-9.
nine principal criticisms:

First, the taking of time-studies and the determination of the setting of a task are a reflection upon the good faith of labor. It sets up the relationship of master and slave. This criticism is undoubtedly prompted by a sensitiveness which is aroused by too much emphasis, in exposition of scientific management, upon the treatment of labor. Most expositions have been for the benefit of management, and have emphasized the handling of labor. In the application of scientific management, however, the managerial force is studied just as keenly and reorganized just as thoroughly as is the labor force. Each person concerned with the executive operation has a task and is held strictly accountable for its performance. In plants in which scientific management has been applied, and in such plants only, is labor enabled to judge of the efficiency of the executive force and to hold it up to established standards of efficiency. Scientific management recognizes no difference, in determining standards of efficiency, between management, capital goods and labor.

Second, the removal from the workman of individual responsibility for determining the method of an operation thus leaving to his attention the skills of the performance only, makes his work uninteresting and monotonous and is bound to stunt him intellectually. My own observations and the observations of others in plants where scientific management has been applied do not support this criticism. The first error in the criticism is the assumption that taking from the workman the necessity of going after and selecting the proper kinds of material, tools, etc., - and that is one of the principal responsibilities of which the redistribution of duties deprives him - takes from him something intellectually stimulating. Another error is the assumption that performing an operation according to the best method is intellectually less stimulating than performing it according to an inefficient method. A third error is the assumption that a method handed down by tradition is intellectually more stimulating than a method derived by experiment.
Third, the effect of scientific management is to "speed up" the workman, wear him out and cause him to be cast aside. Again, actual investigation in plants so organized does not support this criticism. Its error is the assumption that the increased productivity comes from a greater expenditure of muscular and nervous energy in a working day. The increased productivity comes, however, from other things; from saving in overhead charges, from the using of material in a predetermined correct way, from the using of machinery in a predetermined most efficient way, from the elimination of the time a workman wastes in going after material and tools, from the elimination of the misapplication of muscular and nervous energy in unnecessary motions, and from compulsory periods of rest, even, which the workman will ordinarily not take for himself. The beginner at golf expends more energy in a round of nine holes than the experienced player in a round of eighteen; the skilful carpenter expends far less energy in planing a board than does the novice. Scientific management strives to teach the workman skill, and to prevent over-exertion as much as to prevent loafing. One of the most impressive things to the visitor at a plant so organized is the absence, on the one hand of loitering, and on the other hand, of haste.

Fourth, scientific management is inapplicable because of the mobility of labor; to teach the laborer the best method requires that he be retained for a period, but as a rule labor is continually coming into and going out of a plant, and before a laborer becomes skilful he is off and a new awkward man has been hired to take his place. This criticism over-emphasizes the mobility of labor; it promises a mobility which the average manager does not experience. I once asked the manager of a plant organized according to the principles of scientific management what was the average time a workman remained with him. Eight years, he replied. He stated further that the average time was increasing under the new conditions of organization. Scientific management carries with it its own correction of the loss which comes from too great a mobility of labor. The fact that a workman is permitted to work under conditions which render him more productive and that he is paid according to his ability keeps him in the plant.
Fifth, it inaugurates a spying system among the laborers which results in mutual distrust, quarrels and absence of esprit. I do not know what is meant by spying system, unless it refers to the supposed fact that, in a sequence of processes, if one workman fails to keep up to standard, it will cause loss to another workman who to protect himself will have to complain of the first workman. This criticism is due to assumptions concerning scientific management which are not true. No workman has to complain of another; if a workman is derelict the fact is reported automatically to the management by the impersonal time slip, and it is the duty of management to relieve the situation before any other workman can become aware of it. The relationship is not between workman and workman, but between workman and the order-of-work clerk. The persons of whom the workman may have occasion to complain are those in the routing, or executive department. And as a matter of fact, finally, I have not observed, and no one has reported that he has observed, in a plant in which scientific management has become well established, any lack of harmony in the labor force; on the contrary, it is the consensus of opinion that a fine spirit of cooperation is conspicuous in such plants.

Sixth, workmen have had bitter experience with the piece-rate system. They have been "speeded up" by increases in piece-rates only to have the rates cut. May not the differential wage system of scientific management be used against the workman in a similar way? This is a reasonable question. Such a manipulation of the differential wage system seems to the writer to be possible, but I doubt whether it is probable. In the first place, the experience of manufacturers who have reduced piece-rates has been as bitter as the experience of the laborer. They are coming to consider the rate-cutting of the past as one of the great blunders of management. It will take exceedingly strong temptation to induce them to try it again. In the second place, piece-rates in the past have been established without a sufficient knowledge of the conditions of production. They gave to the workman all the increase of production except that resulting from reduction in overhead costs. The invention of new and improved machines brought practically nothing to management,
and placed it at a disastrous disadvantage in
competition with firms paying day-wages, to which
came all the advantages of the introduction of
more efficient machines. Rate-cutting was com-
pelled by the circumstances of competition. Under
scientific management, on the other hand, rates
are determined only after exhaustive investiga-
tions of the productivity of a laborer in combina-
tion with a given machine, and a separate rate
is established for every such combination. If a
new and more efficient machine is introduced, a
new rate is established as the result of a new
investigation. So long as plants organized under
scientific management enjoy the resulting differen-
tial advantage in competition with plants pay-
ing day-wages, there will be little danger of
rate-cutting, for in proportion as the earnings
of workmen increase does the unit cost of the
product decrease. If the time should come, as
it is reasonable to expect it will come, when all
plants in a competitive industry should be or-
ganized according to the principles of scientific
management, so that the differential advantage
would no longer exist, there might be temptation
to rate-cutting. But under those conditions the
temptation would be no greater than to cut under
the day-wage system. And if unions still existed
labor would be in as good a position to protect
itself in the one case as in the other.

Seventh, the increase of efficiency which
results from scientific management will throw
labor out of employment. The untenable assertion
that such would be its ultimate effect is not de-
serving of serious consideration. But that
there may be temporarily such a result in a given
industry is possible, if increased demand result-
ing from decreased selling price should not pari
passu accompany increased efficiency in produc-
tion. It is good economics to assume that in the
long run improved methods will make employment
for a larger number of persons; but it is also
good sense for the laborer to take into considera-
tion the possible immediate consequences of lack
of employment for a season. The saving factor in
the situation is that scientific management can-
not be applied in a day. To apply it to a given
plant is a matter of years. The organizing en-
gineers capable of applying it with such results
in increased productive efficiency as have been
of late brought to our attention are few. If
there is an impending revolution in industry comparable to the revolution at the beginning of the nineteenth century, it will be quite different in at least one respect; systems of scientific management will not be turned out as was cotton and power machinery, in great quantities at a relatively low cost and standardized to fit any and all plants. Each plant presents a distinct problem to the organizing engineer, a problem of several years duration. Therefore, there can never be unemployment of a large body of men on account of sudden wide-spread more efficient organization. The firms which introduce scientific management usually enjoy such a differential advantage that they are able to make prices which enable them to increase their plants so as to take care of the small amount of what would otherwise be surplus labor.

Eighth, it is asserted that labor is not allowed to help fix the rate of compensation. Labor has as yet expressed no desire to do so. In all cases of reorganization rates have been fixed so that labor has been able to earn more than it has demanded. If the time should come, as it surely will come, when labor asks to be allowed a voice in establishing differential rates under scientific management, there is nothing in the nature of that form of organization to make it impossible. On the contrary, it is probable that such cooperation between management and labor would work out more smoothly than under present conditions. The methods of determining what the combination of a machine and a man can do is so scientifically accurate that facts could be easily ascertained, and both labor and manager are reasonable when they know the facts. Whether labor would enjoy the opportunity of helping fix rates would depend on the solidarity of the group in making its demands.

Ninth, it is asserted that scientific management would impair the solidarity of labor; that it would break down unionism by substituting individual bargaining in the place of collective bargaining for which unionism is now struggling. Scientific management aims to do away with equal payment to all laborers irrespective of their productivity, but it does not aim to do away with collective bargaining. It is possible under scientific management for a union through its selected representatives to take a part in
determining what is the best method of performing an operation, what would be a reasonable task, and what would be a reasonable division of the increased returns. These things once determined, it would have to permit its individual members to be paid according to their individual contributions to the increased returns. Scientific management would impair the solidarity of unionism to the extent that that solidarity is dependent upon flat hour rates for all men; it would not impair the solidarity to the extent of making collective bargaining impossible.

I have not enumerated as a criticism of scientific management the assertion that a great number of inefficient "fake" organizing engineers is likely to arise to exploit the new profession and to work havoc with those plants whose managers they induce to accept their services. It is a real danger, but it is not a legitimate criticism of scientific management. Managers should realize that ability to organize successfully a business depends upon a combination of qualities not found together in many men, - largeness of vision, capacity to analyze and to combine, and scientific knowledge of technical processes.¹

We have now set forth in a rather compact manner the fundamental principles of scientific management, what it aims to achieve, and criticisms that have been made against this scheme of operation in industry. There still remains another phase of scientific management that should be portrayed before we proceed in its application to education. Reference is made to the instrumentalities or mechanisms that are usually used to carry out the fundamental principles and aims referred to above. In thinking of scientific management so many people are confused and fail to make the

¹Person, Harlow S. Scientific Management, First Conference at The Amos Tuck School, Dartmouth College, 1912, pp. 10-16.
distinction between the vehicle which carries scientific management, and scientific management itself. This caused Dr. Taylor to issue a definite warning that the mechanics must not be confused with the substance; that the methods most used are only some of the agencies which might be used to carry scientific management. He further points out that scientific management is a philosophy and not a plan.

The Mechanism and Set-up of Scientific Management in Industry

In carrying out this philosophy in management, Dr. Taylor conceived the idea of dividing the entire operation of the plant into units or functions. All of the work of a functional unit is similar, or so similar that a worker can become very proficient in the work he is to do. In charge of each unit is placed a man that is not only highly skilled in that particular field, but is one who is a teacher as well. He is known as a Functional Foreman. On the next page will be found a chart which is a typical set-up of organization of a company for scientific management. If the company is large and has a well distributed trade, the sales department would show further division, as would the financial department. There would perhaps be added a purchasing department with its various sub-heads, and most certainly a personnel department. But for our purpose we wish to portray the production end since it is less understood. This chart shows the important part played by the functional
Figure 2. Typical Set-up of an Organization

<table>
<thead>
<tr>
<th>PRESIDENT or GEN. MGR.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>SALES DEPT.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>PLANNING DEPARTMENT</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>FINANCIAL DEPT.</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>DISCIPLINARIAN FOREMAN</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Routing Foreman</td>
</tr>
<tr>
<td>Methods Foreman</td>
</tr>
<tr>
<td>Costs Foreman</td>
</tr>
</tbody>
</table>

Figure 3. Typical Set-up of an Organization

1. Routing Foreman
   (a) Tag Clerk, (b) Order of Work Clerk
   (c) Recording Clerk (d) Window Clerk: through whom orders are transmitted to the shop.

2. Methods Foreman
   (a) Time Study Manager
   (b) Instruction Card Manager

3. Costs Foreman

4. Disciplinarian Foreman
   (a) Over Planning Dept. and Execution Dept.

5. Gang Boss Foreman

II. EXECUTION DEPT.

6. Instruction Foreman

7. Inspection Foreman

8. Maintenance Foreman (Repair Boss)
foreman. Functional foremanship means nothing more nor less than specialized foremanship. In the Taylor system, functional foremen do not constitute a "staff" separate from the "line." On the contrary, the Taylor system foremen are themselves in the line. They do more than advise; they direct. Of course the separation of planning from execution soon develops groups of highly specialized experts and those in the planning department may in a sense be advisors, but the difference between them and the "staff" is that even the planning department foremen have complete authority within their respective functions.

The old type of foreman had so many things to see after that he could not be a specialist in everything, so he left the workmen to do the work in their own way. Neither could a production manager be a fit inspection foreman because of the very nature of the work. Nor could the reflective man that is needed for inventing new methods be utilized in the other departments. Too many qualities were required of the old type manager, such as brains, ingenuity, technical knowledge, manual dexterity, strength, tact, energy, grit, honesty, judgment, and good health. The results were, much superficiality, skimping, and frequent misfits. Specialization begins by separation of planning from execution of the work.

It might be well at this point to consider further the actual duties of the various foremen in order that a full
realization of the meaning of the term "functional foreman" may be developed. We will take them in the order given on Figure 3 on page 55.

**Routing Clerk or Foreman.** It is the duty of the routing clerk, or expert, to determine the best sequence of operation to be followed in the manufacture of the product. On the basis of the drawing and bills of materials, he prescribes the order in which assemblies and sub-assemblies shall be assigned. He also decides the operations to be performed on each piece and the machines or work places at which they shall be done. In other words, he routes the work through the shop. But remember, he plans this only; he does not execute it. His routing plans may lie in the desk for a year before they are put through by the production manager with the aid of the shop experts and the workmen. The route clerk has the responsibility for technical knowledge and good judgment, but not for executive work.

**Methods Foreman.** Opportunity for the improvement of methods is almost unlimited. Methods foremen are called "instruction-card and time-study men." The by-product of the time study is better methods. It accelerates the process of standardization. It takes a keen, analytical mind, trustworthy observation, and some inventive talent to qualify as a methods foreman. His results bear on the making of instruction cards which convey the methods and the time to the workman. Therefore, the instruction card man should be
a practical operator.

The Gang Boss Foreman. In the shop one foreman looks out for keeping the product moving; for producing goods and for meeting deliveries. This requires that someone on the part of the management shall see that the men are working steadily and at the proper rate, and that the product is moving through. This is the function of the foreman known as the gang boss, who has everything to do with the production in a special sense, and nothing to do with inspection, instruction, or maintenance.

Instruction Foreman. The duties of the instruction foreman are given so clearly by C. B. Thompson in his The Taylor System of Scientific Management, that we quote as follows:

Instruction, however, is one of the most essential factors in the proper management of a plant. We take the workmen as we get them, but we fail seriously in the performance of our duty to ourselves as well as to the men, if we do not make the most of them once they are with us. This is particularly true in the Taylor system, in which methods of work are determined by thorough and often costly research and experimenting. Not to utilize this to the utmost would be a highly expensive neglect. The workman can be enabled to utilize these results only as they are transmitted to him by careful instruction at the hands of those who have worked them out or have themselves been trained for the purpose. It takes a particular type of man to be a good teacher. He is sometimes called a "speed boss." However, he is not a hurry-up man but a man that knows the exact speeds and feeds for the performance of a given operation.¹

¹Thompson, C. B. The Taylor System of Scientific Management, A. W. Shaw Company, New York, 1917,
On the instruction foreman largely rests the task of educating the workman to a point where old traditional methods are inhibited and the new are accepted. By this process only can production be kept at the proper "time" and the quality of the product be maintained at "standard."

The Inspection Foreman. The duties of the inspector who is a functional foreman in the Taylor system, are the same as those of the inspector in current practice. He has supreme authority over the quality of the work that is being done. He is not responsible for the speed nor production, nor for training the operator, but he has complete authority to stop any production which is not up to the standard, whether this be due to defective machines and tools, or to an unskilled workman, or to undue haste.

The Maintenance Foreman. This is a functional foreman that is sometimes called the Repair Boss. His duties under scientific management do not differ much from those of the repair boss of the customary plant. He has for his job the maintenance of all machines, tools, belting, shafts, and so on. It is his business to see that the necessary repairs are made as quickly as possible; and what is rather more important, to see that the repairs or replacements are made before the machine or the tool breaks down. Breakdowns are costly, so the properly trained repair man practices prevention rather than cure. To do this, he must be an expert at diagnosing the many machine troubles.
Functional foremanship is one of the details of scientific management which are comparatively easy to explain but exceedingly difficult to put into practice; for it touches intimately and vitally the human element, and it touches it in what is so often its tenderest spot, - its pride. Attempting to break down the habits, customs and traditions and building new ones in their stead requires a great deal of tact, patience, and a large sum of the essence of human understanding. The wage scale is one of the entering wedges that is most frequently used. Also, here, as elsewhere, knowledge and experience are the great solvents. No further discussion of wages will be given here, but it will be touched on as an incentive in education.
Techniques of Scientific Management

The operation of modern industry became so complex, and competition so keen that survival depended on more efficient methods of production. Dr. Frederick W. Taylor, founder of scientific management, encountered this problem while employed by the Midvale Steel Company during the 1880's. It was there that he wrought out some techniques for more efficient production. This was the birth of scientific management. From this modest beginning it has grown to be a major factor in enterprise, with ever broadening powers and duties.

The reader must note that the following instrumentalities are techniques in production and are not to be confused with principles of scientific management. These techniques are set forth here in order to clarify in the reader's mind the meaning of scientific method and its possible utility to scientific management.

(a) Design. The design of any product of enterprise must be determined with the wishes and welfare of the three groups mentioned before kept plainly in view. These groups are: the capitalist, the worker, and the general public. For, as we said before, the prosperity of the capitalist and the laborer is largely determined by the attitude of the general public toward the product. If the public ceases to think that buggies are the proper means of conveyance, no matter how fine is the buggy that enterprise makes, the undertaking cannot survive. This is as true in the design
of subjective entities. To illustrate, an educational system that would turn out an excellent Hottentot citizen could not survive on that type of product in America. We require that our physicians have certain specifications. None other will suffice. We turn thumbs down on any specifications for chiropractors, and most people do on the principles of psychiatry. Management must ever keep in mind the interrelation of the three interested groups in production.

(b) The Task. In describing the "task," Gilbreth says:

The quantity of work of prescribed quality to be done in a given time, or the time required to do a certain quantity of output in a certain way as prophesied by scientific time-study, is called the "task."¹

The importance of the "task" should not be underestimated. Regarding it, Taylor says:

The most prominent single element in modern scientific management is the task idea.²

Again:

Scientific management consists very largely in preparing for carrying out these tasks.³

In order that the reader may understand the "task" one might describe how the same is determined. The finished product is analyzed into the several major operations


³Ibid.
required to complete the product. Each major operation is then sub-divided into minor operations, down to the simplest process. Experimentation is then begun by the scientific manager to determine best methods, best motions for worker to use, and best materials to be used. Through this experimentation the best methods and best materials are finally determined and the average time that should be required of the worker to finish that particular portion of the finished product up to a given standard of excellency. These minor units are then synthetically put together into larger divisions of the finished product to form the "task." Only such operations are unified as can be done by one individual worker. If another individual is to take the unit and further assemble it with other units, that is another "task" and standard motions, methods, materials needed and time are set for that particular task.

These techniques open a broad field as will be seen from the following problems that immediately arise with the institution of the "task" idea, viz.:

1. Careful selection of workers for each particular operation, or task.

2. Inducing the worker to enter into the part that management wishes him to do.

3. Training and helping him in his work; in motions, methods, speeds, etc.

Involved in the solution of these problems are not only
principles of physical science but principles of personnel. This latter, as has been stated before has biological, sociological, psychological, and economic implications. The science of personnel is only in its infancy, but it has almost infinite possibilities. Evidence of the need for knowledge along this line is the growing demand for personnel directors in many of the larger industries of the country.

Another significant factor, or by-product of the "task" is that it allows management to predict within small variable limits a definite future time for the accomplishment of a given quantity of output. This prediction permits a closer correlation within and among the several functions of the enterprise. For instance, if management knows exactly how long it takes to assemble a boiler and rivet it, it can tell exactly when the flues will be needed and where they will be needed, so that there will be no loss of time.

The "task" has further value in that it is one of the measures for determining the remuneration or pay of the employee. By it, a day's or an hour's work has been definitely fixed or standardized, and the worker knows exactly what he is to receive for a given task. He also realizes that it is not an excessive day's labor, because he knows definitely the methods used in arriving at what a day's labor should be. However, this is not the only factor to be considered in arriving at wages.

(c) **Motion Study.** Motion studies are necessary if
standards are to be established for material tasks. The following excerpt from Motion Study by Gilbreth\(^1\) will help to clarify the meaning of not only "motion study" but "time study" and the "task."

Motion study is the science of eliminating wastefulness resulting from using unnecessary, ill-directed, and inefficient motions.

The aim of motion study is to find and perpetuate the scheme of least waste methods of labor.

By its use we have revolutionized several of the trades. There is probably no art or trade that cannot have its output doubled by the application of the principles of motion study. Among the variables affecting the motions are:

**Variables of the Workers**

<table>
<thead>
<tr>
<th>Anatomy</th>
<th>Earning power</th>
<th>Health</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brawn</td>
<td>Experience</td>
<td>Mode of</td>
<td>Skill</td>
</tr>
<tr>
<td>Contentment</td>
<td>Fatigue</td>
<td>living</td>
<td>Temperament</td>
</tr>
<tr>
<td>Creed</td>
<td>Habits</td>
<td>Nutrition</td>
<td>Training</td>
</tr>
</tbody>
</table>

**Variables of the Surroundings**

<table>
<thead>
<tr>
<th>Appliances</th>
<th>Reward and punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clothes</td>
<td>Size of unit moved</td>
</tr>
<tr>
<td>Colors</td>
<td>Special fatigue elim-</td>
</tr>
<tr>
<td>Entertainment, music</td>
<td>inating devices</td>
</tr>
<tr>
<td>reading, etc.</td>
<td>Surroundings</td>
</tr>
<tr>
<td>Heating, cooling,</td>
<td>Tools</td>
</tr>
<tr>
<td>ventilating</td>
<td>Union rules</td>
</tr>
<tr>
<td>Lighting</td>
<td>Weight of unit moved</td>
</tr>
<tr>
<td>Quality of material</td>
<td></td>
</tr>
</tbody>
</table>

**Variables of Motion**

| Acceleration | Footpounds of work accomplished |
| Automaticity | Inertia and momentum overcome |
| Combination with other motions and sequence | |
| Cost | Length |
| Direction | Necessity |
| Effectiveness | Path |
|                  | Play for position |
|                  | Speed |

(d) The Time Study. "Time Study" is somewhat misleading in that it tends to convey the idea that it is a race against time, or something similar to the racing at Havre de Grace, only in the workshop. This is far from the case. It is not a race against time. The standard time for a given operation or "task" is fixed after painstaking experimentation, in which full consideration is given to such elements as motions, human energy and fatigue, type of materials, equipment used, and any other factors that may be present. This lets the worker know that fatigue due to speed, is properly taken care of by allowing a definite per cent of time for rest and for unavoidable delays.

Quoting from Gilbreth:

Time study is the art of recording, analyzing, and synthesizing the time of the elements of any operation, usually a manual operation, but it has also been extended to mental and machinery operations. ¹

It is necessary to understand the time study and the motion study before full comprehension of the "task" can be obtained. This scientific method of approach to work by Dr. Taylor was one of the most remarkable inventions in industry, for through it, standards may be set on any and all operations and tasks. This is as significant to the manager as the sextant is to the mariner. With it he finds himself, but without it he is lost in modern methods of production.

Summary

Scientific management is the third stage in the development of industrial organization; having superseded the unsystematized and the systematized stages. There are four underlying principles: (1) That its methods are those of a true science; fact rather than fancy. That organizations and products are analyzed into their component parts and recombined synthetically into the best possible form that the entire body of data at hand indicates. (2) That there must be a scientific selection of machines, materials, and workmen for each particular task. (3) That continuous instruction shall be given to the worker after he has been assigned to the task. (4) That there must be intimate cooperation between management and men.

As a vehicle for carrying into effect the principles of scientific management, Dr. Taylor invented the functional foremen plan of organization for production. In his plan the work is divided into eight divisions, and over each is placed a foreman who is especially skilled in that particular type of work. These divisions are headed by the following foremen: routing foreman, methods foreman, cost foreman, disciplinary foreman, gang boss, instruction foreman, inspection foreman and maintenance foreman.

In scientifically arriving at the time it should take to do a given amount of work, and the most efficient way
to do it, scientific management makes use of motion studies, time studies, and from these develops the task unit.
CHAPTER IV

SCIENTIFIC MANAGEMENT IN EDUCATION

In analyzing the field of education, management finds many diverse functions having to do with ideas, materials, and persons. Harmonizing or integrating these into a working enterprise for the achievement of a desired end or goal is its paramount duty. Instead of the eight functions that Dr. Taylor found convenient for his use in industry, there are considerably more in education, due to its greater complexity. Dr. E. E. Lewis has perhaps made the best classification of these functions in education. We are listing them here to inform the reader of the scope of the field. Public relations function, policy-making function, staff personnel function, managerial function, curriculum function, pupil personnel function, reportorial function, the fiscal function, the housing function, the material function, experimentation and research function, adjudication function, appraisal function, inspirational or morale function, professional relationship function, the integration function.

No attempt is made here to define each of these, but only to select a few problems under some of these functions and consider them in the light of scientific principles and practices. As we have stated before, time and space forbids exhaustive application to all, so a few will be given purely to illustrate how the principles and practices may be applied.
Organization for Control of Education

We have found that in industry, management has found it necessary to have jurisdiction over the organization for control as well as the organization within the shop. Scientific management in education also finds that in order to most efficiently operate the organization of the school unit, he must also have general control over a much larger unit. The construction of Austins cannot be efficiently done in a small plant despite the smallness of the product. The reasons are obvious. These same reasons apply in education. However, there are other reasons which will be given in a later paragraph.

(a) Purpose of Education. In any industry the purpose is the production of a certain commodity or finished product. The housing, machinery and labor are the attendant elements, and are secondary to the main aim. So it is in education. The center of gravity is the pupil. All effort should be directed toward the moulding of him into a desirable citizen. Philosophers and laymen as well do not exactly agree on what qualities one must possess in order that he may be styled a good citizen.

There is reason for this disagreement in that we do not wish to have every citizen possess the same qualities. By the very nature of the human mind in all of its physical and subjective aspects, it cannot be standardized. The mind
of John cannot be made to coincide with Joseph in every respect. If this is the case, we will agree that one of the mechanics of scientific management cannot be used in fixing the finished product. By this we refer to "standardization." It is one of the most potent factors used by the scientific engineer, not only in machines and processes, but also in the finished product. In a social order such as ours, even if it were possible (which is not the case) it would be undesirable to mould individuals in similar patterns. Such a process would make for a static society. Similar patterns could not give the necessary variety of units needed to build an aggressive, progressive social order.

It may then be asked, "If we do not know what we are to make, how can we go about making it?" Citizens are constantly being made, none of whom are perfect; but that need not hinder us from making better citizens by instilling more and more of such qualities as most of us agree are the desirable adjuncts of every good citizen. Thus the aim, the greatest number of desirable attributes in youth. That these attributes can be neither scientifically determined nor numerically measured to the third or eighth or Nth degree need not concern us, as they can be measured for all practical purposes. For instance, in measuring the morale of a group, patriotism, or love for one's mother, our knowledge need only be relative; whether there is a total absence, some, a fair amount, or a large amount of the quality present is all
that is needed. This is the same method that McCall used in his Rating of Teachers, which, despite some shortcomings, has the earmarks of the scientific.

(b) Control of Education. Organization for general control and organization for operation are entirely different phases of enterprise. However, the former has so vital an influence on the latter, that management must give organization for control first consideration. In education, general control has charge over finance, philosophies, and policies.

One of the principles of scientific management in analyzing an industry is to hold it at arms length, observe the organization, and evaluate it critically. Advanced American thought on education holds to the opinion that education of our youth is a national affair rather than a local one. If this be true, and the evidence fairly well sustains it, then from a scientific standpoint organization for the educative process should be on a national basis. But Rome was not built in a day; and it is a far cry from the traditional local organization and control of our schools to national control and organization. What with the interference and hindrance of the political to the extent that evolution must take the place of scientific revolution, we must content ourselves with the problem which is more nearly attainable - state organization and control. However, some progress is being made toward nationalization as evidenced by the National Office of Education with its head, the
National Commissioner, and the drive that has been and is still being made for a separate department with the head official having the rank of a cabinet officer.

At the present time the organization in Ohio for conducting the schools, is based primarily on the local political unit or subdivision. This was perhaps the most economical method in our earlier history when education was limited to the three R's. But, with the growth of population and the increased complexity of the social order and of education, that unit has ceased to be the most efficient and economical. The Ohio School Survey Commission, assisted by Dr. Paul R. Mort made a study of the schools of Ohio in 1932 at the request of the Governor of the state.¹ In that study it was found that the educational units were much too small; that by lack of proper organization the "task" of one teacher was as much below its possibility as Mr. Taylor found the daily "task" of a laborer below in the Midvale Steel Company's plant; and that the educational opportunity of the child in the sparsely settled district was far below that in the more favored sections. He found that the valuation available for taxation for the education of the youth had the enormous spread of $260,000 per pupil in the most able district financially, to $1100 per pupil in the poorest. This is a scientific approach to the problem of unit

¹ Mort, Dr. Paul R. Equalizing Educational Opportunity in Ohio, State Department of Education, Columbus, Ohio, 1933.
organization and control, and while it has not yet succeeded in accomplishing the desired purpose, the entering wedge has been started and this will finally leaven the lump of inefficient units.

The principle of state support of schools has been generally accepted. Much better results would accrue if we were to throw aside the political boundaries (a defect in House Bill 688 referred to above) and organize on a basis of school population centers. This method would give better educational opportunities to the child, would be more economic, and would at least partially take the schools out of the county political maelstrom in which it finds itself. Spot maps of school populations, streams, and roads could be made that would give the necessary information for centralization into the proper size units for efficient service. This can be done only when the state has full control over the organization. It naturally follows that if the state controls, it must support the schools, or at least furnish a major portion of the necessary funds.

(c) **State Organization for Control.** Under the present constitution of the state of Ohio, state control is not assured. In order to guarantee state control an amendment should be made to our constitution which will place the general control of education in the hands of a state board of education consisting of say seven members, elected by the qualified electors of the state on a non-partisan ballot as
follows: two from cities, two from exempted villages, two from rural districts, and one at large. Reasons for this will be given later.

**Duties of the State Board of Education.** The selection of a director of education and his subordinates or aides shall constitute one of the powers of said board.

This board shall also be vested with the power, within legal limits to levy taxes for the support of the schools on a state-wide basis.

They shall have the power to establish educational units, on recommendation of the director of education, for the purpose of carrying out the educational policies of the state administration, which policies they in conjunction with the director of education shall also determine.

This body shall also be a court of last resort on all school matters that are not specifically covered by statute.

**The Educational Unit.** The city and exempted village districts are to be left as they exist at present, but the director of education shall have authority to add contiguous territory thereto if he thinks the best interests of the pupils will be thus conserved. An appeal to the state board of education for redress or adjustment is permitted. Of course spot maps and population trend charts shall be made by the state department of education to better clarify the data necessary for locating the school centers.

**The Rural School Unit.** County and township political
unit boundaries shall not be considered as proper boundar-
ies of school units. County boards of education, township
boards of education and county superintendents shall be dis-
pensed with. Then, on a basis of school populations as
determined from the spot maps and charts, the director of
education shall recommend to the state board of education
school centers, which, together with contiguous territory
assigned thereto by the said board on recommendation of the
director, shall constitute a local or rural school unit.
This unit shall be sufficiently large for efficient and econ-
omic operation.

**Rural School Boards.** The rural board of education shall
consist of five members elected on a non-partisan ballot.
Their duties are general control of the local unit, election
of superintendent, teachers and other helpers, and mainten-
ance of the physical plant or plants.

**The Educational Staff.** In the place of the eighty-eight
county superintendents and their staffs will be placed, say
fifteen district supervisors, selected by the state board of
education on the recommendation of the director of education.
Their duties are: the administration of all of the rural
school centers established within their district, which dis-
trict would include territory equal to but not congruent
with about six counties. As stated above, these districts
are to be fixed by the state board of education on recommenda-
tion of the director of education. It shall be the duty of
these district supervisors to counsel local boards of education as to their needs, give point and direction to the educative process in the schools under their jurisdiction, instruct the local superintendent in school procedure, aid in curriculum construction, and organization of the local systems.

Other than as stated above the local school unit shall operate similarly to the present local units. The local board of education, as well as city and exempted village boards of education shall have authority to levy taxes, within certain legal limits to finance a more extensive type of education than that set by the state as necessary to all. This will make it possible for not only the most favored district economically but also the least favored to (if it so desired) establish a standard of education above that set by the state. Local pride and initiative can thus be given a chance to function in a real progressive way.

**Functions of the State Director of Education.** Other than the functions already given the director of education shall determine the number and type of teachers required for schools of various sizes, have sole power of determining standards for certification of teachers, fix standards of educational training required for the various types of supervisors, teachers and other employees. He shall also render to the state board of education an estimate of the finance needed for the ensuing school year with the possible sources
and amounts of revenue possible from each source. He shall also recommend to the state board of education for their approval a salary schedule for the various employees mentioned above. Finally, he shall recommend to the said board, educational policies to be followed in the conduct of the schools of the state.

Reasons for This Reorganization. First, if the education of our youth is a state function, the state should not only finance it, but should also give direction to the process. This we have provided for by the mechanism of a state board of education, a director of education, and district supervisors, who have authority to fix and carry out a standard of education that shall be given to all, and to give direction to education. This latter is highly significant in this day of rapid change and great complexity. These changes require new methods, new aims, new objectives, "new occasions teach new duties, etc.," and in no phase of modern life is a need for a new philosophy more obtrusive than in our changing education. Local boards of education, and the usual local and county superintendents have not the necessary vision to foresee the needs that will prepare the youth to meet a condition in society that is to be different from that of today. A telic society seems to be the only hope for democracy if not for our civilization as well. This cannot be accomplished under conditions extant, but must come by a changed process in which guidance must come
by a changed process in which guidance must come from those of broad experience, vision, and a generous portion of that rare quality, inventive or creative imagination; from those who can bring to us clear principles and sound policies in education. There are extant in the state of Ohio many educational philosophies. We can have no unified philosophy so long as it is encircled within a political maelstrom and hidebound by tradition as at present. Out of such confusion there can only arise a chaos of policy.

Second, the reasons for the termination of the county unit are: (1) To get away from the political entanglements that have been entwined about education, making its freedom hopeless under existing plan. (2) The notorious incompetency of the average county superintendent is well-known. This is partly due to the political conditions above named. (3) The new method of organization furnishes a higher and better type of supervision and does it more economically. The "higher type" has been explained above. Evidence of its economy may be summarized as follows:

Eighty-eight county superintendents, fifty-one assistant county superintendents, and over one hundred clerks are dispensed with. These cost over $335,000 per year for salaries alone. These are replaced by a staff of fifteen highly qualified men with a clerical force of not to exceed forty-five, and at a cost of less than $100,000. The traveling expenses would be less than one-half the present sum
paid to the county and assistant county superintendents. Thus an annual saving of over $255,000 can be made. This could be well used in other desirable phases of education.

Third, the educational unit, due to its larger size, can and will furnish a more suitable educational opportunity than is possible under the smaller unit in use at present. Also will be furnished a better chance to have a teaching corps environment, that is more in keeping with the needs of the pupil as against teachers necessarily teaching subjects about which they know but little, - a prevalent condition in the small schools.

Fourth, the reason for leaving the city and the exempted villages intact, with the possibility of adding to them, is that these units are sufficiently large to permit economic operation; also many of them have at present systems that are superior to any standard that can be set by the state. Leeway must be allowed them to experiment, as most progress is made by experimentation. In the past, cities have lead the way in education, due to their better leadership and their scientific investigation and experimentation. The city schools have had a philosophy to give them direction. This idea must not be submerged in any reorganization, but must be fostered in those school units that do not now have such guiding philosophy.

Fifth, the taxing authority has been placed in the hands of the board of education for the reason that it is
not good policy to have those who neither know education nor the educative process, nor have the necessary educational ideals, fix the sums that are to determine the educational process. They cannot have the educational "slant" that is necessary for weighing educational values and orienting them into terms of money. Fiscal dependence has always resulted in much friction and the curtailment of desirable educational activities.\(^1\) Also there is no good and sufficient reason why education should not have financial support that is as stable as that for any other function of state government - as for example, state highways, or even the courts. Why are these any more necessary or why are they to be more favored than education? Tradition seems to be a very difficult thing to eschew.

**Application of Scientific Principles in the Reorganization**

What are the applications of scientific management to this organization? That the unit is to be fixed by those who are outside specialists, who are not governed by local influences and traditions, who can view the unit from a distance coldly, impersonally, and scientifically, and whose lives are but little affected by whatever decisions they may make, and who are not "political managers," but are

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qualified by extensive training and ripe experience in this type of work.

This is an integrated organization which allows for a uniform aim, a constancy of purpose rather than a disintegrated organization with its multiplicity of purposes and objectives.

Provision is made for a line-staff organization and for functional foremen; also the selection of them is surrounds by such checks that pseudo-functional foremen cannot force themselves into these executive positions.

The size of the unit permits a staff whose work can be specialized to the extent that each worker is placed in a position where his or her interest and capacity can be utilized to a much greater extent than heretofore; where opportunity can be given for self-development or self-realization, rather than a multiplicity of processes and procedures which the worker has neither capacity for, nor interest in. It is only under such conditions that the worker can radiate to those about her the light of a fine personality and inspire them to higher planes of achievement. This is but the application of one of the fundamentals of personnel management as set forth in Creative Management for Teachers, by Lewis and Williams.  

Lastly, the general organization will have relative

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permanence by constitutional amendment. This is a fundamental in that it permits planning for the future and striving for the achievement of the aims, even though the results will be perhaps years in their consumation.

**Financing Education**

(a) **Determining the Need.** In financing education we are at once confronted with the question: How much education and what shall be included therein? There is no material scientific data on this subject. So many phases of education are subjective, are not material, that treating them objectively is impossible. We must turn to the philosophers for guidance as to what the content of education and its objectives should be. Unless we know exactly the purpose of education and the extent to which we should attempt to carry out that purpose, the financing of education can be nothing but haphazard.

It is not our purpose at this point to develop a philosophy of education, but merely to point out that the initial point of finance in education is - What direction are we going, and how far? It will suffice to say that these must be determined by the present and possible future status of the social and economic structure. If, for instance, the philosophy of individualism extant at present, with its attendant element, the capitalistic system, is found inadequate and is breaking down, it would seem
foolhardy to continue the education of youth for the purpose of maintaining the present status and having it financed by a sometimes gullible public who are victims of the regime. Again, to illustrate, the plane of civilization determines in very great measure the scope of the educational institution. In a primitive society the social heritage is so small that passive learning by observing the customs and methods used in "the living together" is sufficient for the needs of the individual. When society reaches a plane where the social heritage is too great to be imparted in this manner, then society must devise a method of passing on portions of this heritage that cannot readily be transmitted by actual experience in the group. This is the function of the school. Haphazardly choosing these elements as has too frequently been done, not only dwarfs the growth of the social order, but gives it wrong direction. It would be following scientific principles if the function of determining the educational philosophy, aims, objectives, content, and methods were placed in the hands of those who are most qualified by training and experience to appraise the social order and economic trends and conditions, and allow them to prescribe the needs. The political set-up for such a procedure is provided for under the heading "Plan for State Organization and Control."

A second consideration has to do with the source of revenues. Institutions that are to be continuous in their
operation must be assured a stable income to carry on the undertaking. In former times when wealth consisted largely of land and other visible personal property, and almost all income was derived therefrom, such levies as were made for school purposes provided a fairly uniform and predictable revenue. Conditions now have changed. Visible property is no longer a fertile source, as returns to the owner from visible property is small comparatively to incomes from intangibles; and yet general property is still carrying the burden of taxation. This defect in method of securing revenue was seen by experts several years ago and warning was issued to readjust the tax burden else the system must break down. Their prediction proved true as in 1932 the general property tax ceased to provide the necessary revenue for carrying on necessary governmental functions. The question at present is - Where shall we turn for not only a stable but a just source of revenue? We have always used the theory of taxing those who have ability to pay. So long as the capitalistic system is in vogue this is perhaps good policy, although some sound argument against such a policy can be offered.

(b) Income, Sales and Severance Taxes as Sources.
That income is a measure of ability to pay cannot be denied. The only problem is the determination of a point above which a tax would be unjust. We are now dealing with material things where scientific research can and should play a
large part. It can be determined what the cost of a given standard of living should be, and any tax on an income that reduces it below the cost of a standard of living in keeping with the man's station in life would be unjust and unreasonable. The principle of a graduated income tax has been fairly well justified in principle and in practice. An effort should now be made to secure a tax on income for schools as it will furnish a permanent source of revenue. True, it will fluctuate with business conditions and living costs, but to a certain extent school costs should parallel them.

At the present time the federal government as well as several departments of our state government are feverishly trying to balance their budgets by absorbing all possible sources of income. If education lies supinely on its back until other departments have taken unto themselves the permanent sources, theirs still for many days will be uncertainty of income and with it uncertainty of policy and expansion. Of course such a situation leads to a decided lowering of the esprit-de-corps among the educational fraternity.

An objection to the income tax has been made that those with large incomes evade it. That it has been evaded is not a just criticism of income as a source for taxation, but only a criticism of the present method, or of the law as it is now written. This objection can be readily remedied
by appropriate legislation.

The Sales Tax. This is also a fruitful source of revenue. It is another method of taxing according to the ability to pay. Those with very small incomes or those whose incomes are too low to be caught by the income tax law, would be obliged to pay a small sum to meet governmental expenses. There is a fundamental principle involved in this that must not be overlooked. When a man invests his money in a governmental institution he becomes much more interested in the whys and the wherefores of it, than if he were not financially interested. In a democracy, such should be the conditions. Funds invested would cause the masses to feel that they were part and parcel of the institution being supported and therefore would have the necessary sympathetic attitude.

The details of this tax, such as taxes on raw necessities, manufactured staples, luxuries, etc. will not be discussed here; but it cannot be gainsaid that the sales tax is the most just and most fertile source for a stable income. Income from this method of taxation would also fluctuate with the business curve, but this would be true of almost any type of taxation, except perhaps the poll tax.

The Severance Tax. This form of taxation has been advocated by school authorities for some time. They have overlooked a glaring objection which precludes its general use under the present set-up. So long as we have local and (or) state taxation, the severance tax will be unjust to
those concerns that are obliged to compete with those in other states. However, if a state has a monopoly of a natural resource, then it would perhaps be satisfactory; otherwise, to be just, any severance tax would necessarily have to be a federal tax. In theory, we agree with the severance tax idea. If schools had federal support, this could be a constant source of income.

(c) The Solution, a Composite Tax. The principle of a stable income is adhered to more closely by the use of a composite tax. The fluctuation would be less and the chances of the entire source drying up as a result of changing conditions would be minimized. An effort should be made to set aside a certain per cent of a general graduated income tax for the support of schools; and further that this portion, by constitutional sanction, shall be immune from encroachments by other departments of government.

That in addition to the above, a certain per cent of the income from a general sales tax shall be set aside as a permanent source for school purposes if needed; and further that school authorities (as set up in the previous plan) be the final judge as to the need.

That tax on general property for the maintenance of schools on a plane above the standard set by the state shall be in the hands of the local board of education, with of course, the usual constitutional limitations and vote of the people thereon.
That rights, privileges, public monopolies, excess profits, utilities, and inheritance taxes as possible sources are not here discussed is not intended to convey the idea of their injustice, unfruitfulness, or unimportance. They are possibilities, but this is not intended to be a comprehensive digest of taxation, but is intended merely to point out a sound basis for support of public education. We repeat here, that if education neglects to grasp the present opportunity, fails to procure for itself a stable source of income, and allows other branches of government to drink these fountains dry, it will be many a day before another such opportunity presents itself, and educational finances will continue in a precarious condition.

This topic has only considered sources for income and it is not intended to convey the idea that this is the only financial problem of education. After sources are found, the problem of distribution on a just basis rather than on a basis of favoritism would arise. Also there must be a per centile distribution of expenditures among the various services in education, such as administration, maintenance, teaching, transportation, etc. Each one of these constitute a problem for individual solution, and scientific principles may well be used in their solution.
Housing and Equipment for Education

(a) **Basis for Determining the Needs.** As has been previously indicated, a sound philosophy of education is paramount for management. It touches the system at all points from the type and quality of the materials utilized in building construction, up through the staff and to the pupil - the center of gravity, and for whom the whole structure (if we may call it a structure) exists. Dr. Lewis in his book soon to be published, entitled **Staff Personnel Administration and Supervision,** objects to the term "philosophy," preferring to use the term "ideology" which he goes on to define as ideas, ideals, convictions, aims, purposes, objectives, policies and plans. Whether or not this clarifies the meaning is doubtful. The former term will be continued in the treatment of this subject. That a philosophy cannot be objectively determined and tested does not say that there are no scientific techniques that can be used. We can by comparisons and by appraisal of consequences and probable consequences cast aside those false philosophies that may enter the picture. That education deals with human values must constantly be kept in mind. Also it must be remembered that bringing to the youth the necessary portion of the social heritage that he will not get is one of the purposes of education. This youth must be so moulded that he will
be enabled to creatively carry the civilization to a loftier plane - that is, give it quantity, quality, and direction. By quality we mean validity rather than the traditional. Hence this philosophy must have validity today, in present society; not for a decade ago. Educational objectives for an autocratic society are unlike those for a democracy. Their points of emphasis are different. At this point we discover that a philosophy of life is pre-requisite to a philosophy of education.

Around the philosophy developed, is built a super-structure of classrooms, equipment, supplies, texts, the staff, organization, methods and procedures in keeping with it. In order that proper content and direction be maintained this must be so. 'Tis true your philosophy may become obsolete by virtue of unforeseen changes in the social order; but one of the tenets of scientific management is the continual investigation and appraisal. A new philosophy should emerge in keeping with the new order.

(b) The Housing Function. The housing for education consists in locating and securing of sites, erecting of buildings, and their maintenance. There are four major factors that must constantly be kept in mind while sites are being secured and buildings erected. They are:

1. Educational aims and objectives based on the accepted philosophy.

2. The vehicle (curriculum, etc.) on which these aims
and objectives are to be carried.

3. Suitability for efficient functioning of the educational staff.

4. Suitability for efficient pupil participation in the educative process.

In the performance of the housing function, management enters the objective field; one that lends itself to scientific experimentation and standardization. Considerable progress has been made in this field, but much room is left for further scientific research.

In scientifically planning the construction of buildings, the curriculum by which the aims and objectives are to be attained, must be one of the factors that has its reflection in the plant. To illustrate, if music is to be an instrumentality, a regular classroom is not a suitable provision for it. Scientific data is at hand which tells us the proper size and type of room needed for this purpose for schools of various sizes. This statement also holds true for the physical sciences, agriculture, art, extracurricular activities, commercial, home economics, cafeteria, etc. If the curriculum has within it provision for the aim of health, here again science informs us of the number of square feet of window space at given latitudes that rooms of various sizes require, proper exposure, how many pupils can be seated in a given room, how often the air must be changed for proper ventilation, most desirable color for
interior decoration, size and location of playgrounds, auditoriums, gymnasiums, whether or not open or closed type of building should be used, size of building for given school population and program, and a thousand and one other things too numerous to mention. The wisest of managers cannot know all these necessary facts, but will consult specialists in the several fields, and will consult his staff on the various aspects of a building program; for buildings are relatively unchanging and errors either in design or materials are costly in terms of human welfare.

Even after the details of needs are accounted for, the problem of harmonizing the program with available finances is encountered. A skilled manager looks ahead, plans, and by studies of growth of populations, trends of populations, and decay and obsolescence of present structures, pictures the future needs and provides for them. This is the most economic method of financing school building programs. Objective data is at hand to substantiate this claim.

(c) Providing Equipment Function. Each piece of equipment must be adapted to its particular use, else its cost cannot be justified. In measuring its utility and in determining the need for it, one must at all times keep in mind the pupil, the staff, the curriculum, and the aims and objectives of the particular school to be served. A log might be a college providing Mark Hopkins was sitting on one end of it, but no one would for a moment say that that
same log would be a suitable seat for either a first-grader or a tenth-grader. Science has pretty well wrought out the seating problem and their findings may be had by any manager. Not that these findings are the last words that will be discovered in seating children; they are the last words that we now have. Science in all fields is in the moult and change will come. In choosing commercial, home economics, history, science, or any other special equipment, their utility is measured by a yardstick graduated to purposes instead of inches. Antiquated equipment that is no longer suited to the present aims and objectives cannot be justified at any cost however small. An educational institution is not a financial institution though it has financial adjuncts. A foot rule, graduated to sixty-fourths is an excellent measure for some uses, but it is antiquated and unsuited for the fine measurements of the machine shops where a variation of one-one thousandth of an inch is unsatisfactory. This is true of educational equipment. There must be a constant integrating relationship maintained among the several factors involved; each piece of equipment should perform its particular part alongside that performed by the plant, the staff, and the pupil. That part should be definitely fixed, and recognized by the staff and the pupil as well as by the management; for only by such mutual recognition of the particular function can each exponent render its proper contribution. Only such equipment as will
best perform that fixed service can be warranted. We smile at the use of the wooden plow used still in certain parts of the world, yet it is comparatively no less antiquated than some textbooks that are still in use in our so-called modern schools. Some supervisors even insist on re-adapting the McGuffey series in toto. Page Dr. Taylor! Scientific management! Where art thou?

(d) **Supplies Function.** The same principles used in selecting equipment apply equally well in selecting supplies, viz: that they are functional, that the function is fixed by the aims and objectives of education, that the "fixed function" must be determined and thoroughly appreciated by the staff, and that the pupil understands the contribution that is to be made by said supplies. The matter of who pays for them is not germane at this point.

If health is our aim, dustless crayon would be preferable to chalk; likewise dull writing paper preferable to glazed. Texts that are well organized, contain the most desirable portions of the social heritage for the purpose, have teacher aids as well as pupil aids, and further usable references, are more desirable than the texts of fifty years ago with their unorganized or poorly organized factual material. Scientific data can be had on such objective material. To illustrate, certain types of flash cards produce better results than certain others for teaching certain fundamentals. Experimentation under controlled conditions
has proved this to our satisfaction. However, we must not naively remark that we can measure the entire results, for some of them are subjective, or immaterial. Comparative estimate of such is our nearest approach to measuring them. Physical reactions and memory can be measured, but feelings, ideals, powers of weighing situations, ability to recognize and utilize fundamental principles are as yet outside the realm of scientific data.
CHAPTER V
PERSONNEL RELATIONS IN EDUCATION

Personnel Relations as a Function

Personnel is one of the sixteen general divisions or functions in education into which it was subdivided in the previous chapter. However, the subject is so broad that a separate chapter for its treatment is needed. In fact, personnel relations can be subdivided into several different units, each of which would constitute a separate function of no inconsiderable size. Personnel relations are human relations, so the science of human relations may readily be called human engineering.

In education the purpose of human engineering is to integrate the human factors and the material factors into a synchronized institution for the purpose of making the best possible citizenry. When we integrate an institution, in the language of Lewis, we unite it "into a harmonious and effective organization for the accomplishment of the desired goals."¹ There is an obvious need for human engineering in the field of education, not only because educating the rising generation is one of the largest enterprises in the land, but also because the results achieved have so vital an influence on our civilization. No effort should

therefore be spared to increase its efficiency. This is a function of the manager or human engineer. Management has the cooperation to the fullest extent of their capacity, of the plant and materials selected. But one of its major duties is to see that the human element is handled in such a way that it is brought to the position where it can also contribute in the fullest possible way.

**Purpose of Personnel Management**

The purposes of effective personnel management, from the viewpoint of creative education, are so well stated in *Creative Management for Teachers* that we quote therefrom as follows:

1. To insure just consideration and treatment of each person as an individual.

2. To discover, arouse, and guide the motives, incentives and interests of each individual in order that the same may be utilized to the best advantage in the person's continued development.

3. To discover the native and acquired capacities of each individual in order better to assist the individual in the proper development of the same.

4. To secure the most efficient and economical functioning of the individual's time and energy.

5. To create and promote the individual's happiness and real contentment in his work and in life in general.

6. To eliminate worries, misunderstandings, useless grievances and controversies between persons.
7. In short, to create the most effective worker-in-his-work units possible. This is done in order to reduce waste, increase efficiency and promote human happiness.1

All of these purposes have to do with the integration of the whole situation; and consideration of just the physical or kinesthetic part of the duties of the worker-in-his-work is insufficient. The psychological enters just as vitally as does the physical. Not only must the morale of the individual be maintained for best results, but also the esprit-de-corps of the entire group must be kept at a relatively high point. The first step toward this condition of course has to do with the individual. How this may be done and the reasons therefore are described so uniquely by Dr. Lewis, that we quote as follows:

Perfect happiness and efficiency in a vocation, or any work situation, depends upon three factors and their relationship. These are (1) interest; (2) capacity and (3) opportunity. When these are equal a perfect worker-in-his-work unit is established.

That is, the interests, and capacities of the worker are just sufficient for the opportunity with which he is provided for their expression. Ask yourself these questions: "Is my opportunity greater or lesser than my interests and my capacities?" Or, expressing it another way, "Are my interests and capacities greater or lesser than my opportunity for their expression?" The ideal, perfect, or utopian situation would be to have all three exactly equal. This is never

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capable of complete attainment. Nevertheless, it is the goal toward which all struggle.  

The ideal function of personnel work is to increase human happiness. To be happy as a worker one must be lost in his work. One is more likely to be lost in his work if it is suited to his best capacities and interests. If one is lost in his work he is more efficient. If he is more efficient he will do more and better work, and, therefore, in the long run earn more. Because he earns more, he is better equipped to provide himself and his dependents with those physical and cultural advantages which in turn contribute to his happiness. This again reacts favorably upon his power to produce whereby the economic benefits to his employer are again enhanced. It is a spiral making continuously for increased production and for greater personal happiness. 

Management in charge of personnel finds many problems, among which we have the selection of staff, recruiting, placing, loading, paying, housing, training in service, and many others. We have arbitrarily selected the staff, the reservoir, morale and the salary schedule for treatment.

The Staff

(a) Selecting the Staff. The staff includes the entire list of employees: janitors, engineers, cleaners, office secretaries, bus drivers, teachers, special supervisors, principles, and all other employees needed. That each should be selected on a basis of his fitness for the specific task to which he is assigned is beyond questioning, and is


2Lewis, E. E. Personnel Problems of the Teaching Staff, Century Company, 1925, p. 10.
in keeping with the purposes set forth above. For instance, among the specific qualities indispensable to a good bus driver are: high moral standards, size and strength for proper handling of the conveyance, knowledge of the machine's operation and maintenance, keen eyesight as well as lack of color blindness, quick kinesthetic reaction, pleasing personality, intelligent, has a knowledge of the laws pertaining to motor vehicles in general and busses in particular, ability to get along with children and discipline them. Unless the chosen one has the qualities in satisfactory quantity, difficulties will frequently arise, with consequent loss of morale and efficiency. This sort of situation affects not only the driver but the pupils and the teaching corps as well. It is therefore only wisdom on the part of management to analyze each and every position that is to be filled, determine the required qualities necessary, and the desirable qualities that should be present, and list them on a sheet that we call standard specifications. By so doing needless waste of time, energy, and efficiency is avoided. This policy will apply to not only the janitor, but to all members of the staff. Specific consideration will only be given to the teaching staff.

(b) Standards for the Teaching Staff. The particular qualities and skills required of the staff are many and varied; and one of the principles to be followed implicitly is to place the selection of individuals possessing these
qualities in the hands of those only who have the better qualifications to judge of these abilities and skills.

In the selection of a worker for a given position, several factors are involved, all of which must be harmonized insofar as they can be. Among these are: the aims and objectives, the curriculum, the pupils, the community, other members of the staff, the specific task to be assigned, and last but not least the teacher herself. This last because she herself effects a change in the otherwise fixed situation. Management should study carefully the total work that is to be accomplished by the staff; then divide this up into particular units that require within the unit certain qualifications that are peculiar to perhaps no other unit. This is purely a division of labor on a basis of "particularizing the job". Man has recognized that as he concentrates his efforts and narrows his field of operation his skill in his chosen profession rises and the quality of his product increases. This is purely division of labor along functional lines. These units will perhaps differ among systems as the aims and objectives differ. Agriculture is a required subject in rural Ohio and should be, but one would scarcely expect to find an agricultural specialist in a commercial school in Cleveland. The curriculum largely determines the units of specialization of the teachers. This division works from the sum total of the work to be done down toward the specific "task," so that the specific qualities and
skills required can be fixed. Standards should be set for each teacher task in amount of training needed and required, type of training, experience if required, sex, marital condition, race, nationality, etc. This precludes waste of time in interviewing many undesirable applicants, helps to integrate the work, and to fix the quality and prestige of the institution. Standards have not been used sufficiently by school people. Too much blind selection has been the rule rather than the exception. However, something along this line is being accomplished by the state of Ohio by the use of minimum standards for teaching, and by specialization of certificates for teaching. We feel that the raising of school standards, except in individual cases, can only come through state support and control. Greater specialization in certification should and must be one of the major controls in fitting the worker to her work. This is not intended to mean that a broad education is unnecessary; it is necessary for proper appraisal of relative values, coordination of efforts, and for furthering cooperation. But the specific task is a highly specialized one and requires specific knowledge and skills. A truism here might be injected; the only possible way of professionalizing the profession is by raising the standards to such an extent that those therein deserve to be called professional. After scanning the names of a teaching corps of a certain county in Ohio, one wonders where the preponderance of weight is - on the
professional or on the unprofessional side. Let's get away from the old saying, "Those who can, do. Those who can't, teach."

(c) The Reservoir. The finding of teachers to fit the standards required is not an overnight's job. An administrator has made a long step toward integrating his system when he has procured for his school a corps where each particular unit is supplied with a teacher who fits the standard specifications in training, experience, personality, etc., required, for only by such matching of the worker and the work can the teacher be satisfied in her work and will be able to give her best. She will be in her field of interest, will be where her capacities can function. It is then up to the system to allow her opportunity for creative expansion. The corps can only be kept up to this high standard by always keeping a reservoir containing the names of promising teachers with their qualifications, and notations as to specific positions in the system that they could fill particularly well. The common sources for the reservoir are known to all. Some principles are involved, however, that must not be lost sight of. Too many local teachers on the corps tends toward inbreeding. This should be avoided in selecting the reservoir. The use of other systems as one of the possible sources is considered at times unethical. There is no good reason why a teacher should be held in any given system when her services are needed in a
larger field; or if she is unhappy in her present position.

The reputation of employment agencies, both public and private should be kept in mind when considering recommendations from such.

Colleges and universities are fertile sources for a supply to keep the reservoir replenished. However, as they are the source of practically all of the pre-service training of the teachers, special consideration should be given to what they are doing. Most colleges and universities have made glaring errors in the type of training that they have given to the prospective teacher. The pendulum swung from pure factual subject matter to methods, and more methods. There was no clear conception of the real function of the teacher in general, much less of the difference in function of a first-grade teacher and fourth or seventh-grade teacher.

The same courses were given to each and the same certificate sufficed for all. It should have been recognized that the portion of the social heritage that each teacher must contribute are quite different; that methods suitable in the one case did not validate them in the other; and further that much of our learning is passive, and a fine personality is a sparkling stream from which the children unconsciously drink the subjective heritage of the race. A wise manager must therefore scrutinize the policies of colleges and universities before recruiting his reservoir therefrom. A definite number of years of training, or a specified number
of hours of methods can no longer be taken as fitting evidence of a satisfactory pre-training. Too many diplomas have been granted on "hours of training" rather than teaching potentialities. No college or university official has any moral right to graduate an individual in education whom he would not wish to teach his own child. This is one of the glaring weaknesses in the training of teachers, and state supported institutions can no longer justify expenditures in the light of such procedures. Even our state departments of education are evaluating certain "things" as equivalent to training, which makes one wonder what, if any, is their philosophy of education.

(d) Securing and Maintaining Morale. The morale of the teacher manifests itself in the form of such desirable qualities as: enthusiasm, good will, wholesome attitudes, devotion to the service, loyalty to the system, and confidence in herself. By careful selection as described under the headings, "Selecting the Staff," and "The Reservoir" a step toward proper morale is made. After the teacher is selected and placed there remains one of the most difficult tasks of administration and that is the fostering of the morale of the teacher. When all of the factors surrounding a given teacher are in harmony with her aspirations and capacities, the effort of that teacher is centered entirely on doing the work in the most efficient manner.

The factors that have an effect on the mind are so many
and so subtle that the administrator must turn his attention more or less to the art or science of psychiatry. Some of these factors that affect the mind of the teacher and over which we have some measure of control are the following:

(1) Salary schedule, (2) tenure of service, (3) pension systems, (4) training in service, (5) local social life, (6) proper housing facilities, (7) faculty conferences, (8) provision for leisure, (9) leaves of absence, (10) sickness leaves, (11) proper loading, (12) Sabbatical leaves, (13) promotions, (14) visitations/leaves. It is not our purpose to consider all of these instrumentalities. The salary schedule will be used to illustrate the application of scientific management and its relation to efficiency and morale. Any other factor may be analyzed and synthesized in somewhat the same manner.

(e) **Salary Schedule.** What is the function of a salary schedule? What have we a right to expect from a salary schedule? The answers to these questions form the base on which any salary schedule should be made. It may be said that the money is to pay for teaching. True enough; but that does not go far enough. Many factors are involved. They will be stated under three headings, each of which can be sub-divided into many others.

1. The need of the pupil as determined by the philosophy and objectives of education.
2. The teacher
   a. Her standard of living
   b. Pre-training
   c. Training in service

3. The total revenue available.

The pupils, as all will agree, are entitled to all that we can afford to give them. We can also agree that their needs in a modern civilization cannot be satisfied by the untrained teacher. How much training should be required? The answer is apparently simple; all that the funds will buy. That would be elementary enough if pre-service training is the only variable to consider. It is probably the most necessary factor, but a schedule based on that alone would give us a group of fossils in a few years. Stimulation is needed for growth and esprit-de-corps, and the salary schedule can be made to contribute to that aim if it is properly manipulated. Hence, only a portion of our sums available should contribute to the pre-service training; but that particular sum will determine the amount of pre-service training that can be demanded. The cost of say four years in college would preclude demanding that amount if you have only an $800 salary. The money invested in an education and the time spent are two of the contributing elements for fixing a minimum beginning salary.

Another factor which either hinders or helps to maintain high efficiency is, whether the minimum salary is a living
wage in that particular locality. If not, loss of efficiency and low morale will immediately predominate the system.

With a minimum starting salary fixed at a living wage, added increments as inducements should be placed in the schedule but only for very definite increases in teaching potentialities. Just regular increases for time in service has a tendency to develop "dead wood" in the corps. Educators are fairly well agreed that growth of teachers by experience alone declines rapidly after the third year. Hence, increases for service alone should only take care of added efficiency.

Increments should be added to the schedule for definite amounts of specific training for the service to be rendered. This training should be in the regular training institutions, where the teacher may replenish her store of knowledge, perhaps acquire new aims, and ideals, and develop her personality, thus assuring added increments to the pupil. In order that only professional teachers be retained, this training-in-service should be a condition of reemployment. This would stop the "hangers-on" in teaching.

The added increments for increased efficiency should be sufficiently large not only to properly remunerate the teacher for money spent thereon, but also should provide for the teacher, after she has demonstrated her professionalism over a period of years, a salary that progresses through the saving wage into the cultural wage. This has a vital
effect on the morale as well as on the capacity for work. Economic insecurity in old age is a monster that ever lurks on the horizon of all until security is finally reached. The saving and cultural wage only partially take care of this. Hence, it might be well to provide a portion of our financial resources for insurance that will not only drive the monster from the declining years but also from the present as well.

Scientific Principles

In solving the salary schedule problem, or of any other problem, hold it at arms length, analyze it coldly, impersonally, comparatively. Determine the exact use or the aim to be achieved. Synthesize the solution by making each part or portion contribute a definite step or increment toward achieving the aims and objectives. Added concomitants which make no definite contribution are superfluous and must be cast aside. Scientific management consists of a philosophy and fundamental principles. It matters not what field is being considered. There are fundamental principles involved in every institution, whether public or private, and the discovery and use of these principles is well worth the time and effort spent. That custom and tradition has long prevented proper research for, discovery, and application of these principles is not sufficient justification for our lack of effort to capitalize on the possibilities of
scientific management.

Summary

Personnel relations are human relations; hence the science would be human engineering. Personnel control is a function of management, the object of which is the harmonization or integration of the human factors however changeable, and material factors that are relatively fixed. Especially must management create situations where the interests, capacities and opportunities of the individual are integrated.

In selecting the staff, this harmonization of position with individual must obtain, either with respect to the teacher or any other employee. In order that better selection of a teaching staff may be made, it is best to maintain a reservoir of likely candidates.

After the corps is selected, there is always present the problem of maintaining the morale. Some of the means for maintaining it are: proper selection, training in service, home conditions, social conditions, etc. Special treatment of the salary schedule makes reference to the part it should play in preserving and promoting esprit-de-corps. A principle to follow in any salary schedule is to make the money available for salary be spent in such a way that each part buys a definitely known contribution to the education of youth.
CHAPTER VI

SUMMARY AND CONCLUSION

Industry during the time of recorded history has passed through several stages, from the simplest possible in savagery to the gigantic enterprises of today. Viewpoints have likewise evolutionized, from individualism in savagery through collectivism during the herding stage of civilization, back to individualism with its capitalistic regime of today. Signs are now present indicating that we are now passing from individualism to corporate governmental control of industry.

With each stage of growth has come an ever increasing complexity, not only in industry but in the whole social structure. The methods of industry have changed and are changing. The products of industry are becoming more varied and complex. Methods of yesterday do not suffice for today.

Necessity is the mother of invention. Management in enterprise was quite simple during the infancy of industry, but is complex today. We have seen enterprise pass through two stages of development, unsystematized and systematized, and it is now in its third stage, scientific. This third stage has brought with it principles and practices which have caused industry to forge far ahead of the social order. This study has been made to determine just what these principles and practices are; with the aim in view of gleaning from them principles and practices that can be used to
further the growth of education.

It has been discovered that scientific management was not autocratically superimposed on industry, but naturally grew out of the situation as a necessary agency for integrating the many inharmonious situations among both materials and persons. With competition growing keener each day, survival depended on increased efficiency. Traditional methods became obsolete. The field of scientific management has grown from a modest beginning in a production shop, to a field which covers organization, control, and finance in addition to the plant itself. A reason for this expanse of power is: that if the principles and practices of scientific management were to be most efficiently used within the plant, management must have jurisdiction over finance and general control, as they vitally affect operations within the plant.

Scientific management, according to Dr. Taylor, has four general underlying principles:

1. That the methods of scientific management are the methods of a true science. That enterprises are broken up into units, and these units again analyzed into their simplest units; then by experimentation they are synthetically rebuilt. Experimentation not being confined to materials and machines alone, but to men as well.

2. On basis of experimentation, selection of machines, materials and workmen are made.

3. That continuous instruction is provided for the workmen selected.
4. That there shall be intimate cooperation between management and men and a redistribution of responsibilities.

In order to carry out the principles, Dr. Taylor organized the industrial plant into eight divisions. Over each of which he placed a specialist in that particular line of work. These heads were called *Functional Foremen*. Each was supreme in authority in his field and in no other. We would call this a practice of scientific management, and not a principle. Other methods such as the motion study, time study, and the task were utilized by Taylor. These are techniques and are not the substance of scientific management.

Application of the principles and practices above named were made to organization, with result that in view of the fact that local control which obtains at present is found inadequate for efficient operation of education. A program including state control is advocated, in which the ones most competent to know the needs for education are given the function of determining them. It is a truism that if the state controls educational aims and objectives, it must also support. This we have provided for in our discussion of finance, but also the principle of a stable source is brought out. A composite tax has much less chance of drying up as a source than a single source.

The purpose of personnel management as was pointed out is the integration of the worker into the situation in which he is placed. This is done by proper selection for
qualifications that harmonize with the duties to be performed. Other attendant elements are then considered which tend to further integrate the situation. This includes the morale of the individual and the esprit-de-corps of the group. Those factors considered which have a bearing on this are: selection of the staff, standards for the teaching staff, the reservoir, securing and maintaining morale, and the salary schedule.
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