T H E S I S

I N D U S T R I A L E X E C U T I V E

T R A I N I N G

Submitted by

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as part fulfillment of the requirements

for the Degree of Master of Science

Colorado Agricultural College

Fort Collins, Colorado

August 10, 1925.

THIS THESIS HAS BEEN READ

APPROVED AND RECOMMENDED

FOR CREDIT

Head of the Department of

Rural and Vocational Education

Colorado Agricultural College

Fort Collins, Colorado

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INTRODUCTION

The fact that a particular curriculum has been in existence for many years is no proof that it is the best one. We accept the present day curricula: first, because they have been in use and have been found to be approximately what was needed, so have developed into a tradition: second, the teachers have been trained and the textbooks written for the established curricula.

As an increasing number of graduates from engineering schools became established in different walks of life, it is found that they fall into two general groups: A large majority is found practicing engineering as a profession, and a smaller number are taking an active part in the management of industrial and other enterprises. As the years go by, it is found that the second group is constantly increasing in number.

An examination of the records of a number of schools of engineering shows that, at the end of five years, twenty-five per cent of their graduates are in activities of the executive type; at the end of fifteen years forty-seven per cent; and at the end of twenty-five years, fifty-seven per cent. It is evident from the above fact that the present engineering school training does not fit its

graduates to take over executive duties in industry upon completion of their school training.

Industry is constantly crying for men with executive ability and training. Our present technical school system fails to supply the demand economically, because an industrial executive must be familiar with the industry in which he is to be an administrator. This means that the technical graduate in order to become an executive must spend from five to twenty years after graduation learning the industry before he can assume the responsibilities of the executive (assuming he has the initial latent ability). We have in our past and present educational system, literally 'put the cart before the horse'. The economic solution of the problem is to offer a training course for executives at the time the training is most needed and also to a selected group of men, who have proven themselves capable of capitalizing the training after it has been given. Obviously the men, who can fill the above requirements are the foremen and minor executives, that are already occupationally trained. When given an understanding and training in the problems confronting the plant executive, these are the men, who can make industry an economical and satisfactory unit of society.

NEED FOR EXECUTIVE TRAINING

Any production force includes executives, supervisors, inspectors, foremen, etc., and the number of these executives bears a certain relation to the total size of the working force.

While there is always a certain turnover in the executive group (promotion, resignation, death, etc.), and a limited amount of training can always be offered for this special purpose, it is, under normal conditions relatively small and forms a very minor part of the training work department of the plant. This is probably the reason this very important phase of our vocational training program has received very little attention up to the present time. Under emergency conditions, as where the amount of production called for is suddenly greatly increased there may be a correspondingly sudden demand for a corresponding increase in the executive and supervisory force, and a corresponding demand for a considerable amount of training for this special purpose. The natural source from which additions to the executive and supervisory force would come, would be the working force of the plant.

The reasons for the above statements of the problem confronting the training of men for industry grew out of

an investigation of engineering education carried on at the Missouri School of Mines last year (1924-25). Being a member of the Committee at the Missouri School of Mines, a subcommittee of the National Committee of the Society for the Promotion of Engineering Education, appointed to investigate and study Engineering Education as now given in the United States, with a hope of offering constructive criticisms which will enable our engineering schools to better fit their graduates to meet the future needs of the engineering profession, my conclusions are drawn from the results of some eight-hundred questionnairs sent to graduates of the School, a large percentage of which are now holding executive positions in industry.

STUDY OF GRADUATES OF THE MISSOURI SCHOOL OF MINES

In prosecuting the study of engineering education, the Committee endeavored to arrive at definite conclusions respecting the following questions:

(1) Should our aim be to graduate men who will be trained and fitted for the executive type of engineering work, or, primarily, should we train for that type designated by the term "technician"?

(2) After we have arrived at a conclusion on the

above question, we should examine the curricula, general and at the School of Mines in particular, in order to recommend possible improvements.

(3) We should examine methods of teaching in general, and those used at the School of Mines in particular.

(4) We should try to determine whether orthodox principles or pedagogy should be used in teaching engineering subjects, or whether modifications are desirable or necessary.

(5) We should study the requirements or qualifications of teachers in engineering colleges.

In dealing with the subject in hand, I will give only such parts of the investigation and results found, that have a direct bearing on the subject of training executives. Questionnaire 1, was sent out to all graduates of the school to determine whether the graduates want a broad general training in "Economics" treated as such, or whether the demand is more for specialized courses in business, accounting, labor problems, etc. The general opinion seems to be that some general training in "Economics" is desirable, but in addition a course in "Business" or "Business Administration" should be stressed. When the Committee finished tabulation of the results from questionnaire No. 1, it was

found that there was a very general demand for the inclusion of "Business" courses of various kinds in the standard engineering curriculum. The exact nature of the courses desired seemed to be rather vague, however, the committee decided that a supplemental questionnaire should be sent out to determine, if possible, the exact nature of the "Business" courses desired.

The second questionnaire was sent out to determine what definite subjects common to Accounting, Business Administration, Industrial Organization, Labor Problems, and General Economics, are considered by the graduates to be of the greatest interest, value, or importance to the executive, both in training and in his work. A list of eighty-three subjects was made up, covering each of the four general groups mentioned above. They were arranged in a general list in random order, with no key as to what group any specific subject was to be included in. The graduates were requested to indicate the relative importance or interest of each of the eighty-three subjects under the headings "None", "Little", "Moderate", "Great", and "Very Great". After tallying the opinions found in all returned questionnaires and replies assembled under the four general group heads, that executives are more interested in the above groups of

subjects than in the standard engineering courses as now given. The order of interest, or the opinion as to the value to the executive of the four main groups of subjects mentioned, seems to run in the following order:

(1) Accounting (broad, general principles).

(2) Business, Business Administration and Organization.

(3) Labor Problems.

(4) Economics.

This order may be remembered from the key word made from the initial capitals of these subjects---ABLE.

The third questionnaire sent out to the graduates of Missouri School of Mines was to determine from the Engineering Profession itself the requirements or qualifications of teachers in engineering colleges.

FORM OF QUESTIONNAIRES AND TABULATION OF REPLIES

Questionnaire No. 2:

Question No. 1, seeks to determine whether the graduates want a broad general training in "Economics" treated as such, or whether the demand is more for specialized courses in business, accounting, labor problems, etc.

Question No. 2, asks what technical courses to drop if "business" courses are to be given.

Question No. 3, seeks to determine what definite subjects Labor Problems, and General Economics, are considered by the graduates to be of the greatest interest, value, or importance to the engineer, both in training and in his work.

Question No. 4, seeks to determine by a direct question which of some 14 subjects in general is of foremost importance or use in the work of the engineer or executive.

Question No. 5, requested graduates to give any constructive suggestions they might have to make regarding the general subject of the questionnaire.

Number of Questionnaires sent out to and received from graduating classes:

	Sent Out	Rep. Rec'd.		Sent Out	Rep. Rec'd.
1874 - 3			1900 - 4		
1875 - 0			1901 - 3		
1876 - 2			1902 -10		
1877 - 0			1903 - 9		
1878 - 2			1904 -15	46	5
1879 - 1	8	3			
1880 - 1			1905 -17		
1881 - 2			1906 -14		
1882 - 3			1907 -12		
1883 - 1			1908 -24		
1884 - 2	9	1	1909 -31	98	14
1885 - 1			1910 -32		
1886 - 1			1911 -23		
1887 - 3			1912 -30		
1888 - 0			1913 -20		
1889 - 0	5	0	1914 -18	123	22

	Sent Out	Rep. Rec'd.		Sent Out	Rep. Rec'd.
1890 - 0			1915 -11		
1891 - 3			1916 -32		
1892 - 4			1917 -27		
1893 - 3			1918 -21		
1894 - 5	15	4	1919 -14	105	27
1895 - 5			1920 -50		
1896 - 0			1921 -59		
1897 - 7			1922 -66		
1898 - 2			1923 -86		
1899 - 7	21	5	1924 -34	295	68

Form of Questionnaire No. 2.

Supplemental Questionnaire Series Aa.
Feb. 4, 1925.

Name: _____
Last First Middle

Recent Address: _____
State City Street or Box

Course graduated from: _____ Year or class: _____

Please cross out the words not applicable, so that the following may as nearly as possible indicate your opinion on the several matters mentioned:

(a) The study of General Economics (is, or is not) essential in the work and training of an engineer or executive.

(b) The study of the general principles of Business, of Business Administration, Finance, Accounting, Contracts, Law, Management, Bookkeeping, Cost Keeping (is, or is not) essential in the work and training of an engineer or executive.

(c) The engineering graduate (should, or should not) be required to have in his college course at least one three-hour course in General Economics.

(d) The engineering graduate (should, or should not) be required to have in his college course at least one three-hour course in Business, consisting of Business Administration, Corporation Finance, Finance, Accounting, Bookkeeping, or_____(write in words expressing your idea, cross out words you do not mean).

(e) The engineering graduate (should, or should not) be required to have in his college course at least two courses, of three hours each in General Economics, whether he gets any course in Business or not.

(f) I think (or do not think) the engineering graduate should have one three-hour course in Business, even though he gets no course at all in General Economics.

(g) The engineering graduate (should, or should not) be required to have at least one three-hour course in Business and two three-hour courses in General Economics in his college course.

Tabulation of Answers to Question No. 1.

1. (d):	Combined Percentages: YES	NO
The Course should include Business Administration	92.7	7.3.
The Course should include Corporation Finance	87.4	12.6.
The Course should include Finance	86.9	13.1.
The Course should include Accounting	84.0	16.0.
The Course should include Bookkeeping	75.7	24.3.
Contracting Law, and Management	Take.	
Public Relations	Take.	
Cost Keeping and Estimates	Take.	
Mine Valuations	Take.	
Letter Dictating	Take.	

Banking----------Take.

Labor Costs----------Take.

Business Law----------Take.

Commercial Law----------Take.

Engineering Law----------Take.

Principles of Accounting----------Take.

Stocks and Bonds----------Take.

Mine Accounting----------Take.

Tax Laws----------Take.

Salesmanship----------Take.

	Combined Percentages: YES	NO
1. (a): The study of General Economics Is Essential In the Training of the Engineer or Executive	81.3	18.7.
1. (b): The Study of Business and Business Administration Is Essential in the Work and Training of the Engineer or Executive	93.7	6.3.
1. (c): The Engineering Graduate Should Be Required to take One Three-Hour Course in General Economics	79.1	20.9.
1. (e): The Engineering Graduate Should Be Required to take Two 3-Hour Courses in General Economics, Whether or Not He gets any Course in Business	47.5	52.5.

1. (f): Combined Percentages: YES NO

The Engineering Graduate Should Have One 3-Hour Course in Business, Even Though He Gets No Course At All in General Economics----------76.8--23.2.

1. (g):

The Engineering Graduate Should Be Required To Have At Least One 3-Hour Course in Business and Two 3-Hour Courses in General Economics----------62.2--37.8.

Condensed Tabulation of Answers to Question No. 2.

What Technical Courses Should Give Way for Courses in Business?

The following subjects were listed as 'should be dropped from the present curriculum:'

1. Athletics.
2. English (as taught)
3. Foreign Languages.
4. Higher Mathematics.
5. Shop Courses.
6. Physics Laboratory.

The following subjects were listed as 'should be allowed less time than now given:'

1. Economics.
2. English.
3. Geometry.
4. Algebra.
5. Calculus.
6. Physics.
7. Chemistry.
8. Surveying.

The following are constructive criticisms offered in answer to Question No. 2.

1. Reduce time spent on "theoretical" courses in engineering.

2. Business courses prepares the men to take care of themselves when they leave the school, and enables them to work into administrative positions.

3. Cannot see how any advance can be made without a knowledge of accounting, law, and finance.

4. Courses in Economics, Business and Management should be added.

5. The engineer should know Economics, Business, and Management if he expects to ever reach an administrative position.

6. I do not believe any technical course should be dropped in order to favor one in Business. Rather shorten the one and include the other.

Form of Question No. 3, relating to the determination of what definite subjects Labor Problems, and General Economics, are considered by the graduates to be of the greatest interest, value, or importance.

In order to get at the content of a course in "Business" for engineers and for other reasons, it is desired that you check from the following list those subjects in which you think the engineer has a fundamental interest, and which are useful in his work as technician or executive. Please check relative importance as indicated:

Degree of Interest or Value					Subjects
None	Little	Moderate	Great	Very Great	
___	___	___	___	___	1. Historic background of our Economic Organization.
___	___	___	___	___	2. Personal liability of partners.
___	___	___	___	___	3. Money and Banking.
___	___	___	___	___	4. American Federation of Labor.

Degree of Interest or Value					Subjects
None	Little	Moder-ate	Great	Very Great	
___	___	___	___	___	5. Balance Sheet and Income Account.
___	___	___	___	___	6. Production for use versus, production for profit.
___	___	___	___	___	7. Difference between stocks and bonds; advantages and disadvantages of each.
___	___	___	___	___	8. Study of Industrial Revolution 1750 to date.
___	___	___	___	___	9. Doctrine of the Wages-Fund.
___	___	___	___	___	10. Principles of Cost-Keeping.
___	___	___	___	___	11. The nature of Corporate Organization.
___	___	___	___	___	12. Profit-sharing.
___	___	___	___	___	13. Negotiable Instruments and law.
___	___	___	___	___	14. Theory of interest.
___	___	___	___	___	15. Growth of population.
___	___	___	___	___	16. Forms for the keeping of job accounts.
___	___	___	___	___	17. How to manage men.
___	___	___	___	___	18. Amortization and sinking funds.

Degree of Interest or Value					Subjects
None	Little	Moderate	Great	Very Great	
___	_____	_____	_____	_____	19. Principles of Labor Legislation.
___	_____	_____	_____	_____	20. The promoter in established industries.
___	_____	_____	_____	_____	21. The theory of international trade.
___	_____	_____	_____	_____	22. Trade Unions.
___	_____	_____	_____	_____	23. General principles of accounting.
___	_____	_____	_____	_____	24. Productive and unproductive labor.
___	_____	_____	_____	_____	25. The rent of land.
___	_____	_____	_____	_____	26. Property dividends.
___	_____	_____	_____	_____	27. Manufacturers' Associations.
___	_____	_____	_____	_____	28. Auditing of accounts.
___	_____	_____	_____	_____	29. Workman's compensation laws.
___	_____	_____	_____	_____	30. Evil, benefits, advantages, disadvantages of our capitalistic System.
___	_____	_____	_____	_____	31. Financial institution and organization.
___	_____	_____	_____	_____	32. The import of "capital stock".
___	_____	_____	_____	_____	33. General subject of Wealth.

Degree of Interest or Value					Subjects
None	Little	Moder-ate	Great	Very Great	
					34. Relations of Capital and Labor.
					35. Reserves for business uncertainty.
					36. Uniform systems of accounts for utility companies.
					37. The earnings of labor.
					38. Land tenure and taxation.
					39. How to organize a company.
					40. The nature of surplus earnings.
					41. Child labor and that of women.
					42. Industrial Democracy, or industrial government.
					43. Relation and interdependence of our economic organization, production, finance, marketing, accounting.
					44. Employee representation on boards of directors.
					45. The Law of agency and torts.
					46. Depreciation and Obsolesence.

Degree of Interest or Value					Subjects
None	Little	Moderate	Great	Very Great	
___	___	___	___	___	47. The promotion of enterprises.
___	___	___	___	___	48. When and how a company should declare dividends.
___	___	___	___	___	49. Knowledge of how to work practical problems in business.
___	___	___	___	___	50. Budget system for corporations.
___	___	___	___	___	51. Socialism and labor problems.
___	___	___	___	___	52. The Malthusian theory.
___	___	___	___	___	53. Broad study of Market, supply, and demand.
___	___	___	___	___	54. Open shop vs. closed shop.
___	___	___	___	___	55. Charges for repairs and replacement.
___	___	___	___	___	56. Production by factory-machine method vs. old handicraft method.
___	___	___	___	___	57. The law of diminishing returns.
___	___	___	___	___	58. Financial panics.
___	___	___	___	___	59. Function of a Board of Directors.
___	___	___	___	___	60. Reserves for self-insurance by private corporations.

Degree of Interest or Value					Subjects
None	Little	Moderate	Great	Very Great	
					61. Study of current assets and liabilities.
					62. How to manage or prevent strikes.
					63. The theory of international trade.
					64. Combinations and trusts.
					65. Cost of production on the marginal field.
					66. Interest on daily cash deposits.
					67. Selling and underwriting syndicates.
					68. The divisions of labor.
					69. Protection and free trade.
					70. Domestic and foreign exchange.
					71. Cooperative effort in distribution and consumption.
					72. Setting up accounts for a new business.
					73. Problems of large scale production.
					74. Regulation of public utilities and their rates.
					75. Bankruptcy and receivorship.

Degree of Interest or Value					Subjects
None	Little	Moderate	Great	Very Great	
___	___	___	___	___	76. Historic survey of industrial trusts and consolidations.
___	___	___	___	___	77. How to become a general manager.
___	___	___	___	___	78. Distribution of overhead expense.
___	___	___	___	___	79. Employee ownership of company stocks and bonds.
___	___	___	___	___	80. Cost as a price basis.
___	___	___	___	___	81. Balance sheet liabilities, as capital stock, bonded debt, capital resources, current liabilities, contingent liabilities, sinking fund reserves, etc.
___	___	___	___	___	82. Repairs, renewals, depreciation, and construction.
___	___	___	___	___	83. Selling expenses as part of manufacturing cost.

Opinion as to Relative Importance of Subjects in Accounting, Business, Labor Problems, and Economics.
(Arranged in order of importance)

Order	Set No.	Key	Subject	%Reporting "Great" or "Very Great"
1.	17	L	How to manage men	85.60.
2.	49	AB	Knowledge of how to work practical problems in business	78.06.

Order	Set No.	Key	Subject	% Reporting "Great" or "Very Great"
3.	82	A	Repairs, renewals, depreciation and new construction	66.08.
4.	62	L	How to manage or prevent strikes	61.75.
5.	3	A	Money and Banking	60.48.
6.	78	A	Distribution of overhead expense	60.20.
7.	10	A	Principles of cost keeping	59.18.
8.	75	BEL	Problems of large scale production	56.87.
9.	46	A	Depreciation and obsolesence	56.80.
10.	53	BE	Broad study of market, supply, and demand	56.59.
11.	39	B	How to organize a company	55.82.
12.	81	A	Balance sheet liabilities, as capital stock, bonded debt, capital resources, current liabilities, contingent liabilities, sinking fund, reserves, etc.	54.62.
13.	18	BA	Amortization and sinking funds	53.74.
14.	61	A	Study of current assets and liabilities	53.26.
15.	80	A	Cost as a price basis	50.90.
16.	5	BA	Balance sheet and income account	50.43.
17.	50	A	General principles of accounting	50.00.
18.	23	A	Budget system for corporations	49.58.
19.	47	B	The promotion of enterprises	49.16.

Order	Set No.	Key	Subject	% Reporting "Great" or "Very Great"
20.	55	A	Charges for repairs and replacements	49.16.
21.	13	B	Negotiable instruments and negotiable instrument law	47.50.
22.	34	L	Relations of capital and labor	46.16.
23.	11	B	Nature of corporate organizations	45.92.
24.	24	EL	Productive and unproductive labor	45.14.
25.	48	BA	When and how a company should declare dividends	43.58.
26.	31.	B	Financial institutions and financial organization	42.87.
27.	29	L	Workman's compensation laws	42.60.
28.	48	BA	General principles of accounting	42.56.
29.	83	A	Selling expense as part of manufacturing cost	42.37.
30.	77	B	How to become a general manager	41.08.
31.	35	AB	Reserves for business uncertainties	40.86.
32.	43	E	Relation and interdependence of our economic organization in production, finance, marketing, accounting	40.86.
33.	6	E	Production for use, versus production for profit	40.66.
34.	59	B	Functions of a Board of Directors	40.18.

Order	Set No.	Key	Subject	% Reporting "Great" or "Very Great"
35.	72	A	Setting up accounts for a new Business	39.29.
36.	2	B	Personal liability of partners	38.74.
37.	7	B	Difference between stocks and bonds, advantages and disadvantages of each	38.13.
38.	28	A	Auditing of accounts	37.74.
39.	54	L	Employee ownership of company stocks and bonds	34.83.
40.	65	E	Cost of production on the marinal field	36.03.
41.	60	A	Reserves or self-insurance by private corporations	35.85.
42.	79	L	Open versus closed shop	34.83.
43.	56	EL	Production by factory-machine methods versus by old handicraft methods	34.47.
44.	74	E	Regulation of public utilities and their rates	32.44.
45.	32	AB	The import of capital stock	31.83.
46.	19	L	Principles of labor legislation	30.44.
47.	16	A	Forms for keeping of job accounts	30.00.
48.	71	L	Cooperative effort in distribution and consumption	29.28.
49.	70	E	Domestic and foreign exchange	29.20.
50.	14	E	Theory of interest	29.07.

Order	Set No.	Key	Subject	% Reporting "Great" or "Very Great"
51.	20	B	The promoter in established industries	28.72.
52.	51	L	Socialism and labor problems	28.19.
53.	75	B	Bankruptcy and receivership	27.91.
54.	37	LE	The earnings of labor	27.36.
55.	30	E	Evils, benefits, advantages, and disadvantages of our capitalistic system	27.36.
56.	57	LE	The law of diminishing returns	26.50.
57.	22	L	Trade unions	24.57.
58.	4	L	American Federation of Labor	24.34.
59.	21	E	Theory of international trade	23.85.
60.	12	L	Profit sharing	22.94.
61.	40	AB	The nature of surplus earnings	21.76.
62.	45	B	The law of agency and torts	21.76.
63.	41	L	Child labor, and that of women	21.67.
64.	68	LE	The division of labor	20.73.
65.	63	E	Theory of international trade	20.00.
66.	9	E	Doctrine of the Wages-Fund	19.79.
67.	38	E	Land tenure and taxation	19.48.
68.	44	L	Employee representation on boards of directors	19.45.
69.	66	A	Interest on daily cash deposits	18.94.

Order	Set No.	Key	Subject	% Reporting "Great" or "Very Great"
70.	26	BA	Property dividends	17.89.
71.	27	L	Manufacture's associations	17.75.
72.	64	BL	Combinations and trusts	17.56.
73.	33	E	General subject of "Wealth"	17.44.
74.	1	E	Historic background of our economic organization	16.53.
75.	67	B	Selling and underwriting syndicates	16.36.
76.	69	E	Protection and free trade	16.21.
77.	15	E	The growth of population	15.92.
78.	42	L	Industrial democracy, or industrial government	15.76.
79.	8	E	Study of Industrial Revolution 1750 to date	15.02.
80.	25	E	The rent of land	14.18.
81.	76	BL	Historic survey of industrial trusts and consolidations	12.83.
82.	52	LE	The Malthusian Theory	10.46.

Combined Answers, Classes 1874-1924
On the 82 subjects
25 in Accounting
25 in Business in general
25 in Labor Problems
25 in General Economics

Subject	Degree of Interest, % of all answers:
Accounting, average percent "Great" and "Very Great"	46.37.

Subject	Degree of Interest, % of all answers:

Business, average percent "Great" and "Very Great"---39.31.

Labor Problems, average percent "Great" and "Very Great"----------31.84.

General Economics, average percent "Great" and "Very Great"----------27.94.

Form of Question No. 4, relating to the determination by a direct question which of some 14 subjects in general is of foremost importance or use in the work of the engineer or executive.

Please indicate by numerals (1, 2, 3, etc.) the order of importance you think the following subjects in general have in the work and training of an engineer or executive:

____ (a) Bookkeeping.

____ (b) Accounting.

____ (c) Business Adminstration.

____ (d) Principles of Modern Business.

____ (e) Relation of Engineering to Modern Business.

____ (f) Commercial Law.

____ (g) Business Law.

____ (h) Contracts and Specifications.

____ (i) General Economics.

____ (j) Finance.

____ (k) Business Organization and Combination.

____ (l) Industrial Management.

____ (m) Cost Accounting

____ (n) Labor Problems.

Combined tabulations on Question No. 4:

Classes 1874-1924 Combined:	No. Reporting	Percent
Business Administration	105	70.4.
Contracts and Specifications	105	70.4.
Relation of Engineering to Modern Bus.	100	67.2.
Cost Accounting	100	67.2.
Business Law	98	65,8.
Finance	97	65.0.
Labor Problems	96	64.4.
Industrial Management	95	63.7.
Business Organization and Combination	94	63.0.
General Economics	92	61.7.
Principles of Modern Business	89	59.7.
Accounting	88	59.0.
Commercial Law	86	57.7.
Bookkeeping	79	53.0.

(Percent basis on 100% equals 149 men reporting.)

Form of Question No. 5, requesting graduates to give any constructive suggestions they might have to make regarding the general subject of the questionnaire:

Please Give any helpful suggestion or additional opinion you may care to, respecting the general subject of this questionnaire:_____

Tabulation of a few typical constructive suggestions and criticisms as to Business Courses, in answer to question No. 5:

Fundamentals of bookkeeping and accounting, knowledge of cost accounting are needed.

E. Wichon.

The idea of the present engineering courses should be shook up and revised. Times change and so must courses.

C. A. Pierce.

I find men with initiative need an engineering course to understand industrial problems. All executives or corporation bankers, lawyers, who have an engineering training has something the others have not. Let your boys know that pure engineering is one of the poorest paid means of making a living, but that a man is not studying engineering just to hold or get a job but to have an aid in getting a start for himself when the opportunity shows up.

F. O. Blake.

Train students as professinnal men not as skilled laborers. Teach them business so that they can take their place as directors and not as another employee.

W. H. Dunlop.

With a general working knowledge of the above subjects coupled with a real good knowledge of how to handle men, ability to organize and direct, the engineer's technical education would be broadened to an extent of assuring success which would otherwise only be probably attained.

R. F. Illidge.

I believe the average engineering student needs more training in business than he gets in the average engineering school.

Geo. Zeller.

I believe that the greatest weight should be placed upon questionnaires of those having the most engineering experience or upon questionnaires of those holding the more responsible positions.

D. Simmarmann.

Do not try to cover the field too broadly, teach a few of the most applicable subjects as thoroughly as possible in the time given.

E. T. Campbell.

General knowledge of economics essential before study of business, I think, but certainly need both. My general economics course was a failure, another course, engineering economics 2-hours, was fine as far as it went. I am now taking a two year business course (Alexander Hamilton) which is O.K. It broadens the vision immeasurably and is well worth the time and money spent. I consider some such training is necessary to me, despite five years contact with business prior to college.

Roger Manning.

The moderate importance of items so checked, would be covered by a general course. I think that an engineer would study along those lines as he was confronted with them in his daily work.

H. J. Beagles.

By all means put in a course in Industrial Management and Organization, because I find an engineer is ignorant of such things.

J. P. Gordon.

It seems as though too much optimism is given the graduate and he comes out of college with a false value of his worth to the employer. The graduate therefore receives quite a jolt when he does not receive the salary that he is commonly led to believe he is going to get at first.

Vern Joslin.

Questionnaire No. 3:

The third questionnaire sent out to the graduates of Missouri School of Mines was to determine from the Engineering Profession itself the requirements or qualifications of teachers in engineering colleges.

Number of Questionnaires sent out to and received from graduating classes:

	Sent Out	Rep. Rec'd.		Sent Out	Rep. Rec'd.
1874 - 3			1900 - 4		
1875 - 0			1901 - 8		
1876 - 2			1902 -10		
1877 - 0			1903 - 9		
1878 - 2			1904 -15	46	6
1879 - 1	8	3			
1880 - 1			1905 -17		
1881 - 2			1906 -14		
1882 - 3			1907 -12		
1883 - 1			1908 -24		
1884 - 2	9	1	1909 -31	98	15
1885 - 1			1910 -32		
1886 - 1			1911 -23		
1887 - 3			1912 -30		
1888 - 0			1913 -20		
1889 - 0	5	0	1914 -18	123	21
1890 - 0			1915 -11		
1891 - 3			1916 -32		
1892 - 4			1917 -27		
1893 - 3			1918 -21		
1894 - 5	15	4	1919 -14	105	31
1895 - 5			1920 -50		
1896 - 0			1921 -59		
1897 - 7			1922 -66		
1898 - 2			1923 -86		
1899 - 7	21	6	1924 -34	295	63

Form of Questionnaire No. 3.

Questionnaire in regard to teachers:
Feb. 4, 1925.

These sheets are separate from the others so that, in case you do not care to have your name attached to it in any way, you can mail it separately from the others. Please fill in the same and mail to the Committee on Engineering Education, Box 39, Rolla, Mo.

1. Place numerals (1, 2, 3, etc.) indicating your idea of the prime qualifications of the teacher in an engineering college in their order of importance:

____ Good moral character, loyalty, etc.

____ Theoretical knowledge of his subject.

____ Practical working knowledge of his subject.

____ No practical engineering knowledge or experience.

____ Sympathy with students, judgment, good sense in such contacts.

____ Liking or love for athletics and college sports.

____ Liking for out-door life in general.

____ Love for research or advanced study in engineering-science.

____ Polish, social activity, manners,,culture in general.

____ Demonstrated ability to teach, even if not a "walking encyclopaedia" in his subject.

____ Degree of Doctor of Philosophy.

____ Advanced degree in engineering, as C.E., M.S., ScD.,etc.

____ A B.S. degree in engineering.

____ Basic training in business side of engineering.

____ Basic training in "A.B." or cultural subjects.

____ General interest in affairs of the community and nation.

____ Ability to command a good salary.

____ Years of practical training in teaching.

____ Specific training in principles of pedagogy.

____ Other qualifications (Name them)_____

_____

2. Would the qualifications and fitness of engineering teachers be materially improved by requiring of the average entering teacher a combined degree or training in "engineering education"?

____ Yes _____Any other answer.

____ No

3. Do you think the engineering college is under obligation, in order to get better trained teachers, to provide a special course of study arranged for those who elect to follow the profession of engineering education?

____ Yes _____Any other answer.

____ No

4. What courses of study from the following list do you consider most important for prospective teachers in the engineering college? Indicate 1, 2, 3, etc., order of importance.

____ "A.B." or cultural subjects.

____ Fundamentals of science, as physics, chemistry, etc.

____ Engineering subjects.

____ Mathematics.

____ English and languages.

____ Basic business training.

____ Broad training in economics.

____ Broad training in psychology, sociology, philosophy.

____ Public speaking.

____ Political economy, government, etc.

____ Education and pedagogy.

____ Practical experience in industry, in shops, field, etc.

____ Any other_____

5. If an instructor is being chosen for a position in a department as English, Mathematics, Physics, etc., and is not to teach the technical "Engineering" subjects, should he necessarily know much of anything about engineering, provided he knows his own subject?

____ Yes _____ Any other answer.

____ No

6. Should the College attempt to improve the fitness of the younger teachers in any way other than by permitting them to practice teaching? If so, how?

_____

_____

Tabulation of replies to Question No. 1---The essential qualifications of the teachers in the Engineering School. Listed in order of importance as determined by the graduates of M. S. M. who reported. 150 men answering is the basis of rating.

Order of Importance	Name of the Qualification.
1.	Theoretical knowledge of his subject.
2.	Practical working knowledge of his subject.

Order of Importance.	Name of the Qualification.
3.	Demonstrated ability to teach.
4.	Sympathy with students, judgment, good sense in such contact.
5.	Practical engineering experience.
6.	Good moral character, loyalty, etc.
7.	Basic training in "business side of engineering."
8.	Love for research in engineering and science.
9.	"Mixer", polish, manners, social activity.
10.	General interest in community and national affairs.
11.	Years of practical training in teaching.
12.	Engineering degrees as E.M., C.E., M.E., E.E., M.S., ScD., Dr.Eng., etc.
13.	Ability to command a good salary.
14.	Love for out-door life in general.
15.	Liking for athletics and college sports.
16.	B.S. degree in engineering.
17.	Basic "A.B." training, cultural subjects.
18.	Specific training in principles of pedagogy.
19.	Degree of Doctor of Philosophy.
20.	No practical engineering knowledge or experience.

The order of importance was determined by selecting as first that qualification receiving the greatest total number of votes of all orders of importance, and so on until the rating as shown above was obtained.

Tabulation of replies to Question No. 2---Would the qualifications and fitness of engineering teachers be materially improved by requiring of the average entering teacher a combined degree or training in "engineering education"?

All classes combined:	No.	Percent
Yes	85	56.66.
No	41	27.34.
Questionable	12	8.00.
Not answering	12	8.00.
Total	150	100.00.

Tabulation of replies to Question No. 3---Is the engineering college under obligation, in order to get better trained teachers, to provide a special course of study arranged for those who elect to follow the profession of engineering education?

All classes combined:	No.	Percent
Yes	58	38.67.
No	75	50.00.
Questionable	6	4.00.
Not if can properly teach	1	0.67.
Practical experience more to be desired	2	1.33.
Provide more money, and so get better teachers	1	0.67.
Not answering	7	4.66.
Total	150	100.00.

Tabulation of replies to Question No. 4---The fundamental courses of study prospective teachers in the engineering colleges should have had.

Order of Importance.	Name of the Course
1.	Fundamental sciences, as physics, chemistry.
2.	English and languages.
3.	Practical experience in industry, shops, etc.
4.	Mathematics.
5.	Engineering subjects.
6.	Basic business training.
7.	Broad training in economics.
8.	"A.B.", or cultural subjects.
9.	Public speaking.
10.	Psychology, sociology, philosophy.
11.	Education and pedagogy.
12.	Political economy, government.

The order of importance is determined by the relative size of the number constituting the total of votes of all kinds or "orders" from first to twelfth order.

Tabulation of replies to Question No. 5---If an instructor is being chosen for a position in a department such as English, Mathematics, Physics, etc., and is not to teach the technical "engineering" subjects, should he necessarily know much or anything about engineering, provided he knows his own subject.

All classes combined:	No.	Percent
Yes	90	60.00.
No	46	30.67.
Questionable	10	6.67.
Not answering	4	2.66.
Total	150	100.00.

Tabulation of replies to Question No. 6---Should the College attempt to improve the fitness of the younger teachers in any way other than by permitting them to practice teaching? If so, how?

(a) Graduates answered the first part of the question "College should attempt to improve fitness" as follows:

All classes combined:	No.	Percent
Yes	75	50.00.
No	10	6.67.
Not answering	36	24.00.
Other answers as tabulated below	29	19.33.
Total	150	100.00.

(b) How "Fitness" is to be improved:	No.	Percent
Give them, or require them to get, practical experience in engineering	47	31.67.
Let the Director, or Department Heads, supervise their teaching or study	30	20.00.
Bring them into contact with successful industry	25	16.67.
Encourage or require post-graduate work	20	13.33.
Introduce course in Engineering Edu.	16	10.67.
Permit or require them to engage in reaearch	14	9.33.
Discourage inbreeding, or selection of M.S.M. graduates as teachers	6	4.00

Note: The numbers and percentages in the above will not sum to 150 for the numbers, or 100.00 for the per-cents, as same answer has in some instances been assigned to two groups, and some men gave more than one answer.

SHORT UNIT COURSES FOR INDUSTRIAL EXECUTIVE TRAINING

Training for supervision, is in general, along technical rather than production lines, and is likely to consist of various unrelated lines of work rather than to constitute a definite "course of instruction" as the term is commonly used. It might, for example, deal with certain forms of applied mathematics, or the particular procedure for routing and checking work in that particular plant, or with methods for keeping the work going, or of handling men. Such courses would evidently be disconnected so far as what was taught in one course was likely to help a man in another course, and the order in which he took the different lines of work would be of little importance.

Instruction for prospective executives will be of little value unless it is specialized, that is, unless it deals with the particular problems that come up in the particular plant in which the training department is located; with the particular methods followed in that plant, with the methods of handling the particular sort of men employed, etc. Only in rare cases, and with very advanced men will "general" courses be effective.

Probably work of this sort affords more field for the

use of printed instructional material, text books, (where books of the right sort are available, which is not often the case) illustrative methods of presentation and use of "home study" than any other line in Vocational Education. The men should be a highly selected group, of a high degree of intelligence, ambitions, and thoroughly familiar with the practical aspects of their trade. This type is so much more likely to do effective work under the instructional conditions just described.

The following pages contain discussion topics covering the field of the Industrial Executive as covered in the replies to the questionnaires sent out at the Missouri School of Mines. The topics are set up in the short unit course type, and are to be used in connection with foremanship conferences of the promotional type, when the plant has an independent training department. Since these courses are of college grade, they may be offered bythe college extension department or at the college, if the college is centrally located with respect to several small industries, not maintaining special training departments of their own. Whether or not the work is given in the college or in the industry, it should be under the direct supervision of the State Supervisor of Trade and Industrial Education.

I. Economics.

Introduction:

The Nature and Scope of Economics.

Definition of Economics.

Studies of man in process of development.

Economic laws.

Characteristics of the Present Economic System:

Human and physical conditions of economic activity.

Private enterprise and state activity.

Division of labor and exchange.

Economic classes.

Private property.

Trade-marks, copy-rights, and patents.

Inheritance.

Freedom.

Competition.

Cooperation.

Monopoly.

Custom.

Principles and Problems:

Production:

Production defined.

Production of values.

Factors of production.

Division of labor.

Effects upon the worker.

Productive organization of American People.

Consumption:

Consumption defined.

Human wants.

Law of diminishing utility.

Consumption and saving.

Harmful consumption.

Value and Price:

Meaning and significance of value.

The market.

Supply and demand.

Nature of supply.

Nature of demand.

The determination of price.

Distribution:

The problem of distribution.

Distribution controlled by existing institutions.

Law of diminishing productivity.

Marginal productivity of labor.

Marginal productivity of land and capital.

Social aspects of diminishing productivity.

II. Engineering or Plant Economics:

Introduction:

Need for knowledge of Plant Economics.

The problem of economic solution of plant structures and equipment.

Interest:

Simple Interest.

Compound Interest.

Use of Interest Tables.

Problems.

Sinking Funds:

Definitions.

Methods used in the determination of Sinking Funds.

Problems.

First Cost:

Definitions.

Determination of First Cost.

Problems.

Salvage Value:

Definitions.

Determination of depreciation etc.

Methods used in the determination of Salvage Value.

Problems.

Elements of Yearly Cost of Service:

Definitions.

Determination of Yearly Cost of Service.

Problems.

Estimating and Plant Valuation:

Problems.

Basis of Economic Selection:

Problems.

Procedure for Economic Selection:

Problems.

Examples and Exercises in Economic Selection.

Use of Depreciation and Life Interest Tables.

Use of Formulae, Tables and Values.

III. Industrial Organization:

Historical and Fundamental Principles:

Fundamental Principles.

Systems Preceding Present Methods:

Domestic production.

Handicraft Period.

Trade Guilds.

Cottage Period.

The Factory System.

The Industrial Revolution:

The Great Inventions.

The Character of these Inventions.

The Effects of the Great Inventions:

Extension of the New Principles.

Modern Industrial Tendencies:

Aggregation or Increase in Size.

Specialization----General Features.

Specialization of Men.

Advantages and Disadvantages of Specialization.

Standardization---Economic Basis.

Interchangeability.

Advantages and Disadvantages of Standardization.

Division of Mental Labor.

Forms of Industrial Ownership:

Individual Ownership.

Partnership.

Joint Stock Association.

Corporations---Nature and Classification.

Corporate Organization---Directorate.

Advantages and Disadvantages.

Cooperative and Governmental Ownership.

Principles of Organization---System:

General Principles.

Military or Line Organization.

Functional Organization.

Coordination and Executive Control.

Committees in General.

The Manufacturing Committee.

The Tool Committee.

The Shop Committee.

Other Committees.

Departmental Systems.

IV. Industrial Management:

The Physical Side of the Plant:

Location of Plant.

Adaptation of Buildings---Plant Layout.

Arrangement of Equipment.

Sequence of Processes----Routing.

Building Construction.

Industrial Lighting.

Industrial Air Conditioning.

Factory Power.

Planning Departments:

General Principles.

Routing or Scheduling.

Dispatching.

Functions of the Planning Department.

Functional Foremanship.

Forming the Instruction Card.

Order of Work Methods.

Data on Machines.

Standard Performances---Time and Motion-study.

Requirements and Apparatus for Time-study.

Making Time-study Observations.

Interpreting Time-studies.

Fatigue.

Length of Rest Periods.

Methods of Insuring Performance.

Standardization:

Standardization of Product:

Standard Materials.

Standards of Form and Size.

Standards of Excellence.

Standardization of Quantity.

Standardization in Operation:

Standard Methods and Performances.

Standard Tools.

Standard Conditions.

Engineering Standards.

Effect of Standards.

Inspection:

Reasons and Basis for Inspection.

Relation of Inspection to Standards.

Inspection of Purchases.

Inspection During Manufacture.

Performance and Assembly Tests.

Inspection in General.

Wage Payment:

The Basis of Industrial Wages.

The Primary Wage Systems.

Day Work---Defects etc.

Piece Work---Difficulties etc.

Contract System.

The Halsey Premium Plan.

The Rowan Modification of the Halsey Plan.

The Tayler Differential Piece Rate.

The Gantt Bonus Plan.

The Emerson Efficiency Plan.

Profit-sharing Methods.

Summary---Theories of Management:

Business Failures---Causes of Failures.

Scientific Methods.

Economic Principles.

Human Relations.

Economic Results.

V. Finance or Cost Keeping:

Need of Accurate Costs.

The Elements of Cost.

Classification of Expense.

Interest and Rent.

Insurance and Taxes.

Repairs and Betterments.

Depreciation.

Defective Material and Spoiled Work.

Experimental Work.

The Classified Expense Order-number List.

Sources of Cost Data.

Characteristics of Expense:

Distribution on Material as a Basis.

Distribution on Direct Labor as a Basis.

Distribution on Prime Cost as Basis.

Distribution on Man-hours as a Basis.

Distribution by Machine Rate.

The Machine Rate and Supplementary Rate.

Distribution by Production Centers.

Application of Production Center Method.

Distribution of General Expense.

VI. Employees' Service and Labor Problems.

Employees' Service:

General.

Factory Welfare Work.

Scope and Origin of Employees' Service.

Health Conservation.

Factory Hygiene and Personnal Comfort.

Ventilation and Lighting.

Lavatory and Dressing Facilities.

Housing and Individual Equipment.

Accident Prevention and Relief.

Financial Betterment.

Rest and Recreation.

Future of Employees' Service.

Industrial Education.

Industrial Legislation.

Employee Participation in Management.

Labor Problems:

Labor Unionism.

Strikes and Lock-outs.

Causes and Effects.

Apprenticeship.

The Earnings of Labor.

Doctrine of the Wages-Fund.

Profit-sharing.

How to Manage Men.

Productive and Unproductive Labor.

Child Labor and that of Women.

Relations of Capital and Labor.

Open Shop versus Closed Shop.

Employee Ownership of Company Stocks and Bonds.

Workmens' Compensation Laws.

Principles of Labor Legislation.

Manufacture's Associations.

Industrial Democracy or Industrial Government.

SELECTION AND QUALIFICATION OF TEACHERS FOR EXECUTIVE TRAINING

In the selection of a teacher for this particular job, one must be provided who possesses in a large measure all the qualities desirable in all teachers, plus others peculiar to the work of the industrial teacher. The selection of such teachers should be made with care to insure the right personality, while the professional qualifications should be assured by a thorough training

program that is based upon the immediate demands of the situation. In the first place, certain characteristics, native and acquired, are obviously highly desirable, these to-gether with experience and general training, should be the determining factors in the selection of these teachers.

(a) Factors in the selection of teachers:

1. They should have a strong abiding sympathy and a desire to help the men meet their problems.

2. They should possess resourcefulness and tact in meeting new and difficult situations and should embody a happy combination of dignity, reserve, and sense of humor.

3. They should be likable and optimistic and should radiate enthusiasm.

4. Their observations should be wide and accurate, their experience broad and inclusive.

5. Their habits and standards should be acceptable.

6. They should be master of the subject matter or content of instruction.

7. They should have had experience as a wage earner comprehensive enough to give an understanding and appreciation of the problems which confront industrial workers.

8. An understanding of the fundamental social and economic principles underlying the institutions of our society.

9. Adequate experience in the practical work of the occupational field in which the individual is to teach.

(b) Professional requirements of executive teachers:

1. Ability to visualize the needs of the group to be served.

2. Detailed knowledge of local economic and industrial conditions, problems, and needs including, a detailed knowledge of the local resources that play a part in the individual instruction.

3. Understanding of the physical and mental characteristics of the men to be instructed.

4. Appreciation of the necessity of treating the men as individuals.

5. Ability to determine individual needs.

6. Ability to interpret need in terms of training objectives.

7. Ability to make an analysis---job, responsibility, or lesson, etc.

8. Ability to plan teaching units or lessons based on an analysis.

9. Ability to organize subject matter into courses when necessary.

10. Ability to use sources of information and to develop and select teaching materials.

11. Mastery of special methods and uses of illustrative, graphical, and demonstration material as aids in teaching.

12. Ability to teach in terms of objectives.

INSTRUCTOR TRAINING PLAN FOR INDUSTRIAL EXECUTIVE TEACHER TRAINING

The purpose of this training course is to equip individuals to conduct instructor-training courses; the purpose of an instructor-training course is to equip instructors to instruct. Since this plan is to develop instructor-trainers for executives only, the purpose will be to give only teaching technique and instructional managerial ability to individuals who already know what they are to teach and who possess a mastery of content through occupational experience.

From the standpoint of organization this particular instructor-training course can be organized or classified as either a short-unit continuous intensive training course, or as a short-unit discontinuous intensive training

course. The first type is characterized by the fact that a group of prospective instructors are brought together for a short period of extremely intensive work, during which they give their whole time and energy to the work. A period of six weeks will give very satisfactory results in terms of the objective. The second type is usually conducted through meetings held twice a week in the evening, the members of the group carrying on their ordinary occupations during the day-time. These courses usually extend over a period of twenty-five weeks. The training may be carried on through a designated educational agency such as the State university, A. and M. college or in industry its-self.

In most cases the limited time available for giving such courses, makes it necessary that the subject matter should deal as directly as possible with the principles and methods of good teaching and their application to the teaching problems of the particular occupations of the prospective or employed teachers under instructor-training. A teacher-training plan that would meet the above requirements should consist of the following steps:

1. The selection of instructional methods in developing the method of analysis, including:

(a) The development of the idea of analysis,

through its application to simple every-day jobs---telling time by a watch, opening a pocket-knife, taking key off a key-ring, and methods for teaching its applications to trade analysis.

1. Create a sense of need by assigning simple analysis to introduce the subject.

2. Give demonstration and practice on sample analysis of some simple every-day jobs.

2. The technique of instruction:

(a) The lesson or instructional job and its determination:

1. Objective or Purpose.

2. Points to be covered in lesson.

3. What the learner knows or can do.

4. Points to be taught.

5. Equipment, supplies etc.

6. Method to be used in instructing.

(b) The analysis of the instructional unit or the teaching process:

1. Preparation Step:

(a) Getting the learner's interest.

(b) Statement of objective.

2. Presentation---Instructor presents:

(a) Teaching method.

(b) Operating points 1, 2, 3, etc.

(c) Questions by learner, when necessary.

3. Application---Learner applies himself:

(a) Method of application.

(b) Operating points 1, 2, 3, etc.

(c) Help from instructor when necessary.

4. Test Step:

(a) Method of testing the learner.

(b) Learner goes through job unassisted by instructor.

3. Training in the selection and use of instructional methods suitable to developing the idea of progression in instruction:

(a) The conception of the difference between learning difficulties and production difficulties.

(b) The analysis of an instructional job with regard to learning difficulties.

(c) The conception of progression with regard to learning difficulties.

(d) The setting up a series of instructional jobs in progression with regard to learning difficulties.

(e) Methods for developing the ability to use the principle of the card index in making a complete classified analysis of the occupation by the prospective instructor.

1. For example:

Taking the subject of executive training, one subdivision in the major classification would be Industrial Management. This is considered as a block of the larger or complete subject under the head of executive training. In turn this block is broken up into smaller divisions called checking levels. An example, "Standardization" would be classed as a checking level. The checking level "Standardization" will again be divided into unit lessons such as Standardization of Product, Standards of Operation etc. These lesson units will be classified as to specifications of each, and into groups meeting approximately the same specifications. The lesson units are made out on cards and arranged in packs; each pack approximately corresponding to the type lesson specifications for one checking level. The different packs should then be arranged in the order of successive checking levels. Each checking level and block division should be indicated by a colored guide card and thus a complete analysis of any subject may be made.

(f) Methods suitable to the development of the various concepts treated in the instructing process and the application of these methods to the various steps in the lesson.

1. Methods to be used in the instructing process:

(a) Lecture method.

(b) Demonstration.

(c) Illustration.

(d) Experimental method.

(e) Combination of above methods.

4. The general principles of instructional management as applied to the use of the conference or group method in instruction with men of the type to be trained:

(a) The development and informational lines of approach and their relative value in developing the various concepts included in the instructor-training course.

5. The use of instructional material:

(a) Types of instructional material available, consisting of instruction notes, forms, and points for discussion.

(b) The effective use of the material in connection with the conference method of instruction and with regard to the characteristics of the conference group.

(c) Dangers in the improper use of instructional material and how to avoid them.

6. Records and reports:

(a) The use of the individual progress charts.

(b) The use of enrollment and discharge cards.

(c) Reports regarding time required to develop a reasonable degree of efficiency in teaching.

Effective instructional work for prospective instructors for an instructor-training course of this type should be given in from one-hundred to one-hundred and fifty hours, provided the prospective instructor-trainers are well aquainted with the ordinary information possessed by competent instructors, have had teaching experience, understand the difference between development teaching and mere conducting of textbook recitations, and have had contact with industrial people.

THE HUMAN ELEMENT

Supervision----Man Factors.

This unit deals with possible supervisory responsibilities in connection with the "man factors". It is the field to which the average foreman has given the least careful thought, and his conception of his "man factor" responsibilities is usually limited. Methods of approach

must, therefore, be largely developed, and discussion must be used freely. In many cases, men will be introduced to responsibility points that have never come to their attention. While this unit apparently deals with foremen only, the successful executive must have an appreciation of these "man factor" responsibilities.

In following the plan of the work as laid out the instuctor should bear in mind that this unit only deals with responsibility points in supervision, not with cost or management. Unless this point is continually kept in mind in directing discussions, much confusion will result. The questions and discussions should all center around questions of responsibilities. Should, or should not a foreman be held responsible for (?) as a part of getting out his product?

Topics for discussions:

Labor Distribution---General.

Man factor defined.

Men as part of the production equipment.

Orders, Suggestions, Directions---General.

Carrying on work by prescribed procedure.

Working with other men:

Cooperating.

Keeping up morale.

Cooperating with the management.

Cooperating with immediate superiors.

Cooperating with other foremen.

Responsibilities for promoting interest.

Responsibilities for promoting satisfaction.

Keeping up the working force:

- Hiring men.
- Firing men.
- Penalizing men.
- Reprimanding men.
- Commending men.
- Transferring men.
- Summary.

Physical condition of the working force:

- Illness.
- Incipient disease.
- Chronic disease.
- Personal habits.
- Physical fatigue.
- Mental fatigue.
- Dangers of personal injury due to special conditions of the man.
- First aid.
- Summary.

Keeping Records:

Seeing that records are correct.

Seeing that records are complete.

Seeing that they are kept in prescribed manner and form.

Seeing that they are kept up to date.

Seeing that they are legible.

Making Reports:

Making reports correctly.

Making complete reports.

Reporting on time.

Reaching the right person.

Making them in prescribed form.

Making them legible.

Cost Elements In Connection With Men:

How necessary and unneccessary order, directions, and suggestions affect cost.

Cost elements in safety.

Cost elements in ventilation.

Cost elements in illumination.

Cost elements in temperature conditions.

Cost elements in modern surroundings.

Cost elements in working facilities.

Welfare work versus cost control.

Cost of the dissatisfied man who is dissatisfied with his job.

Cost of the dissatisfied man who does not think that "he is getting a fair show."

Cost of the man who is dissatisfied with the working facilities.

Cost of the man who thinks his job not important.

Cost of the man who thinks his job is "beneath him"

The man who "knows too much for his job."

Cost of the man on the wrong job.

Cost of the man who thinks that he is being "put on"

Cost of the poorly adjusted team.

Cost of fatigue due to length of working period.

Character of job as a cost factor.

Disease as a cost factor.

First aid as a cost factor.

THE ADMINISTRATION OF EXECUTIVE TRAINING COURSES

The administration of executive training courses should be through the local director of vocational education. The authority of the director is, of course, derived from the Board of Education through the State Supervisor of Trade and Industrial Education. His responsibilities may be classified as follows:

1. Teachers:

(a) Power to select and recommend for appointment.

(b) Power to recommend for dismissal.

(c) Power to recommend for promotion.

(d) Power to assign, transfer, and reassign.

All of the above subject to approval by the state supervisor and board of education.

2. Equipment:

(a) Power to select and recommend concerning all phases of equipment, subject to approval by state supervisor and board.

3. Materials and Supplies:

(a) The responsibility for the formulation of material and supply lists, specifications and requirements.

(b) Power to purchase on basis of predetermined and approved budgets.

(c) Responsibility for the formulation of a material and supply budget.

(d) The establishment and maintenance of a record system for keeping account of materials and supplies.

(e) The assignment of materials and supplies to certain classes, or teachers.

(f) The establishment and maintenance of a proper accounting system.

4. Courses of Study:

(a) Formulation of curricula, courses of study, short unit courses, for special classes and needs.

(b) All courses of study should be developed in conference with teachers most concerned, and laymen specially interested.

(c) The examination and adoption of text books.

All of the above subject to final approval by the state supervisor.

5. Records:

(a) The director should maintain a system of records concerning:

1. Classes, schedules, programs, and holding power of classes, size of classes.

2. The students; concerning age, intelligence quotients, distribution of marks, kinds of employment etc.

3. Regarding the teachers; their previous training and experience, courses taken during service, programs of teaching, salaries, etc.

4. Concerning costs: costs per student-hour, per class, per teacher, for materials and equipment etc.

6. Budgets:

(a) General yearly budgets covering teachers' salaries, materials and supplies, equipment etc.

(b) Any special budgets as called for by the state supervisor or board.

7. Research:

(a) New courses, new schools, and new classes.

(b) The functioning of present course offerings.

(c) Statistics concerning any phase of the student body.

8. Cooperation:

(a) To work out plans for cooperating with various agencies interested in the special problem of executive training.

CONCLUSION

Executive training is a field in which, to date, the vocational educators have practically neglected and a need for it is readily recognized after a careful study of the results of the investigation of engineering education carried on at Missouri School of Mines. The solution of this problem lies in the field of vocational education. Since the courses for executives are of college grade, they are adaptable to college classes for executives or may be given in industry where training departments are maintained.

The type of school beat fitted for this work would probably be the evening extension type or possibly a part-time school for adults. The group whose needs must be served are those foremen and minor executives who are employed and whose maturity places them beyond and outside of the group served by the continuation school and the part-time trade extension school. Members of this group have secured effective entrance into industry and are pursuing occupations that yield a higher income than that of the younger workers who are still of school age. Furthermore the courses would probably be given under the conference method by an able conference leader or instructor who is a successful executive himself.

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