

EDUCATION FOR INDUSTRY

**A COLLEGE LEVEL PROGRAM EMPHASIZING
TECHNICAL AND PRE-SUPERVISION PREPARATION
FOR MANUFACTURING AND SELECTED SERVICE INDUSTRIES**

**by
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of the University of Maryland in partial
fulfillment of the requirements for the
degree of Doctor of Education**

1952

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PREFACE

Modern industry requires a wide range of specialized persons and a systematic coordination of these specialists. The executive group includes both high-level specialists such as engineers and accountants and high-level coordinators such as general managers, comptrollers, industrial relations managers and the like. Throughout the different management-levels these parallels are maintained.

At the first-line supervisor level the aspects of the job which require technical expertness are provided by design engineers, production engineers, production planners, and material control experts. The coordination of the elements of production and the handling of the workers requires a person with sufficient understanding of technical procedures to supervise the processes of manufacture in accordance with established qualitative and quantitative standards and to meet the production schedules through the effective organization of people. Experiences providing preliminary preparation for the fulfillment of these functions are provided through the technical, and the human relations and leadership areas of this proposed Education for Industry curriculum.

The complexity of modern industry and the numerous laws and regulations under which it operates necessitates the use of extensive oral and written communications, records and

reports, and the concomitant need for a knowledge of the language arts. Preparation for these functions are provided through the communications area of the proposed curriculum.

The social-civic responsibilities of modern production supervisors require an understanding of people, a knowledge of the functions of various political, social and economic groups, a comprehension of the reasons for their behavior, and a familiarity with labor economics and the history and government of the United States. Experiences in the social-civic area are required to develop competency in these fields.

Opportunities to observe and experience first-hand the organization, practices, and problems of industry are provided through work-experience internships. These practical internship periods should also afford the student with opportunities to correlate his studies on the campus with the needs of particular industries and to visualize and understand these relationships more thoroughly.

The purpose of the Education for Industry program is to prepare students for positions in industry, starting as production or inspection technicians and advancing, with further experience in the company, to positions of greater responsibility including supervision. The technical experiences provided in the program coupled with the other college experiences and the work internship periods should prepare the student for initial employment in various types of production or inspection work or as trainees for supervisory positions.

At the same time, the student is provided a general education with a Bachelor of Science degree and he is developing valuable background experiences which should enable him to advance to higher positions in the industry of his choice.

The proposed program is in keeping with the trend of universities and colleges to extend their offerings into new fields of endeavor. The American university has come to share the responsibility for improving medical practices, engineering, agriculture, home economics, and international relations to mention only a few areas. These services have been added one by one as each field came to comprehend more than could be learned by the "pick-up" method and as persons sought to use higher education facilities to become more proficient in their practices. Understandings and techniques essential to the efficient operation of industry have become extensive and they have become systematized, thus permitting teaching and learning. Students are now seeking to use their college years to learn these understandings and techniques. The University of Maryland can extend its services to the manufacturing and service industries of the state by providing a curriculum for the preparation of semi-professional personnel utilizing existing courses and facilities which are available in its various colleges.

The purposes of this study have been to obtain information for the purpose of developing a tentative four-year college program emphasizing technical and pre-supervision

preparation for employment in manufacturing and selected service industries, to determine the reaction of Maryland industrialists to the proposed program, and to summarize the need for personnel with this type of preparation.

The study is presented in the following sequence. In Chapter I the problem is introduced, the procedures and techniques used in the study are described, and the assumptions which were made for the conduct of the study are stated. Similar industrial education programs in universities, colleges and a technical institute are described in Chapter II, and several industrial training programs in private industry are presented in Chapter III. In Chapter IV the proposed "Education for Industry" program for the University of Maryland is outlined, and Chapter V compares the program with other comparable curriculums offered by the University of Maryland. The results of the survey of Maryland industries are revealed in Chapter VI, and conclusions and recommendations are made in Chapter VII.

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Further acknowledgements are due the universities, colleges, technical institutes, and manufacturing companies which submitted catalogues, bulletins, and reports concerning their education programs, and to the Maryland industrial executives who reported in the survey.

W. P. Tierney

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CHAPTER I

INTRODUCTION TO THE PROBLEM

This study is the outgrowth of the expressed needs of a limited number of Maryland industrial representatives for a college program to supply graduates who would be potential candidates for management positions of the semi-professional or junior executive type, and the expressed needs of students for such a program. A tentative program was prepared and presented with favorable reaction at a joint meeting of the Maryland Society of Training Directors and representatives of the University of Maryland on September fifteenth, nineteen hundred and fifty.

Statement of the Problem. The first purpose of this study is to obtain information for the purpose of developing a tentative college-level program emphasizing technical and pre-supervision preparation for employment in manufacturing and selected service industries. The second purpose of the study is to determine the reaction of Maryland industrialists to the proposed program. The study also summarizes the need of Maryland industries for semi-professional persons who would enter employment as production or inspection technicians and advance with further experience and training to positions of greater responsibility including supervision. Upon the basis of these findings, the need for the program is presented and recommendations are offered for the further refinement of

the program.

Procedures and Techniques. After the area of study was selected the first step in the delineation of the problem was to examine pertinent literature. Indices such as the Readers' Guide to Periodical Literature, the Industrial Arts Index, the Psychological Abstract, the American Vocational Association's bibliography Studies in Industrial Education, and the magazine "Occupations" were used to locate source materials.

In order to determine what other institutions of higher learning are doing regarding the preparation of students for work in industry, a search was made for similar programs. To select the names of institutions where programs might exist, the Education Directory of the Office of Education Part 3, Higher Education, was used. The selections were made on the basis of the names of the institutions and offices that were listed in the directory which were in some way related to industrial education. Schools of engineering and business management were generally excluded because the purposes of curriculums in these fields differ from the purpose of the proposed curriculum in this study. Where it was believed there was no possibility for a program to exist the institution was excluded. This elimination included such institutions as medical, law, theological seminaries, women's colleges, music and art schools, and military schools. Junior colleges were also omitted chiefly because the Educa-

tion for Industry program is a four year program. This list was supplemented by including names of some of the institutions which had offered to assist in the Work-Study-Training for Productivity Program sponsored by the Productivity and Technical Assistance Division of the Economic Cooperation Administration. A letter was mimeographed (Appendix A p.150) and sent to sixty-one selected institutions. Replies in the form of letters, catalogs, or bulletins were received from forty-seven institutions.

To gain an insight into what industrial concerns do toward educating employees, letters (Appendix B, p.152) were sent to twenty-four national concerns which had literature pertaining to training programs deposited in the American Society of Training Directors' Library at Purdue University, Lafayette, Indiana. A catalogue of these training materials is included in a supplement to the Journal of Industrial Training, Volume 4, Number 6, November-December 1950. Nineteen replies were received and seventeen companies sent materials pertaining to their training programs.

The main body of the study consists of the survey of Maryland industries to determine the need for graduates of the proposed program and the reaction of Maryland industrialists and business men to the specific and general requirements of the proposed curriculum. Preliminary survey forms were developed. Copies of these are included in Appendix C (p.154). Six industrialists and business men were then

personally interviewed, first, to determine difficulties which might be encountered by the respondents, second to observe their reactions, and third to establish a basis for refining the survey instrument. It was found that these persons seemed to prefer to discuss needs of their company first before talking about the details of the proposed program and that some difficulty was encountered by them in relating the titles of courses listed in the survey form to the course descriptions which were listed separately. This resulted in two major changes in the survey forms. The sequence was changed, placing the general questions first, and the form was altered to include a brief course description at the place to be checked, thus eliminating the necessity for referring from one section to another. The two sections were also made more distinct by labelling one "Information" and the other "Survey."

In order to obtain the mailing list, the Maryland Department of Labor and Industry's Directory of Maryland Manufacturers, October 1950, was used. This directory lists approximately four thousand, six hundred Maryland industries. From this number five hundred and seventy-two were selected on the basis of number of employees and the type of industry. All companies employing less than twenty-five employees and industries employing large percentages of women, such as, food processing and garment manufacturing were excluded. It was felt that the opportunities for advancement and the need

for graduates of the proposed program would be very limited in these industries. Three further eliminations were made on the following bases: first, manufacturers or processors of simple products such as soft drinks, concrete and cinder block, boxes and crates, paper boxes and other paper products, metal stampings, scrap metals, sand and gravel, and manufacturers employing large numbers of unskilled workers such as manufacturers of cotton fabric, yarn, netting, twine, glass bottles, and book matches were eliminated; secondly, manufacturers employing highly specialized workers such as manufacture or processing of optical lenses, jewelry, mattresses, synthetic soap, shoes, building stone, drugs, oils, greases, stone cutting and polishing, metal engraving, and manufacturers of specialty products such as artificial trees, emblems and insignias, Christmas tree ornaments, toy watches, sporting goods, wooden lamps, store fixtures, and household specialties were eliminated; the third and final elimination included small manufacturers of products which duplicated the products of larger companies which were already included. These eliminations brought the total to one hundred and thirty-nine industrial concerns. All of these companies were contacted and responses were received from sixty of them.

Assumptions. In order to conduct this study the following assumptions were made:

1. That there is need in Maryland industries for persons prepared in a four-year college level program which emphasizes technical experiences in a variety of areas and a general education characteristic of a non-professional, four-year program.
2. That it is possible to identify within a variety of industries a series of continuing needs which can be met in a single program.
3. That the increasing complexity of modern industrial processes, and production machinery calls for greater competency in technicians who work with these processes and who operate and maintain intricate equipment.
4. That the supervision of production workers involves greater responsibility in modern industry today than it did formerly, and that a broader type of preparation is needed.
5. That there is an adequate body of subject matter in the fields of work represented to warrant the extension of university activities into this field.
6. That the questionnaire which was developed based on interview and preliminary form and used for the study was a satisfactory instrument for obtaining the data which were sought.
7. That the questionnaires were filled in by responsible people who are in positions to have the information which

was sought.

8. That the persons who filled out and returned the questionnaires understood the questions asked and supplied valid and reliable answers.

9. That the companies which responded to the survey represent a cross section of the companies which were contacted.

10. That the data which were collected can be compiled and brought together in summarizing statements.

CHAPTER II

A REVIEW OF SIMILAR INDUSTRIAL EDUCATION PROGRAMS

In order to determine what other institutions of higher learning are doing to meet the need for industrial technicians and prospective supervisors, sixty-one educational institutions were selected according to the procedure described in Chapter I, and were contacted by letter (See Appendix A, p.150). Thirty-five of these institutions are universities, ten are colleges, and sixteen are technical institutes. Of the forty-seven which responded either by letter or by submitting their catalogues, eight were found to have programs similar to the one proposed in this study. Thirty-nine were found to have no similar programs. The following eight institutions were found to have programs similar in many respects to the program proposed for the University of Maryland: (1) Agricultural and Mechanical College of Texas, College Station, Texas; (2) Bradley University, Bennett College, Peoria, Illinois; (3) Kent State University, Kent, Ohio; (4) Oregon State College, Corvallis, Oregon; (5) University of Houston, Houston, Texas; (6) Western Michigan College of Education, Kalamazoo, Michigan; (7) West Virginia Institute of Technology, Montgomery, West Virginia; and (8) Wilmington College, Wilmington, Ohio. Seven of these programs are in operation and one, Wilmington College's, is planned but as yet has not been placed in

operation.

Agricultural and Mechanical College of Texas. The Agricultural and Mechanical College of Texas at College Station, Texas has a program called Industrial Technology. The purpose of this program is to prepare young men to enter industrial employment in the following types of occupations: Industrial Relations, Production, Personnel Work, Public Relations, Industrial Supervision, and Industrial Safety Positions. It is a four year program with no credit allowed for work experience. The degree of Bachelor of Science in Industrial Education is awarded upon successful completion of the program. The first two years of the curriculum are identical to the first two years of the curriculum for industrial arts teacher education.

The Curriculum. The curriculum for the Industrial Technology program is as follows:

Freshman Year			
First Semester		Second Semester	Credit
Basic	1	Basic	1
Engineering Drawing	2	General Chemistry	4
Indus. Freehand Sket.	3	Engineering Drawing	1
Eng. Comp. & Rhet.	3	Descriptive Geometry	3
Wood Craft	3	Methods of Industrial	
Algebra	3	Reproductions	1
Plane Trigonometry	3	Eng. Comp. & Rhet.	3
Welding & Foundry	1	Sheet Metal	3
Military or Air Science	1	Welding and Foundry	1
Physical Education	R	Military or Air Sci.	1
		Physical Education	R
	<u>19</u>		<u>18</u>

Sophomore Year

Construction Drawing	2	Construction Drawing	2
Eng. Comp. & Lit.	2	Development & Practice	
History	3	in Industrial Ed.	2
Ornamental Iron	3	Applied Indus. Elec.	3
Engineering Problems	2	Engineering Problems	2
Machine Shop	1	Cabinet Making	3
Military or Air Science	1	Machine Shop	1
College Physics	4	Military or Air Sci.	1
Physical Education	R	College Physics	4
		Physical Education	R
	<u>18</u>		<u>18</u>

Junior Year

Business Adm.	3	Business Law	3
Writing and Discussion	2	Prin. of Economics	3
American National Govt.	3	Writing for Prof. Men	3
A Study of Modern Indus.	3	Industrial Accident	
General Metalwork	3	Prevention	3
Elective	3	Survey of Indus. Engin.	3
		Elective	3
	<u>17</u>		<u>18</u>

Senior Year

Economics(elective)	3	Personnel Prob. of	
Speaking for Prof. Men	2	Industry	3
Foremanship & Supervis.	3	Seminar in Indus. Ed.	1
Industrial Journalism	3	Production Engineering	2
Elements of Time Study	1	Labor and Industry	3
Industrial Psychology	3	Approved elective	7
Elective	3	Elective	3
	<u>18</u>		<u>19</u>

Bradley University. Bennett College of Bradley University, Peoria, Illinois has a program called "Industrial Education for Industry", the purpose of which is preparation for work in industry. Applicants seeking admission to the program must meet the regular admission requirements of the college. If he is a graduate from a four year high school he must present 15 units of acceptable preparatory work. If he is a graduate of a three year high school he must have

successfully completed twelve units of work. A student in the upper half of his class may be admitted without examination but he must have five recommendations from school officials and others who are personally acquainted with him. If a student was in the lower half of his class he may be admitted only by examination and special action of the faculty admissions board.

Curriculums. The courses for all students in the Industrial Education for Industry programs are the same for the freshman and sophomore years. Six options, however, are provided during the junior and senior years. These include the automotive, the building construction, the electrical, the machine drafting, the metal, and the wood options.

First Semester		Freshman Year	
	Hours	Second Semester	Hours
English Composition	3	English Composition	3
Applied Physics	3	Applied Physics	3
Industrial Math	3	Industrial Math,	
Mechanical Drawing	3	Mechanics I	3
Approved Elective	2-3	Approved Electives	5-6
P.E. or A.S.	1-2	P.E. or A.S.	1-2
		Sophomore Year	
U.S. History & Govt.	3	U.S. History & Govt.	3
Principles of Econ. or		Principles of Econ. or	
Pol. Sci.	3	Pol. Sci.	3
Foundation Drawing or		Speech Elective	2-3
T. Dr.	2	Approved Electives	6-7
Approved Electives	4-5	P.E. or A.S.	1-2
Hygiene	2		
P.E. or A.S.	1-2		

Automotive Option Junior Year

First Semester		Second Semester	
Gen'l. Machine Shop	3	Gen'l. Machine Shop	3
Forg., Weld., Heat Tr.	3	Welding	3
Aircraft Engines	2	Garage	3-4
Machine Details	3	Report Writing	2
Elec. Wiring	3	Motor Test & Repair	3
Garage	2-3	Electives	2-3
Senior Year			
Diesel Engines	2	Law for Engineers	2
Machine Tools	3	Machine Tools	3
Air Engine Lab.	3	Adv. Garage	3-4
Adv. Garage	3	Accounting	2
Accounting	2	Electives	4-5
Electives	2-3		

Building Construction Option Junior Year

Mach. Woodworking	3	Machine Woodworking	3
House Planning	3	Estimating	3
Accounting	2	Accounting	2
Heating & Ventilating	3	Perspective	3
Approved Electives	6	Approved Electives	5-6
Senior Year			
Real Estate	2	Report Writing	2
Arch. Projects	4	Adv. Arch. Projects	4
Ind. Management	3	Real Estate Law	2
Adv. W.W. Machine	3	Building Construction	4
Approved Electives	4	Approved Electives	6

Electrical Option

Junior Year			
Illumination	2	Rect. & Converters	3
D.C. Machinery	3	A.C. Circuits	3
Gen'l. Machine Shop	3	Gen'l. Machine Shop	3
Accounting	2	Accounting	2
Intro. to Psychology	3	Ap. Math Elec. &	
Bus. Corr.	2	Mag. Circuits	3
		Report Writing	2
Senior Year			
Adv. Machine Shop	3	Adv. Machine Shop	3
A.C. Machinery	3	Elec. Circuit Analy.	3
Ind. Management	3	Industrial Psych.	2-3
Electives	6-7	Creative Design	2
		Electives	4-5

Machine Drafting Option

Junior Year

Pattern Making	3	Mach. Drafting	3
Adv. Mach. Drawing	3	Mach. Tools	3
Machine Tools	3	Wiring or D.C.	3.
Accounting	2	Accounting	2
Industrial Management	3	Personnel Management	2
Arch. Drawing	3	Approved Electives	2

Senior Year

Mechanical Design	5	Metal Processing	3
Adv. Machine Drawing	3	Arch. Drawing	3
Report Writing	2	Gears and Cams	3
Industrial Psy.	3	Approved Electives	8
Approved Electives	3-4		

Metal Option

Junior Year

Machine Tools	5	Machine Tools	5
Welding	3	Pattern Making	3
Bench Metalwork & Spin.	3	Machine Details	3
Intro. to Psychology	3	Lettering & Sketch.	2
Ind. Management	3	Elements of Motion and Time Study	3

Senior Year

Metal Processing	3	Practical Metallurgy	3
Sheet Metal	3	Report Writing	2
Production Planning	3	Gears and Cams	3
Tools, Jigs, Fixtures	3	Safety Engineering	2
Approved Electives	4-5	Approved Electives	6-7

Wood Option

Junior Year

Adv. Mach. Woodwork	3	Millwork	3
Furniture Design	3	Carpentry	3
Accounting	2	Math Materials of Ind.	3
Foundation Drawing II	2	Estimating	3
Furniture Construction	3	Accounting	2
Wood Finish & Upholstery	3	Approved Electives	2-3

Senior Year

Manufacturing Practice	3	Machine Cabinet Work	3
Maintenance	3	Industrial Psych.	3
Applied Psychology	3	Creative Design	2
Industrial Management	2	Approved Electives	8-9
Report Writing	2		
Approved Electives	3		

The Industrial Education for Industry programs are four year programs and the Bachelor of Science degree is conferred upon completion. A maximum of ten semester hours of academic

credit is allowed for work experience in industry which may be obtained through proficiency examinations. A fee of fifteen dollars is charged for each semester hour of credit obtained in this manner. C.M. Hewitt, Vice-President of the College, indicated that the job placement record and the success of graduates in procuring promotions was "good." Bradley College also offers two year terminal programs in the same areas for which a diploma is granted to students upon successful completion of a program.

Kent State University. Although the main purpose of Kent State's Industrial Arts program at Kent, Ohio is teacher preparation, quite a number of its graduates are being placed in industry especially those who take the twelve week cooperative course with the Chrysler Corporation in Detroit, Michigan. The Industrial Arts Department jointly sponsors with the Mathematics and Physics Departments a Bachelor of Science field of concentration titled "Industrial Technology." Applicants who are graduates of first-grade high schools in Ohio and have at least sixteen units of high school credit are accepted after passing certain tests which are a general admission requirement of the college. Graduates of accredited secondary schools of other states are considered on the same basis.

Curriculums. The required and elective courses for the Industrial Technology curriculum are as follows:

Sponsoring Departments (108 quarter hours)		Other Departments (36 quarter hours)	
Industrial Arts		QH	
General Metal Working	5	General Chemistry	15
Engineering Drawing	3	Principles of Econ.	5
Descriptive Geometry	3		
Architectural Residence		16 hrs. selected from:	
Planning	3	Principles of Accounting	10
Machine Shop Prac. Theory	5	Principles of Economics	5
Engineering Drawing I	3	Theory & Use of Slide	
Theory of Construction	3	Rule	1
Aircraft Materials &		Business Law	5
Processes	3	Business Organization	
Conference Leadership		& Combination	5
Training	2	Survey of Production	
		Management	5
Mathematics		Organization for	
College Algebra	5	Industrial Management	5
Plane Trigonometry	5	Personnel Management	5
Plane Analytic Geom.	5	Motion and Time Study	5
Calculus I	5	Investment Analysis	3
Calculus II	5	Marketing	5
Calculus III	5	Marketing Problems &	
Plane Surveying	5	Policies	3
		Principles of	
Physics		Salesmanship	3
General Physics	15	Prin. of Advertising	5
Applied Electricity	5	Industrial Marketing	3
Statics	5	Sales Management	3
Mechanics of Materials	5	Organization of small	
Dynamics	5	Business	3
Fluid Mechanics	5		
Thermodynamics	5		

Students must also meet the following general requirements to be eligible for graduation:

Universal requirements:

English Composition, Orientation, H.P.E. or
R.O.T.C. 16

Group Options:

- a. Fine or Practical Arts, English 290
- b. Natural Sciences
- c. Social Studies
- d. Philosophy 260, Psychology 261
- e. Mathematics

Total for College requirements
(foreign language optional) 32
Total 48-

In addition to completing the courses for the general requirements and for the field of concentration, the B.S. candidate must, to be eligible for graduation, complete the following:

A total of 192 quarter hours, exclusive of failures and repetitions.

A cumulative average of 2.25 on all work, in whatever departments, taken to fulfill the requirements of the field of concentration.

A cumulative average of 2.0 on all work attempted.

At least three quarters in residence and at least the last three quarters in residence.

The Industrial Technology field of concentration is a four-year program leading to the Bachelor of Science degree. No academic credit is allowed for the work experience phase of the program. Although the Chrysler Corporation is the only company which is cooperating at the present time, the Goodyear Tire & Rubber Company, Thompson Products of Cleveland, and other small metal and wood processing industries in the area around Kent, Ohio have cooperated in the past. E.W. Tischendorf, Acting Head of the Industrial Arts Department, indicated that the job placement record of the program "has been good" and that "most students who accepted jobs with Chrysler Corporation have been especially fortunate in receiving promotions."

Oregon State College. Oregon State College at Corvallis, Oregon has a similar program called "Industrial Administration." This program leads to the degree Bachelor of Science in Industrial Administration and has three

options: the Metals-Industries, the Tool Design Industries, and the Wood-Industries. The latter option has two sub-options: Building Construction, and Furniture or Mill-Cabinet Construction. The program had its inception in 1928 and has as its purpose the serving of the general field of industrial management by preparing production line supervisors and technicians who can progress to supervisory and junior executive positions. The admission requirements are exactly the same as for all the other students of the college: graduation from a standard high school, which in Oregon involves the completion of 16 units, 8 of which are required as follows - 3 units in English, 2 units in social science, comprising state-adopted courses in United States history-civics and socio-economic problems or equivalent courses, 1 unit in health and physical education, 1 unit in mathematics, and 1 unit in the natural sciences. Individual schools within the State College may strongly recommend additional subject matter and better than average scholarship. In order to be admitted to any of the four-year curriculums in engineering, except in industrial arts, a student must present 1 unit in elementary algebra, $\frac{1}{2}$ unit in higher algebra, and 1 unit in plane geometry. A student deficient in mathematics and hence not qualified for admission to engineering may be classified as pre-engineering. Two classes of special students are recognized: (1) those not qualified for admission as regular students but qualified by maturity and experience to work

along special lines; (2) those qualified for admission as regular students who are not working toward a degree. An applicant for admission as a special student should be not less than 21 years of age and must file with the Registrar documentary evidence sufficient to prove his special fitness to pursue the subjects desired. A special student may become a degree candidate only after qualifying as a regular student.

Curriculums. These curriculums are designed to meet the ever increasing demand in industry for men with basic skills and technical knowledge, supplemented with studies in scientific management and in business administration. This program of studies includes those accepted principles and practices by which the manufacturing industries have evolved a system of production control which give optimum results to the community, the consumer, the worker, and the manufacturer. Correlation of the technical studies, manufacturing processes, and management principles is emphasized to the extent that graduates of these curriculums can progress to supervisory and junior executive positions. The various options enable a student to specialize in the particular phases of industry consistent with his interests and aptitudes. The program affords an opportunity to combine technical training and business management in preparation for positions in industry or the service occupations such as industrial technicians, production managers, tool designers, and time-study men. The curriculums are as follows:

Freshman Year

	Term Hours		
	F	W	S
Norm			
Pattern Making (IE 111)	3	-	-
Foundry Practices (IE 240)	2	-	-
Forging and Welding (IE 250)	-	2	-
Machine Tool Practices (IE 260)	-	-	2
Engineering Drawing (GE 111,112,113)	2	2	2
English Composition (Eng. 111,112,113)	3	3	3
*Physical Education	1	1	1
Air, Military, or Naval Science or electives	2-3	2-3	2-3
	13-14	10-11	10-11

Metal Industries Option

Freshman Year Norm	13-14	10-11	10-11
Intermediate Algebra (Math 100)	4	-	-
Elementary Analysis (Math 101)	-	4	-
Elements of Statistics (Math 109)	-	-	4
Extempore Speaking (Sp. 111)	-	-	3
Industrial Arts Drawing & Design (AA 281)	-	3	-
	17-18	17-18	17-18

Tool Design Option

Freshman Year Norm	13-14	10-11	10-11
Elementary Analysis (Math 101,102,103)	4	4	4
Extempore Speaking (Sp. 111)	-	-	3
Industrial Arts Drawing & Design (AA 281)	-	3	-
	17-18	17-18	17-18

Wood Industries Option

Freshman Year Norm	13-14	10-11	10-11
Methods in Woodworking (IE 112,113)	-	3	3
Intermediate Algebra (Math 100)	4	-	-
Elementary Analysis (Math 101)	-	4	-
Elements of Statistics (Math 109)	-	-	4
	17-18	17-18	17-18

*General Hygiene (PE 150) 1 term hour, is taken one term in place of Physical Education.

Sophomore Year		Term Hours		
Norm		F	W	S
Welding Processes and Applications (IE 354)		2	-	-
Descriptive General Chemistry (Ch 130)		-	-	3
Business English (Eng. 217)		3	-	-
American National Government (PS 201)		-	-	3
Physical Education		1	1	1
Air, Military, or Naval Science or electives		2-3	2-3	2-3
		8-9	3-4	9-10
Metal Industries Option				
Sophomore Year Norm		8-9	3-4	9-10
Machine Tool Practices (IE 261)		2	-	-
Machine & Tool Maintenance (Machine Shop IE265)		2	-	-
Welding Processes & Applications (IE 358)		-	2	-
Introduction to Scientific Management (IE 290)		-	-	3
Casting Quality Control (IE 345)		-	2	-
Mass Production Methods (IE 361,362)		-	2	2
Sheet-Metal Work (IE 380)		-	2	-
*Technical Electives		2	2	3
Abridged General Physics (Ph 211,212)		3	3	-
		17-18	17-18	17-18
Tool Design Option				
Sophomore Year Norm		8-9	3-4	9-10
Machine Tool Practices (IE 261)		2	-	-
Mass Production Methods (IE 361,362)		-	2	2
Mechanics (Statics) (ME 212)		-	3	-
Mechanics (Dynamics) (ME 213)		-	-	3
*Technical Electives		-	2	-
Differential & Integral Calculus (Math 201,202)		4	4	-
Engineering Physics (Ph 101,102,103)		3	3	3
		17-18	17-18	17-18
Wood Industries Option				
Sophomore Year Norm		8-9	3-4	9-10
Machine Tool Maintenance(Wood Shop IE 295)		2	-	-
Introduction to Scientific Management (IE 290)		-	-	3
House Planning & Architectural Drawing (AA 178,179,180)		3	3	3
Industrial Arts Drawing & Design (AA 281)		-	3	-
*Technical Electives		-	2	2
Abridged General Physics (Ph 211,212)		3	3	-
Extempore Speaking (Sp 111)		-	3	-
		16-17	17-18	17-18

Junior Year Norm	Term Hours		
	F	W	S
Methods and Motion Study (IE 391)	3	-	-
Time Study (IE 392)	-	3	-
Production Planning & Control (IE 395)	-	-	3
Outlines of Economics (Ec 211)	4	-	-
Economic Development of the United States (Ec 215)	-	4	-
General Electives	3	3	7
	<u>10</u>	<u>10</u>	<u>10</u>

Metal Industries Option			
Junior Year Norm	10	10	10
Production Machine Work (IE 363)	3	-	-
Materials of Engineering (ME 216)	-	3	-
Mechanism (ME 312)	-	-	3
Engineering Metallurgy (ME 416)	-	-	3
Business Law (BA 411, 412 or 413)	3	3	-
Technical Electives	2	2	-
	<u>18</u>	<u>18</u>	<u>16</u>

Tool Design Option			
Junior Year Norm	10	10	10
Machine & Tool Maintenance (Machine Shop IE 265)	2	-	-
Production Machine Work (IE 363)	3	-	-
Materials of Engineering (ME 216)	-	3	-
Strengths of Materials (ME 311)	-	3	-
Mechanism (ME 312)	-	-	3
Materials Testing Laboratory (ME 316)	-	-	3
*Technical Electives	3	-	2
	<u>18</u>	<u>16</u>	<u>18</u>

Wood Industries Option			
Junior Year Norm	10	10	10
Mill Work-Machine Woodwork (IE 311)	3	-	-
Wood and Metal Finishing (IE 316)	-	-	3
Carpentry & Building Construction (IE 333)	-	3	-
Business Law (BA 411, 412)	3	3	-
*Technical Electives	-	2	4
	<u>16</u>	<u>18</u>	<u>17</u>

Senior Year Norm			
Safety in Industry	-	-	2
Industrial Supervision Principles (IE 490)	-	-	3
Principles of Accounting (BA 211, 212)	3	3	-
Industrial Cost Accounting (BA 424)	-	-	3
Money and Banking (Ec 413)	4	-	-
Applied Psychology (Psy 209)	-	-	3
General Electives	3	3	3
	<u>10</u>	<u>6</u>	<u>14</u>

Senior Year (continued)

Metal Industries Option

	Term Hours		
	F	W	S
Senior Year Norm	10	6	14
Tool Engineering (IE 464,465)	3	3	-
Labor Problems (Ec 425)	-	4	-
*Technical Electives	4	3	3
	<u>17</u>	<u>16</u>	<u>17</u>

Tool Design Option

Senior Year Norm	10	6	14
Tool Engineering (IE 464,465)	3	3	-
Die Design (IE 469)	-	-	3
Machine Design (ME 411,412)	3	3	-
Business Law (BA 411)	-	3	-
*Technical Elective	-	2	-
	<u>16</u>	<u>17</u>	<u>17</u>

Wood Industries Option

Senior Year Norm	10	6	14
Labor Problems (Ec 425)	-	4	-
*Technical Electives	7	7	3
	<u>17</u>	<u>17</u>	<u>17</u>

*Technical electives must be related directly to the major professional option of the student and will be selected with approval of major advisor.

The University of Houston. The program of Industrial, Vocational, and Technical Training has one phase of preparation which is similar to the proposed program for the University of Maryland. This phase requires one hundred and fifty-two semester hours of work and the degree of Bachelor of Applied Science is conferred upon graduates.

Much of the technical education is semi-professional in nature, having more emphasis given to technical knowledge than is given in specialized vocational programs. More emphasis is placed on laboratories and the development of hand skills than is given in advanced engineering education.

Technical training is especially planned for those wishing to qualify as engineering aides and technicians, such as laboratory supervisors, inspectors, junior draftsmen and designers, laboratory technicians, control instrument experts, foremen, chief maintenance men, and persons charged with responsibilities and skills of a semi-engineering nature. All students of good moral character who are high school graduates or over eighteen years of age and who can present evidence of ability to profit by these courses are eligible for admission.

Curriculums. The curriculum for the Bachelor of Applied Science requires one hundred and fifty-two semester hours of study, one hundred and twenty-two semester hours to be completed in the Schools of Technology and thirty semester hours to be completed at the University of Houston. At least twelve semester hours in each of three subjects other than the major must be completed. These hours are in addition to required courses in English.

Programs of study begin with two or three years of specialized technical training in one of the following fields:

1. Aeronautics - two years plus eight weeks ground course for private pilot's license plus seventeen weeks advanced ground course for commercial pilot's license.
2. Air Conditioning and Refrigeration - two years, three years if stationary engineering is included.

3. Automotive Trades - thirteen and one-half months to thirty-six months
4. Communications - Radio and Electronics - two and one-half years
5. General Radio Repair Course - one and one-half to two years
6. Diesel Engines - one year for diesel mechanic - two years for diesel technician - three years for diesel electric technician
7. Architectural and Structural Drafting - one year
8. Machine Drafting - one year
9. Industrial Electricity - two years
10. Furniture Upholstery - one year - for additional certificate in auto upholstery one-half year additional
11. Industrial Mechanics - Machine Shop - four years
12. Welding - one to one and one-half years
13. Woodworking - two to three years
14. Technical Photography - two years
15. Stationary Engineering - two years

Background and related information courses such as Industrial Management, Business Organization, Mathematics, Employer-employee Relations, English, Government, Physics, Chemistry, Blue Print Reading, Sketching, Mechanical Drawing, Shop Safety are included as required in the various programs. Thirty semester hours must be completed in the major field of study and at least twelve semester hours in each of three subjects other than the major as part of the one hundred and fifty-two semester hours for the Bachelor of Applied Science degree.

Western Michigan College of Education. The Western Michigan College of Education at Kalamazoo, Michigan has a program called Industrial Supervision intended for young men who are planning to go into industry and who eventually may be selected for administration and/or supervisory positions. This is a four-year program leading to the Bachelor of Science degree. Students are admitted to this curriculum who have successfully completed one of the two-year technical programs in one of the following fields: machine shop, drafting, automotive maintenance, refrigeration and air conditioning, printing, radio, electricity, or aviation. Certificates are awarded upon completion of the first two years of technical work.

In addition to providing extensive technical experiences the four year curriculum offers opportunities for study in such areas as plant management, production control, time study, job analysis, and industrial cost accounting. Students in this curriculum are also required to take considerable work in psychology in order to acquire a sound understanding of how to deal with people. No work experience internship is included.

Curriculum. The first two years are spent in following a technical curriculum in one of the above mentioned fields. Students who achieve an excellent record in the technical work and demonstrate outstanding qualities of leadership are qualified to enroll in the Industrial Supervision curriculum.

Third Year	Semester Hours
Communications 104A and B, or	8
Rhetoric 106A and B, and Speech 105	9
General Psychology 200	3
Psychology of Personality 207	4
Introduction to Contemporary Society 101A and B	8
Foremanship Training 353	2
Business Correspondence 232 or Report Writing 233	3
Electives	5-6

Fourth Year	
Occupational Analysis and Classification 404	2
Personnel Administration 336	3
Business Administration 321	3
Labor Problems 325A and B	4
Marriage and Family 345	2
Industrial Cost Accounting 316A and B	4
Time Study and Job Analysis 354	3
Plant Maintenance 355	2
Production Control 356	3
Electives	8

Total of 128 semester hours for graduation

1. Major - 30 to 35 semester hours in technical shop work
2. First Minor - 15 hours in industrial supervision
3. Second Minor - 15 hours in social studies, economics, mathematics, or psychology

West Virginia Institute of Technology. The West Virginia Institute of Technology at Montgomery, West Virginia has two programs which are similar in purpose but narrower in scope than the Education for Industry program proposed in this study. Curriculums leading to the degree of Bachelor of Science are offered in mining, and printing and publishing to provide broad acquaintance with these fields for those who ultimately hope to occupy executive positions in these fields. In addition to these two programs the Department of Industrial Arts has as its secondary purpose the preparation of students to enter industry or to establish private

businesses of their own.

Curriculums. The mining program is designed to train qualified students in the fundamental principles of mining and engineering so that after appropriate industrial experience they may assume positions of responsibility in the development and operation of mining enterprises. This program requires one hundred and fifty-three semester hours of course work including the following:

Mining	Semester Hours
Mine Surveying	9
Elements of Mining	2
Mining Methods	3
Coal Preparation and Analysis	2
Mine Plant I and II	4
Mine Design	3
Mine Ventilation	3
Mine Management	2
Mine Equipment and Mechanization	2
Mine Safety	1
Coal Preparation	4
Engineering	
Land Surveying	2
Engineering Problems	2
Mechanical Drawing	3
Descriptive Geometry	3
Elements of Electrical Engineering	3
Structural Drafting	2
Statics	3
Mechanics of Materials	4
Materials Testing Laboratory	1
Metallurgy	3
Kinetics	3
Fluid Mechanics	4
Structural Engineering	3
Mathematics	
College Algebra	4
Plane Trigonometry	3
Analytical Geometry	4
Calculus	8
Physics	
Engineering Physics	10
Heat and Thermodynamics	4

Chemistry	
General Chemistry for Engineers	8
Quantitative Analysis	2-3
Geology	
General Geology	3
General Geology Laboratory	1
Minerology	2

The printing and publishing program is designed to prepare students for the printing industry and for positions as shop foremen, production managers, plant superintendents, and junior executives. This program requires one hundred and twenty-eight semester hours of work with fifty-one semester hours in the major as follows:

Printing and Publishing	Semester Hours
Typography I and II	4
Color I and II	2
Typography III and IV	6
Layout and Design	6
Fundamentals of Photolithography	3
Newspaper Practice I and II	4
Machine Composition	2
Advanced Machine Composition	2
Presswork I and II	6
Printing Estimating	4
Printing Production I	2
Printing Plant Management	2
Photolithography	2
Advanced Photolithography	2
Offset Presswork	4
Chemistry	
Chemistry for Lithographers	4
Journalism	
Photography for Printers and Publishers	3
News Photography	3

In addition to the specific requirements in the above two curriculums, students must meet the following constant requirements:

- Orientation - required of all students who enroll as freshmen
- Physical Education - four semester hours in activity courses

Written and Spoken English - nine semester hours
 General Education - twenty-four semester hours

Wilmington College. Wilmington College of Wilmington, Ohio has a program planned but it has not been put in operation for two reasons. First, they did not have a sufficient number of students for the program due to a competing work-study program for which recruiting was carried on at the same time. The second reason was that industrialists refused to accept students who were subject to Selective Military Service for the work experience phase of the program. The program is planned as a four year program leading to the Bachelor of Science degree.

The proposed program was the outgrowth of discussion, consultation and research over a period of almost two years by the collaborative efforts of the Cincinnati Industrial Institute and Wilmington College. The Cincinnati Industrial Institute is a management clearing house and research and planning center for one hundred and twenty-two industries in the Cincinnati area. The Institute working with Wilmington College conducted a detailed study in industry to determine the skills, attitudes, and capacities needed in supervisory positions.

A Wilmington College bulletin (33 ,p.2) "Wilmington College announces a new Co-Operative Program in Industrial Supervision" sets forth some of these qualifications as follows:

The industrial supervisor plays a crucial role in the production process and requires a greater versatility of skills than other employees with the exception of high executive officials. This person must be familiar with the various techniques although he may not be an expert in any. He must have an intimate understanding of the laboring man and an insight into his needs, legitimate aspirations, and his adaptability to production operations. He must have qualities of leadership and an above-average capacity for working with people.

The task of the supervisor is to be a communication officer and transmit understanding of policies and personal needs to those people with whom he works. He must appreciate the special requirements of management and be able to think and act intelligently to further these concerns. In this capacity, he must understand the significance of his industry as it relates to the economy of the area and to the economy of the nation and the world. He must be a good citizen within and outside his plant. He is essential not only to the laborer but to the chief executive as well. Indeed, the qualities needed, when enriched by experience, are similar to those expected in the highest executive positions.

The Proposed Curriculum. The program is planned as a co-operative work-study program in which the student would spend one semester on the campus alternating with one semester in full time employment in industry where he would "Learn by doing" industrial technique from the ground up in order to offer him first-hand experience in his field of concentration. Following is a sample curriculum for a student preparing for work in a metals industry. It was planned to alter the curriculums to fit the type of industry for which the student would be preparing.

Semester I, First Year - On Campus

Introduction to Democracy	Three Hours Credit
English Service Course	Three Hours
Elements of Accounting	Three Hours
Principles of Engineering Drawing	Three Hours
Natural Science (Physical Science)	Four Hours
Physical Education	One Hour

Semester II, First Year - On Co-op Job
(Full time work plus Work term courses)

Business and Industrial Math	Three Hours
Physical Education	One Hour

Summer Term I, First Year - On Campus

Metals	Three Hours
Principles of Engineering drawing	Three Hours

Summer Term II, First Year - On Campus

English Service Course	Three Hours
Metals	Three Hours
Physical Education	One Hour

Semester I, Second Year - Co-op Job
(Work Term Courses)

Principles of Business Organization	Three Hours
Physical Education	One Hour

Semester II, Second Year - On Campus

Survey of Accounting	Three Hours
Principles of Economics	Three Hours
Natural Science (Biology)	Four Hours
General Psychology	Three Hours
Blueprint Reading and Duplicating	Three Hours
American Literary Masters	Two Hours

Summer Terms I and II, Second Year - On Co-op Job
(Work Term Course)

Principles of Factory Management	Three Hours
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Semester I, Third Year - On Campus

Business Statistics	Three Hours
Woods	Three Hours
Public Control of Business	Three Hours
Intermediate Economics	Three Hours
The World Today	Two Hours
Machine Shop	Three Hours

Semester II, Third Year - On Co-op Job
(Work Term Course)

Group Dynamics Three Hours

Summer Term I, Third Year - On Campus

Bible Two Hours

American Federal Government Two Hours

Practical Electricity Three Hours

Summer Term II, Third Year - On Campus

Bible Two Hours

Essentials of Public Speaking Two Hours

*(Required Electives) Three Hours

Semester I, Fourth Year - On Co-op Job
(Work Term Course)

Managing Men at Work Three Hours

Semester II, Fourth Year - On Campus

Labor Problems Three Hours

Business Law Three Hours

Public Speaking Two Hours

Woods Three Hours

International Relations Two Hours

*(Required Electives) Four Hours

Summer Terms I and II, Fourth Year - On Campus

Maintenance, Repair of Equipment Three Hours

Literature Two Hours

*(Required Electives)

*(Required Electives)

Six hours of Art or Music

Nine hours of World Studies

(To be selected by the student)

Summary. All of the curriculums cited in this chapter are four-year programs. They all culminate in the conferring of a baccalaureate degree. Seven of the institutions grant the Bachelor of Science degree for the successful completion of the program cited while the other institution, the University of Houston, confers the degree of Bachelor of Applied Science. All of the curriculums presented in this chapter aim at the preparation of students for work in industry, and

are based upon the idea of preparing these students for initial employment as technicians who with further experience may advance to more responsible positions including industrial supervision.

Table 1 on pages 34 and 35 presents the requirements in semester hours for several groups of subjects in the various curriculums of the eight institutions. Two of the institutions, Kent State University and Oregon State College, are on the quarter system. Quarter hour credits were converted to semester hours for comparative purposes.

In all of the curriculums cited, heavy emphasis is placed upon technical preparation. The number of required shop and drawing courses ranges from eighteen and two-thirds semester hours in the Kent State University program (see p.15) to two or three years in the University of Houston's programs (see p. 23-24).

Seven of the eight institutions require mathematics in the curriculums cited. The number of semester hours required in mathematics varies from four semester hours in Printing Estimating required in the Printing and Publishing program of the West Virginia Institute of Technology (see p. 28) to the twenty-three and one-third semester hours of higher mathematics required in the Kent State University program (see p.15). The eighth institution, Western Michigan College of Education, makes no specific requirements in mathematics but this subject may be selected as a second minor.

TABLE I

**Subject Area Requirements in College Level Education
for Industry Curriculums of Eight Institutions
Expressed in Semester Hours**

	A & M	B R A D L E Y	K E N T	O R E G O N	H O U S T O N	W I C H I G A N	W I R I N I A	W I L M I N G T O N
Ind. Ed.								
Shop & Dr.	35	55-58	18 $\frac{2}{3}$	38 $\frac{2}{3}$	2-3 yrs.	30-35	51	30
Prof.	19	4	1 $\frac{1}{3}$	18		*	15	
Bus. Mgt.	13	3-9	10 $\frac{2}{3}$	8 $\frac{2}{3}$ - 12 $\frac{2}{3}$	*	10		21
Economics	3	6	3 $\frac{1}{3}$	5 $\frac{1}{3}$		*		6
Basic Sci.								
Chem.	4	0	10	2	*		10-11	4
Physics	8	6	28 $\frac{2}{3}$	4-6	*		14	
Math	6	6-9	23 $\frac{1}{3}$	8	*		22	6
Psychology	3	0-3	0	2		7		3
Eng., Sp., Lit.	12	8-9	10 $\frac{2}{3}$ **3	10	*	8-9	9	12
Tech. Wr.	3					3		
Electives	12	27-43	21 $\frac{1}{3}$	14 $\frac{2}{3}$				15
Hist., Govt.	6	6	0	2	*	10		9
Work Exp.	No	Yes 10	Yes	No	No	No	No	Yes
Total Sem. Hours	145	120- 137	123	136- 140	152	128	153	126

TABLE I

Subject Area Requirements in College Level Education
for Industry Curriculums of Eight Institutions
Expressed in Semester Hours
(Continued)

The University of Houston requires thirty semester hours in the major plus twelve semester hours in each of three other subjects.

Western Michigan College of Education requires a second minor with fifteen semester hours in one of the following subjects: social studies, economics, mathematics, or psychology.

The West Virginia Institute of Technology requires twenty-four semester hours in general education in addition to specific requirements.

* Catalogs indicate that these subjects are required but no specific number of hours are stated.

** Includes Orientation, and Physical Education or R.O.T.C.

Six of the eight institutions require physics with a range of four to twenty-eight and two-thirds semester hours. Oregon State College (see p. 20) requires four to six semester hours of physics, and Kent State University (see p. 15) requires twenty-eight and two-thirds semester hours of physics. Wilmington College's proposed program (see p. 31) does not require any physics but has a requirement of four semester hours in natural science. Western Michigan College of Education makes no requirement in physics in the program cited.

Five of the eight institutions require from two semester hours of chemistry at Oregon State College (see p. 20) to ten or eleven semester hours at the West Virginia

Institute of Technology (see p. 28). Bradley University and Western Michigan College of Education require no chemistry in the programs presented in this chapter. Wilmington College's proposed program requires no chemistry but has a requirement of four semester hours in natural science.

Work experience in industry is provided for in the programs of three out of the eight institutions. In two of the programs, Bradley and Kent State Universities, the work experience is on a part-time basis. In Wilmington College's proposed program the work experience is on a cooperative work-study basis, with the students alternating between work in industry and study on the campus on alternate days of the week. Bradley University provides a maximum of ten semester hours of credit for work experience and is the only institution which gives credit for this phase of the program.

Business management courses are required by seven of the eight institutions in the programs cited with a range of three to twenty-one semester hours. Bradley University (see p. 12-13) requires three semester hours in Industrial Management in the Metal Option, four semester hours of Accounting in the Automotive Option, four semester hours of Accounting and three semester hours of Industrial Management in the Building and Construction Option and in the Electrical Option; in addition to four semester hours of Accounting, three semester hours of Industrial Management and two semester hours of Personnel Management are required in the

Machine Drafting Option; in the Wood Option four semester hours of Accounting and two semester hours of Industrial Management are required. Wilmington College (see p. 31-32) requires twenty-one semester hours of business management subjects in the proposed Co-operative Program in Industrial Supervision.

Economics is required in the cited programs of six of the eight institutions. The requirements range from three semester hours in the Agricultural and Mechanical College of Texas (see p. 10) to six semester hours in both the Bradley University (see p. 11) and the Wilmington College (see p. 31) programs.

Psychology is required by five out of eight of the institutions in the programs cited, with a range of two to seven semester hours. Oregon State College (see p. 21) requires two semester hours, listed as three quarter hours, in applied psychology during the senior year. Western Michigan College of Education (see p. 26) requires seven semester hours in psychology during the junior year, three of these hours are in general psychology and the other four are in psychology of personality.

The requirements in English, speech, and literature are about the same in all of the programs cited with a range of eight to twelve semester hours. Two of the institutions, the Agricultural and Mechanical College of Texas and Western Michigan College of Education, require an additional three

semester hours in technical writing.

Six of the eight institutions require from two to ten semester hours of history and government or social studies. All the programs provide for electives which vary in the different institutions from twelve semester hours to forty-three semester hours. The total number of semester hours required in the programs varies from one hundred and twenty to one hundred and fifty-three.

CHAPTER III

INDUSTRIAL TRAINING PROGRAMS

In order to ascertain a picture of the status of supervisory and upgrading training programs in industry, letters were sent to twenty-four national concerns which had pertinent literature deposited in the American Society of Training Directors' Library at Purdue University, Lafayette, Indiana. A sample letter is included in Appendix B (p.152). Nineteen companies responded to the request. Seventeen concerns sent literature describing their programs while two companies claimed no knowledge of the publications requested and did not submit other materials.

J.D. Adams Manufacturing Company. The J.D. Adams Manufacturing Company of Indianapolis, Indiana has a Supervisory Training Program to provide newly appointed supervisors and foremen with information and knowledge concerning their responsibilities and duties relative to the essential elements of supervision. This is an in-plant program under the direction of the Training Director, covering eight phases of instruction as follows: (1) Orientation; (2) Company Policies and Their Interpretation; (3) Principles of Labor Relations; (4) Personnel Policies; (5) Principles of Human Relations; (6) Principles of Instruction; (7) Principles of Foremanship or Exercising Good Judgment and Making of Own Decisions; and

(8) Duties of the Foreman in x Department.

In the orientation phase the new foreman is made to feel welcome in his new position, his place in the organization is defined, and the limits of his authority are indicated. Top management problems are presented, assurance is given that his ideas for improvement in production, management, morale, labor relations, and policies will be considered, and the need for departmental cooperation and management teamwork is stressed. Thirty-six traits which a good foreman should have are listed as follows:

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|---|--|
| 1. Human interest & knowledge of human nature | 18. Listen to suggestions |
| 2. Leadership | 19. Ability to keep men working cheerfully |
| 3. Keen mind | 20. Ambitious |
| 4. Dependability | 21. Reliable |
| 5. Confidence in his men | 22. Loyal |
| 6. Confidence in himself | 23. Good teacher |
| 7. Honesty | 24. Discipline fairly |
| 8. Pleasant disposition | 25. Set a good example |
| 9. Knowledge of job & equipment | 26. Able to take responsibility |
| 10. Interest in the safety of others | 27. Personal interest in workers |
| 11. Physically able to perform | 28. Good public relations |
| 12. Firmness | 29. Personal appearance |
| 13. Sense of humor | 30. Clear expression |
| 14. Able to plan & organize | 31. Efficient |
| 15. Give praise at the right time | 32. Not afraid of work |
| 16. Be fair, impartial, & co-operative | 33. Respect superior orders |
| 17. Strength of character | 34. Able to select workers |
| | 35. Try to be well liked |
| | 36. Show confidence |

In the phase covering company policies and their interpretation, explanation is given concerning the origin, use and contents of the company Policy Manual. Company policies with respect to capital investments, economics, personnel,

progressiveness and retardations, conventions, customs and beliefs, position in the community, and public and community relations are also explained.

Under the principles of labor relations the union agreement is interpreted and clarified. The mechanics of the grievance procedure are explained. The Taft-Hartley Act is discussed and the company's policies on labor relations are defined.

Under personnel policies the procedures for preparing and processing all personnel department forms, the maintenance use and contents of records, employment procedures and the foreman's responsibility relative to them, the services of the personnel department and how they can aid the foreman, the methods and the foreman's responsibility for issuing or granting leaves of absence, vacations, insurance, safety glasses, and pay checks, what to do in case of accident, and the functions of a department are covered.

The purpose of the human relations phase of the program is to increase the foreman's knowledge of basic human feelings, reactions and relations, and to show him how to use this knowledge to improve his ability to direct people to work better. The relationship between the foreman and his workers and getting along with people are stressed.

Under principles of instruction job relation, job instruction, job methods training, the development of assistants, the importance of instruction, the introduction of the

new worker to his job, methods of instruction, and types of industrial training are treated.

The phases of the program covering principles of foremanship responsibilities or exercising good judgment and the making of own decisions, and the duties of the foreman in x department take up the application of company policies to daily activity, the exercise of authority over others in matters of job performance, the encouragement of suggestions from workers, the development of a good attitude regarding safety, the characteristics of good working conditions, leadership in administering the department, the definition of the foreman's authority and the support he can expect to receive from his superior, and the interpretation of the foreman's duties by his immediate superior.

The Allis-Chalmers Manufacturing Company. The Allis-Chalmers Manufacturing Company of Milwaukee, Wisconsin has seven different industrial training programs. Four of these programs are in-plant programs and three are operated in co-operation with educational institutions. The in-plant programs include a supervisory training program, an apprentice training program, a program offering technical and commercial classes for employees seeking additional knowledge relating to their specific branch of work, and an engineer's graduate training course. The three programs utilizing educational institutions include vocational school courses, a co-operative university program for engineering students, and a

graduate program for engineers leading to the master of science degree in engineering.

The supervisory training program consists of seventeen courses designed to aid supervisors in all levels of management to solve production and human problems. The program's immediate goal is trained supervisors who will be more efficient and better able to complete their duties. The long range objective is aimed beyond the supervisors to the improvement of the employees under them and the betterment of their working conditions. The supervisory program is conducted by the training department in cooperation with a shop supervisory training committee which determines the training needs, supervises the preparation of subject material, trains conference leaders, and coordinates and administers all training programs offered on a plant-wise basis. The seventeen courses which vary in length from two to fifteen one-hour conferences are as follows: Duties and Functions of Supervisors, Human Relations, How to Handle Men, Grievance Handling, Budgets and Budget Control, Costs and Cost Control, Stock Orders-Repair Orders and Contracts, Industrial Safety, Forms and Procedures, Job Evaluation, Plant Maintenance, Foundry Control, Time Study, Allis-Chalmers Production Control System-Dispatching, Job Instruction Training, Job Methods Training, and Personnel Relations Training. In 1949 the company conducted a survey among more than 1100 supervisory employees of the firm's West Allis Works which showed

the continuing need for such instruction.

The apprenticeship training program covers thirteen trades. Ten of the apprentice courses are four-year apprenticeships and include the following trades: blacksmith, brass molder, iron molder, machinist, maintenance and production fitter, pattern maker, production electrician, sheet metal worker, toolmaker, and woodmaker. The mechanical drafting and plate and structural layout courses are three year apprenticeships. The apprentice course for weldment fitter is a two-year apprenticeship. Admission to all courses with the exception of two, iron and brass molding, require a high school education. These two courses require only an eighth grade education. In addition to work in the shops, apprentices are required to attend a vocational school for related subjects. The subjects in vocational school include shop mathematics, mechanical drawing, blueprint reading, metallurgy, safety appliances, shop hygiene, English, and economics. The vocational school requirements for the weldment fitter course consist of 288 hours based on an average of eight hours per week. For mechanical drafting and plate and structural layout courses 432 hours are required, and for the four-year courses a total of 576 hours are required.

The program offering technical and commercial subjects for employees who desire them is operated during the employees' off-hours. The classes meet in the training department's

conference rooms and there is no tuition charge for most of them. The courses include such subjects as basic electricity, blueprint reading, know your products, mechanical drawing, precision instruments, shop sketching, shop trigonometry, slide rule, and Spanish. Special courses in other subjects are given whenever the demand and need arise.

The engineer's graduate training program is an in-plant program for graduate engineers covering eighteen months of shop, office, and classroom work before they are given permanent transfer to a department. The training is directed toward production, design, sales, or research, depending upon their individual aptitude and interest. The graduate is rotated from one department to another on a prescribed schedule. A short time before the completion of his training course he selects the department which interests him most, and is temporarily assigned to it. If he and the department head both agree that it is the department which best fits his training, he is placed there permanently. The program has been in operation since 1904 and many of the company's top executives have completed it in the past. A diploma is awarded upon completion of the course and the company looks to graduates of this course for its future leadership.

Vocational school courses are made available to employees of the Allis-Chalmers Company without cost or at a nominal fee. Specialized or additional training in shop work and commercial subjects are offered at the Milwaukee,

West Allis, and Cudahy vocational schools as well as at Marquette University and the University of Wisconsin at Milwaukee. Technical courses include blueprint reading, shop mathematics, and trade and industrial training in machine and electrical work. The commercial subjects include typing, bookkeeping, and shorthand. A five year technical course, equivalent to about two years of college, is given at the Milwaukee and West Allis vocational schools.

A program of cooperative training is offered to engineering students of Marquette and Northwestern universities. The students go to school and work in the Allis-Chalmers shops during alternate semesters. Upon receiving their engineering degrees graduates of these programs are eligible for the regular graduate training course previously described in this chapter.

A graduate program is offered for employees who hold a Bachelor of Science degree in engineering, in science or its equivalent and who have a high scholastic standing in their undergraduate and graduate courses. This program leads to the Master of Science degree in electrical or mechanical engineering and is presented in cooperation with the Illinois Institute of Technology. The program is operated on a part-time basis concurrent with industrial experience. The courses provide students with an integrated major study in the fields of Electrical or Mechanical Engineering with options in Electric Power, Electronics, Machine Design, or

Heat and Power Engineering. Supporting courses in Advanced Mathematics, Industrial Engineering, Mechanics, and Physics are provided to round out the minor field of study, and to provide a series of suitable electives. The work for the degree may be completed in a minimum period of about three years, but a program covering four years is more normal. The minimum requirement is 32 semester hours of satisfactory graduate credit, of which 28 are normally allotted to courses acceptable for graduate credit and 4 are allotted to the research and thesis. Students must maintain a B average in all work in this program. The cooperative aspects of the program make it possible to combine study and research with practical experience in connection with the analysis and working out of on-the-job problems. Moreover it makes possible the visualization of practical work against an actual background of economic and technological change, a procedure that is usually impossible during the average undergraduate courses. The company assists trainees in financing this program by paying one third of the tuition upon registration and an additional third after successful completion of each course.

American Steel Foundries. American Steel Foundries of Chicago, Illinois has three general plans of training for upgrading and for the preparation of new employees. These plans include the graduate plan of training which applies to college graduates coming to the company with a purely

academic background, the cooperative student plan of training which permits students to acquire related practical shop and company experience along with his academic theoretical education, and the craft apprentice, operating management, and in-service training programs which are designed to provide craftsmen, technical, supervisory, and executive personnel.

The purposes of the college graduate training programs are to prepare salesmen, project engineers, and accounting supervisors. Engineering graduates are accepted as applicants for salesmen and project engineers. Applicants for supervisory training positions in the accounting division must be graduates of a recognized college of commerce with a major in accounting. Age requirements for applicants vary slightly with the different divisions of the company but range generally from 21 to 30 years. The length of training time also varies from one division to another and depends upon the goal of the program, the age of the applicant, and his previous experience. In the Railway Sales Division, the length of the training program varies from 80 months for applicants who are 28 to 30 years of age to 134 months for applicants who are 22 to 24 years of age. In the Industrial Sales Division, the maximum length of the training period for salesmen is five to seven years depending upon the foundry knowledge and qualifications of the individual. The length of the training program for project engineers ranges

from two and a half to three years. The time for training supervisors in the Accounting Division varies from two to four years depending upon the experience of the applicant. The job rotation method of training is used in these training programs and trainees work for various periods of time in different departments and in some cases divisions when it serves the best interests of the trainee and the company.

The cooperative student plan of training is a plan which enables energetic, ambitious young men of superior ability to secure a college or university degree in engineering in five years while working for the company. Students are teamed up and alternate at scheduled intervals between attendance at the college or university and work assignments in the Product Engineering Division. During the five year course there are eight work periods. Students are shifted from department to department of the Product Engineering Division in order that their training may be as diversified as possible and their schedule includes the following work experiences in the order listed: (1) Lettering, tracing and elementary layout work; (2) Field testing (Service Laboratory cars); (3) Laboratory testing - one half of a work period and Assistant to a Test Engineer one half of a work period; (4) Calculating and estimating; (5) Product design - as assigned; (6) Product design - section optional with student; (7) Product development; and (8) Chief Mechanical Engineer's staff.

The third general training plan of the American Steel Foundries includes their craft apprentice, operating management, and in-service training programs. These programs are open to college graduates but are by no means reserved for this group for past experience has proved that the particular aptitudes and abilities which make for success in management positions should not be confined to members of any specific educational group or level.

Armstrong Cork Company. The Armstrong Cork Company of Lancaster, Pennsylvania utilizes both individual and group methods of training its supervisors. The company places emphasis on individual training plans and supplements these with group training procedures.

Under individual methods the company uses "The Supervisory Six" which includes the six following forms:

(1) Position Specification; (2) Degree of Authority; (3) Performance Report; (4) Review of Service; (5) Individual Training Plan; and (6) The Personnel Folder. The first three of these define responsibilities, describe working conditions and establish standards. The fourth assists in determining individual training needs; the fifth sets up an individual training schedule; and the last establishes a personal history and inventory. Some of the most effective methods utilized in the individual training programs include the following procedures: (1) Special coaching by staff representatives; (2) Special coaching by superior; (3) Brief

assignment in another department; (4) Enrollment in evening classes; (5) Visits to other plants and companies; (6) Assignment to trade and technical association meetings; (7) Long-term plan of position assignments; (8) Participation in group training projects; and (9) Utilization of presently available training material.

Under group methods, four procedures are used. These include a production management course, conferences and special courses, home office visits, and high school and college courses. The production management course considers the company history, principles and organization, supervisor's responsibilities for quality, schedules, personnel relations, costs, and maintenance. The course is intended primarily for new supervisors and as a possible refresher course for others. Another phase of the production management program includes a basic training course for junior project engineers to train graduates recruited from engineering colleges. This plan involves company and department inductions, plant trips, and a work schedule in the engineering shops, the production shops, the General Engineering Department, and in staff departments. It also includes conferences on engineering procedure and relations, a methods improvement program, engineering association meetings, and personal conferences.

Conferences and special courses include regularly scheduled meetings to permit two-way communication between all levels of management on company and plant operating

problems and policy; consideration of special subjects such as veteran employment, methods development, review of service; and periodic meetings for the presentation of operating plans and progress reports.

The home office visits bring line and staff members of management in small groups to the home office once every three years for home office contacts, and discussion of company organization, operations, plans, and progress.

The high school and college courses include technical, vocational, and general courses in which individuals are enrolled on a supplementary basis to meet their specific needs. These may be given on an in-plant basis.

The Electric Storage Battery Company. The Electric Storage Battery Company of Philadelphia, Pennsylvania is in the process of reorganizing its management development program. The company retained the Industrial Relations Counselors, Incorporated, to study its management staffing problems and upon the advice of these consultants has adopted a new Management Inventory and Development Program.

The study, which at the present time is about twenty-five percent completed, is an analysis of company personnel problems and the accumulation of basic records of the management talent they now have and the management talent they will need. After these records are analyzed the company plans to prepare individual development schedules to insure that it will have men available for its more critical

management positions.

General Motors Institute. The General Motors Institute at Flint, Michigan is the central training agency for the General Motors Corporation. The institute's training programs may be grouped under the following six headings:

(1) General Motors Co-operative Training Programs; (2) Plant Management Training; (3) Technical and Specialized Training; (4) Training for the Distribution Organizations; (5) Training for Specific Groups and Advisory Service; and (6) Spare Time Training.

Under the co-operative programs there are three different programs: the Engineering Program, the Business Administration Program, and the Dealer's Program. In relation to the first two there is also a Fifth Year or Post Co-operative Program. The co-operative programs are based on alternate periods of four to eight weeks of instruction at the Institute, followed by corresponding alternate periods of practical work in the co-operating plants or divisions. Relationships between the institute and the plants contribute to a close co-ordination of these two phases of training.

In the Co-operative Engineering programs, which are four years in length, the Institute gives fundamental training in mathematics, science, engineering and tool drawing, shop practice and methods, English, and other subjects related to the work for which the student is being trained. In Industrial Engineering additional specialized subjects

such as general manufacturing, body manufacturing, methods engineering, foundry technology, welding technology, and process engineering are required. For Mechanical Engineering the additional specialized subjects which are required include automotive engineering, body and sheet metal engineering, basic mechanical engineering, tool engineering, die and sheet metal engineering and automotive service engineering. In the work experience phase of the training definite work schedules are arranged to provide good mechanical training and experience in the work of the divisions with which the students are connected. The two phases of the training are co-ordinated by a series of reports which the students are required to write during their work periods. These reports, called co-ordination reports, follow organized schedules which parallel the students' work schedules.

The Co-operative Business Administration program is a four year program offering extensive training in industrial and business operations and management with specializations in accounting, merchandising, parts distribution, personnel, materials control, and traffic and transportation. Academic and work experience periods alternate the same as in the Engineering Program. The Institute provides studies in science, engineering, social relations, English, business, economics, and industrial engineering.

To provide for an orderly and effective transition from programs of directed development to those of self-development

a Fifth-Year Program is used in relation to both of the co-operative four-year programs described above. During the fifth year trainees are assigned to full time work in the plant and also to project studies involving about twelve hours of study per week at home. The project studies are composed of actual problems, selected by the co-operating plant or division in the area of the student's work assignments and are of such a nature as to be of importance to current or future operations. The fifth year program provides the student with opportunities to broaden his training, demonstrate his engineering or business administration ability and his capacity to assume responsibility, and to be evaluated by his employer under a continued work experience program.

The Dealer Co-operative Program is designed to meet the need for young men of broad foundation training to qualify for future responsibilities in the dealer and distributor organizations. It corresponds in its general nature to the other two co-operative programs. The instruction at the Institute emphasizes those phases of training which will enable the student to be of value in his work periods with the dealer. The entire program is based upon the theory that, to be qualified for work in dealerships, men should have practical experience as well as training in fundamentals of sales and service, and that best results are obtained when these two phases of training are properly co-ordinated.

The Institute's Plant Management Program has been developed into a pattern of organized group training pertaining to intensive management training, initial management training and management conferences for organizational development and team training.

The intensive management training is a two week intensive training course given to new foremen before they are placed on the job. It includes five main sections: (1) the job of first-line management; (2) organizational structure, policies, and procedures; (3) departmental functions and inter-relationships; (4) management skill in working with people; and (5) management skill in job training and job improvement. An adaptation of this training is also given frequently to groups of intermediate supervisors and foremen who have had considerable experience in the management organization and to groups of men of general foreman and superintendent rank from various plants. Intensive type courses are also conducted in more technical areas such as work standards and better methods designed to meet the needs of the supervisory organization.

The initial management training program is designed to give the new foreman a clear understanding of what makes up his specific management job and of his divisional and plant policies, procedures, and relationships. It is also designed to aid him in the application of management skills to the requirements of his own job.

The management conferences for organizational development and team training were established to assist members of management in meeting the requirements of new developments and changing situations as they occur and in meeting the increased responsibilities of new positions upon promotion. They were also designed to bring about uniform understanding and uniform functioning throughout the organization and the training units numbering about 200 are aimed at specific organizational needs or objectives. These units include such titles as the American industrial system, analysis of operations, conveyORIZED assembly operations, the field of better methods, fundamentals of human relations, fundamentals of industrial relations, fundamentals of management, induction, fundamentals of work space layout, General Motors salaried personnel policies and procedures, labor management relations act, report writing in industry, working with individuals, and safety in General Motors.

The Technical and Specialized Programs were established to meet the technical training needs brought about by the rapid developments in equipment, tools, methods of manufacture and the corresponding developments in the control and operation functions which frequently presented needs for short training programs even for experienced men. The programs are carried on both on an intensive basis at the Institute and on an extension basis in the various plants. They have filled the plant needs in planning, operation, control, maintenance,

and improvement. Some of the courses offered under these headings include process planning and methods planning; manufacturing methods, industrial electronics, die setting, and machine setup; work standards, production control, technical time study and quality control; hydraulic controls, machine maintenance, and welder maintenance; and better methods of manufacturing and office management, methods improvement, micro motion, and process analysis.

The training program for the distribution organizations includes the dealer co-operative program, previously described, which provides a broad foundation training and the specific training courses for the improvement of job operation and job management in the sales and service departments of the dealer organizations. These courses include the application of fundamentals of service department management, the principles and methods of satisfying service needs of customers, the principles of sales management and their application to dealers' sales departments, the principles of management and merchandising and their application to dealers' parts departments, and a post-graduate training course in the organization and management of a General Motors dealership.

Under the heading of Training for Specific Groups and Advisory Service the Institute offers training for teachers of auto-mechanics in public schools and colleges, diesel power groups, trade apprenticeship, and advisory services. The instruction for teachers covers automotive products,

design-construction-operation, service methods, and modern equipment. For the diesel power groups instruction covers the construction and operation of automotive diesels. The trade apprenticeship covers job analyses, program development, conferences, advisory service, instruction material, and related instruction. The Institutes Advisory Services include training needs analyses, training methods, instructional material, design and development of training aids, and training program planning.

The Spare-Time Training Program consists of over 200 units of instruction for employees who through their own initiative and ability wish to prepare themselves for more highly skilled and more responsible positions. The original program of the Institute was organized on a spare-time basis for this purpose. The units of instruction require from one to four hours per week for a term of twelve weeks. Many of these units have been arranged in complete sequences requiring from four to ten hours per week, for three to twelve terms. Some of these sequences include business training - one to two years, industrial management - two years, technical training and trade training - one to four years.

International Harvester Company. The International Harvester Company of Chicago, Illinois has two training programs - the Progressive Students Course and the Off-Hour Education Program. The purpose of the former program is to help promising young people to equip themselves for positions

of responsibility in staff and technical positions; the latter program's purpose is to further employees' education and to develop special talents and leisure time activities.

The Progressive Students Course is a two-year supervisory development program. Candidates are recruited from two main sources. The first source includes graduates from colleges and universities with training in mechanical, electrical, industrial, metallurgical or agricultural engineering, or other fields which may be closely related to the objective position for which the student is to be trained. The second source includes persons who have had prior service with the company and have graduated from high school or preferably have had some college training and have demonstrated technical aptitude and other qualities which merit special consideration and warrant further development. Candidates must have a personality and character which indicate possible success in a position requiring supervisory ability, be between the ages of twenty-one and thirty, and be citizens of the United States for work in the American works or citizens of Canada for work in the Canadian works.

This program provides for: (1) on-the-job experience in all applicable phases of plant operation; (2) classroom sessions; (3) personal counsel and guidance by members of the works management; (4) independent study and work in specially assigned projects; and (5) a special orientation course at the Harvester Central School in Chicago.

Student schedules are prepared by the individual works in accordance with local and divisional requirements. However, the following schedule may be regarded as typical with technical on-the-job experience being emphasized during the first year and classroom studies during the second year.

First Year	
Department	Number of weeks
Inspection	4
Pattern Shop	1
Foundry	6
Metallurgical Laboratory	2
Mechanical Engineering (Shop Functions)	6
Plant Engineering (Shop Functions)	3
Chassis Machining	16
Engine Machining and Assembly	5
Chassis Assembly	3
Forge and Die Shop	3
Welding	1
Vacation	2
Total 1st yr.	52
Second Year	
Industrial Relations	2
Wage Administration	4
Materials Control	5
Buying	1
Training	1
Mechanical Engineering	4
Plant Engineering	1
Accounting	4
Production Research	1
Product Engineering	1
Salary Administration, 8 days and	
Budget and Cost Control, 8 days	2
Specialization	24
Vacation	2
Total 2nd yr.	52

The Off-Hour Education Program is entirely financed by the company in order to make it possible for employees and members of their families to broaden the scope of their knowledge in subjects of their own choice by continuing the

process of learning during off-hours. The program includes arts and crafts, business, home economics, shop practice and technical subjects varying in length from twelve to forty-five clock hours with the majority of them covering thirty clock hours of instruction. Instructors are selected from qualified Harvester employees, the Canton High School, business schools and colleges. The following list of courses indicates the type of instruction offered: auto driver training, blueprint reading I and II, cabinetmaking, comptometry, dressmaking, effective speech, foods, foundry practice, general metallurgy, handicraft, home care of the sick, home decorating, human behavior, introductory art, machine shop practice, mechanical drawing, mother and baby care, pencil sketching, personal problems of everyday living, photography, practical law, shop mathematics, shop sketching, shorthand I and II, slip covers, statistical quality control, tailoring, and typing I and II.

Johnson & Johnson Company. The Johnson & Johnson Company of New Brunswick, New Jersey is in the process of revising literature describing their training activities. The following descriptions are about five years out of date but will serve to indicate the scope of the Company's training programs. The Company uses the conference method, job rotation, and classroom instruction as well as individual instruction. Its programs may be classified under nine headings: Supervisor Training, Pre-Supervisor Training, Executive

Training, Orientation Training, Operator Training, Business Training, Employee Training, General Education Courses, and Miscellaneous Training.

The Supervisor Training program is designed to assist supervisors to meet successfully their human, industrial engineering, and production problems, and aims to develop supervisors so that they, themselves, produce a minimum of problems. The program is preventive in nature more than it is corrective, by helping supervisors to locate incipient problems before eruptions occur, and by helping them to operate in such a manner that fewer problems arise. There are two divisions of the program - Management Training and Technical Training.

Under Management Training, conferences are held on such subjects as principles of industrial organization, duties of supervisors and their responsibilities, labor legislation, union contracts, production control and material planning, building production incentives, measuring production efficiency and grading employees, absenteeism and labor turnover, company rules, regulations and services, inducting the new worker, guaranteed annual wage, purchasing, quality control, supervising the woman worker, costs and budgets, payroll and cost control, giving orders and directions, correcting and improving subordinates, mechanical department functions, placement and supervision of veterans, safety, housekeeping, developing understudies, and leadership and self-improvement.

Conferences are also held on such topics as industrial hygiene, development of initiative and confidence, time study, time budgeting and work planning, controlling, selecting employees, procuring cooperation, psychology of learning, practical psychology, nutrition, waste control, warehousing, product design, reduction of cost, report writing, aptitude testing, know your product, function of sales department, and counseling.

The Technical Training for Supervisors consists of thirty-one and a half hours of instruction in the following areas: (1) introduction - one and one-half hours, covering purpose of classes, a short background of the development of complicated machines to replace hand labor, and teaching through the use of models, written descriptions, photographs, symbols, and drawings; (2) mechanical drawing - four and one-half hours covering instruments, planes, projection, development, isometric, perspective, and sketching; (3) fundamentals of motion - ten and one-half hours covering reciprocation, rotation, kinematic chains, cams, levers, and combinations of cams and levers; (4) stresses - one and one-half hours; (5) drives - four and one-half hours including direct, belt, gear, and chain drives; (6) bearings - one and one-half hours; (7) cutting, slitting, and dieing - one and one-half hours; (8) lubrication - one and one-half hours; (9) instruments and controls - three hours; (10) protection and safety - one and one-half hours; and (11) the

development of the machine - one and one-half hours. A course is also given in industrial electronics.

The Pre-Supervisor Training Program is conducted for the purpose of providing new, capable, well-trained men to fill vacancies in supervisory positions. It is a six weeks program of classroom conferences and on-the-job training with rotation from department to department. Applicants must be from twenty to thirty years old and are selected first from within the plant and secondly from outside. College graduates are preferred. The conferences cover the same topics previously noted in the Supervisor Training Program.

Executive Training is offered to top staff and line executive groups to provide the latest material dealing with the problems of human engineering and technological advance. One phase of this program is in the form of monthly seminars dealing with problems of interest to top executive personnel. The groups meet on a voluntary basis and choose their topics from a list sent to each member in advance on which they indicate their preference. The other phase is the provision of the latest articles, periodicals, and books on such topics as human relations, organization, reconversion, management research, and expansion. Notices are sent to each member of the group giving a brief digest of the content along with a listing of topics covered. The material is circulated to those indicating a desire to read it.

The Orientation Training Program is designed to speed the process by which new employees become satisfied, efficient members of the company. It aims to inform workers about rules, regulations, policies, company history, the products manufactured and their importance, the worker's contribution to the finished articles, the dependence of the company upon the workers, and to provide a permanent channel for presenting information to employees and influencing their reaction to it. This training is covered in four two-hour sessions.

The Operator Training Program is on-the-job instruction of new and transferred employees. Its purpose is to reduce labor turnover, increase quality production, and promote high morale. The training covers specific instruction for the particular job to be performed.

The Business Training Program offers instruction for secretaries, clerks, typists, and stenographers. It calls for twenty hours of instruction covering a review of the principles and techniques of good business practices, the presentation of new theories and practices in filing, telephone conversation, completing office forms, correspondence, and letter forms.

The Employee Training Program is primarily a program for the development of attitudes and is designed to be of practical value to the production worker in his home, social, or work-a-day life. A combination of lecture, conference and discussion techniques are used. Topics such as profit and

production, a good steady job, be satisfied with your job, know yourself, what we are making, what does your company believe, spend your money wisely, and what do you suggest are covered in this program.

The General Education Courses include such subjects as public speaking, Russian, mathematics, writing, English, home decorating, handicrafts, civics, home economics, and other fields of interest to employees. The purpose of these courses is to equip employees to handle their present job better and to prepare them for advancement. As part of this program local schools who offer evening courses are contacted and information concerning their programs, entrance requirements, etc. is compiled in the form of notices and sent to each supervisor.

The Miscellaneous Training includes those training activities which are spontaneous in nature and are conducted whenever the needs arise. They are conducted informally through direct, out-of-class contacts and include problems submitted to the training department by group leaders, foremen, superintendents, executives, and other employees.

The Quaker Oats Company. The Quaker Oats Company of Cedar Rapids, Iowa has two trainee programs. One is a specialized program involving intensive training called the "Foreman Training" program. The other is a general program extending over a three year period called the "Mill Training" program. Both programs have the common purpose of preparing

selected trainees for future supervisory positions. They differ in the length of time involved, method of training, and job assignments.

The Foreman Training Program consists of the assignment of the trainee to a mill supervisory group at the foreman's level so that he may participate in all training and discussion meetings. It also involves the offering of courses in job methods, job relations, job instruction, and safety training. The trainees take these courses at the same time that they are made available to regular supervisors. If regular courses are not available at the time students are receiving their training, then special courses are made available for them. Whenever possible trainees are given responsibility for supervision on the basis of vacation relief, sickness relief, or other suitable local plans. Trainees participate in all activities made available to mill supervisors.

The Mill Training Program is based principally upon actual job experience and trainees are assigned to the various departments for work, observation, and study. The total length of the training period is thirty-seven months with the job assignments in the various departments varying from one to six months.

The Radio Corporation of America. The Radio Corporation of America, Victor Division, at Camden, New Jersey has a supervisory training program applicable to all levels of supervisors throughout the organization. It has five main purposes as follows: (1) to provide all supervisors with the fundamental knowledge and skill of technical, operating, and supervisory responsibilities which are necessary for the efficient performance of their jobs; (2) to assist supervisors in the better understanding of human relationships in industry as they affect job performance and costs, and to develop an attitude of human relations which predisposes supervisors to look for basic causes of human behavior; (3) to keep all supervisors informed of current problems and changes; (4) to provide a supplement to the regular line of communication to insure uniform understanding of policies and directives "down the line" and to be a means of reporting problems, conditions, and results "up the line"; and (5) to develop supervisors in accordance with organization needs by broadening their experiences and increasing their knowledge. The program is divided into three sections: (1) basic material for new supervisors; (2) standard subjects for experienced supervisors; and (3) advanced subjects for supervisory development.

The basic material for new supervisors includes the following topics: the supervisor's responsibility, the organization, personnel functions, company policies, sources of

and requirements for proper operation and care of equipment, tools, material, supplies, safety and good housekeeping, know-how information as to the technical or skill aspects of the work supervised, review of routine functions, job instructor training, job relations training, elementary time study, job methods improvement training and study of the union contract.

The standard subjects for experienced supervisors cover proper selection and placement of workers, orientation of employees, absenteeism and turnover, proper wage and salary administration, rating of employees, human relations, union relations, planning of work, setting of standards, importance of cost and its elements, work simplification, review of various plant section activities, material handling, industrial safety and health, and industrial housekeeping.

The advanced subjects for supervisory development include formation of policies, improving communications, technique of effective expression, importance of keeping employees informed, interviewing and counseling, understanding people, supervising women, industrial economics, production control, advanced time study and motion economy, the sales function, the engineering function, the purchasing function, the quality control function, and the accounting function.

Seagram & Sons, Incorporated. The Joseph B. Seagram & Sons Incorporated of Louisville, Kentucky advocate an

education program involving employee training for operators, pre-supervisory training, supervisor training, and cooperative extension classes with local universities.

The training program for new employees as production operators includes an interview with the safety director upon completion of a physical examination, a plant tour to give a general overall picture of the company and its products, three weekly orientation meetings to present the company's regulations, facilities available to employees, plant safety regulations, and an explanation of the production processes used, a one to four day observation period in which the new employee observes and studies each unit operation and its significance in the overall process, and a short "break-in" period in which the new employee moves from one work assignment to another to gain experience and knowledge of each phase of the manufacturing process.

A pre-supervisory education program is offered to employees who are potentially eligible for supervisory positions. It covers instruction in personnel relations through a planned program involving the use of speakers chosen from the management ranks, the local university, or from other industries, the use of commercial sound slide films, the preparation of a short speech by the student, and the opportunity for the student to conduct the meetings from time to time.

The supervisor training program is conducted through the use of textbooks published by the company, the distribution to supervisors the weekly bulletin "Management Information" published by the Elliott Service Company of Owensboro, Kentucky, weekly meetings of the supervisory staff of each department, rotation of supervisory assignments through different departments, and fellowships for graduate study at universities throughout the country. The fellowships range from one to three years depending on the graduate degree the supervisor acquires.

Cooperative industrial training programs are offered on an extension basis by the University of Louisville for the plant in Louisville, Kentucky, by the University of Maryland for the plant in Relay, Maryland and by Purdue University for the plant in Lawrenceburg, Indiana. Courses such as accounting, public speaking, industrial relations, business law, report writing, and bacteriology for the distilling industry are provided in series. Upon completion of a series of courses the employee is awarded a certificate signed by officials of the company.

Standard Oil Company. The Standard Oil Company of California, San Francisco, California has a supervisory training plan called the "Management Conference Program" and some of its departments have employee development programs. The majority of the production training consists of on-the-job and job rotation.

The Management Conference Program consists of eight monthly conferences during a year with a four month recess during the summer months. Prior to the 1949 series, all meetings were of the conference type. At this time they were changed in accordance with the members' wishes to include five meetings which were expository in nature. Some of the discussion topics which have been used are: Dealing with Fellow Employees; Industrial Relations Policies and Their Administration; Labor Relations; Employee Rating; Introducing the New Employee; Reduction of Waste; The Supervisor and His Job; Exit Interviews; Employee Transfers; Discipline; Training and Developing Employees; and Planning and Scheduling Work. The expository subjects have included such topics as: The Current Oil Industry Financial Picture; Cost Control and Manpower Utilization; Countering Subversive Activities; Labor Relations; The Company's Personnel Relations Program; and the Company's Public Relations Program.

The development program of the Comptroller's Department was established to bring along promising young men who were primarily interested in accounting, financial and economic analytical work. It involves a series of job rotations for approximately eighteen to twenty-four months, after which the trainee is assigned to a position in an accounting or related activity.

The Producing Department has a professional training program lasting from twelve to eighteen months in which

engineers and potential analysts are afforded an opportunity to gain practical experience in various phases of the department's activities, after which they are assigned to professional positions in operating or administrative work.

Thompson Products Incorporated. The Thompson Products, Incorporated, Cleveland , Ohio utilizes two training programs: a Supervisor Induction Program and a Supervisory Development Program. The company feels that "planned training does for members of the organization what scheduling has done for product manufacture, what engineering has done for equipment improvement, and what budgeting and forecasting has done for cost control." Both programs are carried out through the use of the conference methods and printed manuals.

The Supervisor Induction Program orients new supervisors who have just been promoted from the ranks to the management bracket of the company. Discussions are held on Company policies, practices, and procedures. Topics include such items as the new responsibilities as a supervisor, the supervisor's work, selection, placement and adjustment of employees, eliminating waste, reducing accidents and hazards, business operations and problems, customer relations, working conditions, business outlook of the Company, personnel policies, the union contract and employee handbook, the importance of harmonious working relationships with the rank-and-file employee, fairness in handling men and problems, adjusting the employee to his job and fellow workers, how to get ready

to instruct, how to instruct, procedure for successfully adjusting a new employee to fellow workers, explaining changes and keeping workers informed in advance about changes affecting them, maintaining discipline, employee merit rating, production and cost information, production schedules, care of equipment, structure of costs, how pay rates are set, and distribution of the Company's income.

The Supervisory Development Program starts by covering the same topics introduced in the Supervisor Induction Program and goes into them in greater detail. In addition to these subjects the following items are treated: federal, state and municipal regulations, budgetary control system, factory cost accounting, building a working force, getting out the work, keeping the unit running smoothly, maintaining group harmony, time card information, and further discussion of employee rating.

United States Navy. Since much of the training material used by naval stations originates in the Navy Department, Office of Industrial Relations, Washington, D.C. and is adapted to fit local needs, there is great similarity in the training programs. Therefore the programs of both of the stations contacted - the San Francisco Naval Shipyard and the United States Naval Ordnance Plant at Indianapolis, Indiana - will be discussed at the same time.

Their Employee Development Programs formerly known as Work Improvement Programs cover supervisor training and

apprentice training. The purpose of the former is to raise the standards of supervision at all levels and the latter aims to train men to be well rounded journeymen who have a general and specific knowledge of the particular shop to which they are apprenticed.

The Supervisor Training Programs provide a uniform method of exposing all supervisors in all naval stations to the latest approved techniques in raising the efficiency and standards of supervisors. The material is prepared in theory in Washington and adapted to local conditions at each station or yard. The material is presented in lecture form whenever possible, however, some of it is covered in group conferences. The lectures and conferences deal with such subjects as the principles of instruction, teaching techniques, training organization, organization and management, related technical material, relationships with organized labor, procedures, systems, and practices of the Navy Department, and dealing with people.

The Apprentice Programs are four years in length and involve alternate periods between on-the-job experience and classroom instruction. An apprentice learns as he works in the shop, on production work, for a period of three weeks. He then attends school for one week. The alternate periods of three weeks of work and one week of academic work continue throughout the training period. During the last year, if the apprentice is an outstanding student, he is assigned

responsible related jobs such as planning and estimating, and progress and design so that he receives a well rounded and varied experience that may make him suitable material for future supervisory positions. While in school the apprentice studies English, mathematics, history, science, mechanical drawing, and his own trade theory. Credits he may earn for this work are added to his high school graduation units, or if he has already graduated from high school these units are added to his junior college work. After an apprentice serves four years and earns the required 7312 hours, he attains his journeyman status plus his high school diploma or his junior college certificate.

When the number of personnel on the training staffs permits, other programs are offered such as artisan training, storekeeping, typing and stenography refresher courses, business English, mathematics, letter writing, correspondence, interior decorating, home gardening, electronics, and welding.

Western Electric Company. The Western Electric Company, Kearny, New Jersey has a Supervisory Development Program covering the first three levels of supervision. The Works Training Advisory Committee, consisting of a representative of each Assistant Works Manager's organization, functions as a Board of Education for the Kearny Works. Since the organizations represented perform the staff, financial, engineering, sales, and manufacturing functions, the Committee is a cross-section of the plant and is able to consider the problems of

supervisory development on a plant-wide basis. This Committee advises and assists in analyzing training needs and prepares courses and programs to satisfy these needs. The program consists of several series of conferences, the first called Fundamentals of Supervision, the second Labor Relations, the third Principles of Supervision, and the fourth Human Relations in Management.

The series of conferences, Fundamentals of Supervision, was originally called Orientation and was intended for newly appointed section chiefs. So many experienced section chiefs requested it, however, that it was eventually extended to cover training for all section chiefs. It is a two-week, full-time series during which the supervisor is relieved of all other job duties and responsibilities. Analysis of the section chief's job revealed that the section chief needs to know the nature of his responsibilities, the technique of leadership, the details of the work of his section, how to effect improvements, and how to work in harmony with his associates. The topics covered in this series include labor relations, personnel practices, job relations, instructor training, job methods, safety, program planning, production scheduling, production service, job planning, piece rates, cost control, and quality control.

The Labor Relations series of conferences last for a period of one week, full time. This series is designed to equip the supervisor to carry out labor relations in

accordance with union agreements, the spirit of the law, and the Company's personnel policies. The subjects covered include labor history and organization, federal and state labor laws, details of current union agreements, and the relationship between the personnel practices of the Company and the union agreement.

The conference series on Principles of Supervision is also a one week, full time series held for department chiefs. An analysis of the second-level supervisory jobs indicated that they differed from the first-level in degree rather than in kind. Where the section chiefs work through people directly, the department chiefs do so both directly and indirectly by way of the section chiefs. Methods of dealing with people therefore become the department chief's most pressing need. Psychology, interviewing, conference leading, and leadership are discussed in the conferences.

As training for the third-level of supervision, the assistant superintendent level, the company participates in the A.T. & T. conference series, Human Relations in Management. Discussions in this series include the need of obtaining greater cooperation and application from all employees, positive leadership, individual's motives, incentives, drives and impulses, the need for communications, attitudes, and employees' behavior and psychological needs. The Company is considering the extension of the concepts of the Human Relations in Management series to all levels of

supervision.

The York Corporation. The York Corporation, York, Pennsylvania cooperates in two College Cooperative Training Programs, one in relations with Pennsylvania State College and the other with the Drexel Institute of Technology. The college programs followed by the trainees are Industrial Engineering at Penn State and Mechanical Engineering with an Industrial Engineering option at Drexel. The programs are five years in length with the student spending thirty-six months on campus and twenty-four months on the job at York. Half of the time spent with the Company is devoted to gaining shop experience and the other half involves the development of office experience. The Company employs graduates of these programs in the following phases of its manufacturing activities: operations planning, production control, procurement, quality control, production supervision, industrial engineering, and in the Controller's Division.

Summary. The literature submitted by the companies discussed in this chapter indicates that all of them are concerned about the development of supervisory personnel and the improvement of the technical competence of their employees. In their training programs they provide opportunities for both vocational and self improvement. Many of them also provide service courses for their employees and in some instances for members of their families. Five of the companies have cooperative agreements with colleges,

universities, technical institutes, and high schools to provide the professional and technical preparation required for engineering students, management personnel, and technicians while the companies provide the on-the-job training experiences. One company operates its own technical institute for the training of its employees.

The company training programs include a variety of experiences to prepare supervisors and employees to cope better with management and production problems. Many of the educational activities sponsored by the training departments of these companies deal with understandings which are specifically related to their own policies. Primary emphasis is placed upon the interpretation of company policies relating to: (1) personnel problems such as selection and placement of personnel, understanding of job relations, employee attitudes, and upgrading and promotions; (2) production problems such as production methods, production control, quality control, training methods, and safety; and (3) general management problems such as cost control, wage and salary administration, union agreements and public relations.

The secondary emphasis in these training programs is related to the development of general understandings and competency in dealing with human relations, communication problems both oral and written, economic problems, mathematics, science, psychology, business organization and control, and technical problems. It is in these fields that the

university can be most helpful in preparing people to become more proficient employees in modern, progressive industries.

CHAPTER IV

THE PROPOSED EDUCATION FOR INDUSTRY CURRICULUM

The tentative curriculum of the Education for Industry program which has been submitted by the Industrial Education Department of the College of Education, University of Maryland, to the Faculty Curriculum Committee for action is a four year program leading to the degree of Bachelor of Science in Education for Industry. The proposal would require educational experiences in four areas of competency: the technical, the communications, the social and civic, and the human relations and leadership. These four areas were selected to meet the expressed needs of the limited number of Maryland industrialists and the students desiring such a college program. In addition to these four aspects of the program, four internship periods of on-the-job, full-time employment of ten weeks each are required.

The Technical Area. Technical shop experiences are provided by the College of Education through the Industrial Education Department, and chemistry, physics, and mathematics by the College of Arts and Sciences.

The industrial education courses include study and laboratory practice in mechanical drawing, woodworking, shop calculations, arc and gas welding, foundry, machine shop practice, sheet metal work, industrial safety education,

modern industry, trade and occupational analysis, and shop organization and management.

The chemistry involves one year of study of general chemistry. The studies in physics involve either a one year survey course in general physics or a one year course in general physics depending upon the student's interest and aptitude for the subject.

The mathematics courses include one year of studies including one semester of algebra or college algebra, and one semester of trigonometry and analytic geometry or plane trigonometry.

The technical area prepares the student by providing experiences both theoretical and practical, the emphasis being on the latter with a wide variety of laboratory experiences to enable the student to gain first-hand knowledge of industrial processes, materials, tools, equipment, and machinery.

The Communications Area. Communication experiences include studies in composition, public speaking, American literature, and English. All of these courses would be provided by the College of Arts and Sciences.

All University of Maryland students are required to take one year of composition and American literature and one year of composition and World or English literature. In addition to the University requirements, the curriculum for the Education for Industry would require one semester of

public speaking which includes the preparation and delivery of speeches, reports, etc. on technical and general subjects.

The Social and Civic Area. The area for the development of social and civic competency requires the subjects of sociology, history, government, economics, military science, and physical education. The sociology and history courses would be provided through the College of Arts and Sciences, the government and economics courses through the College of Business and Public Administration, the military science courses through the College of Military Science, and the physical education courses through the College of Physical Education, Recreation, and Health.

In sociology, one semester of sociology of American life would be required. This is a requirement of all University of Maryland students. One year of history of American civilization and one semester study of American government would also be required as these are prerequisites of all University students.

In economics, one semester of fundamentals of economics and one semester of labor economics would be required. These would be specific requirements of the Education for Industry curriculum.

The Human Relations and Leadership Area. The area for the development of human relations and leadership would include the study of the following subjects: psychology, industrial sociology, and business administration. The subjects

in psychology and the course in industrial sociology would be offered through the College of Arts and Sciences, and the business administration courses through the College of Business and Public Administration.

In psychology, three courses would be required: one semester each of introductory psychology, applied psychology, and social psychology. A one-semester course in industrial sociology would be required for all students in the Education for Industry curriculum.

In business administration four courses would be required: one year or two semesters of business organization and control, and one semester each of personnel management, industrial relations, and job evaluation and merit rating.

Full-Time Internship. In order to provide students with opportunities for first-hand experiences with business and industry, forty weeks of full-time employment would be required. This would be divided into four periods of ten forty-hour weeks each or 400 work hours (minimum), and would carry twelve semester hours of college credit upon the recommendation in terms of satisfactory work and work attitudes.

The student is responsible for obtaining his own employment with the coordinator advising him with regard to job opportunities which have the optimum learning value. The nature of the work experience would be determined and planned by the coordinator, employer and student; evaluations would be based upon these planned experiences.

The initial employment period would be served after the successful completion of the freshman year with a grade average of C and with no required courses failed or incomplete. Two periods of internship must remain after the first semester of the junior year.

All four internships may be served with different employers or in a single establishment. Any one period of internship, however, must be served through continuous employment in a single establishment. The number of internship periods which may run consecutively is limited to two.

The Colleges Utilized. The five colleges of the University of Maryland and thirteen of their departments through which courses for the program are to be offered are as follows:

The College of Arts and Sciences
 The Department of English Language and Literature
 The Department of Chemistry
 The Department of History
 The Department of Mathematics
 The Department of Physics
 The Department of Sociology
 The Department of Psychology

The College of Business and Public Administration
 Department of Business Organization & Management
 Department of Economics
 Department of Government and Politics

The College of Education
 The Department of Industrial Education

The College of Military Science

The College of Physical Education, Recreation & Health
 Department of Physical Education for Men

The Areas of the Program. The five areas of concentration may be presented as follows:

Technical Area

General Chemistry
Elements of Physics, or
Fundamentals of Physics
Trig. and Analytic Geometry, or
Plane Trigonometry
Algebra or College Algebra
Machine Woodworking
Shop Calculations
Mechanical Drawing
Arc and Gas Welding
Foundry
Machine Shop Practice
Sheet Metal Work
Industrial Safety
Organization and Management
of Modern Industry
Trade or Occupational
Analysis
Shop Organization
and Management

Communications Area

*Composition and American
Literature
*Composition and World
Literature, or
Composition and English
Public Speaking

*Required of all University of Maryland Students.

**Required of all Men Students of the University of Maryland.
Electives - ten semester hours in senior year.

Human Relations and Leadership Area

Introduction to Psychology
Social Psychology
Applied Psychology
Industrial Sociology
Personnel Management
Business Organization and
Control
Job Evaluation and Merit
Rating

Social and Civic Area

*Sociology of American Life
*History of American
Civilization
*American Government
Fundamentals of Economics
Labor Economics
**Basic Air Force R.O.T.C.
*Physical Activities

On-the-Job Area

Organized and Supervised
Work Experience
(4 internship periods of
ten weeks each of
full-time employment)

The Courses by Years. The curriculum for Education for Industry broken down into the courses a student will take each year and the semester in which they will be offered is as follows:

Freshman Year

		Semester	
		I	II
*Eng.1,2	Composition and American Literature	3	3
*Soc.1	Sociology of American Life	3	
*G and P.1	American Government		3
Speech 7	Public Speaking	2	
Ind.Ed.1,21	Mechanical Drawing	2	2
Ind.Ed.22	Machine Woodworking	2	
Ind.Ed.12	Shop Calculations	3	
Ind.Ed.23,110	Arc and Gas Welding; Foundry		2
Ind.Ed.69	Machine Shop Practice I		2
Math 10 or 15	Algebra or College Algebra		3
**A.S. 1,2	Basic Air Force R.O.T.C.	3	3
*P.E. 1,3	Physical Activities	1	1
Total Semester Hours		19	19

Sophomore Year

*Eng.3,4	Composition and World Literature, or	3	3
*Eng.5,6	Composition and English Literature	3	3
*H.5	History of American Civilization		3
B.A.10,11	Organization and Control	2	2
Phys.1,2	Elements of Physics	3	3
Phys.10,11	Fundamentals of Physics	4	4
Econ.37	Fundamentals of Economics		3
Ind.Ed.24	Sheet Metal Work	2	
Math 11 or 15	Trigonometry and Analytic Geometry, or Plane Trigonometry	2 3	
**A.S. 3,4	Basic Air Force R.O.T.C.	3	3
*P.E.5,7	Physical Activities	1	1
Total Semester Hours		16-18	18-19

Junior Year

*H.6	History of American Civilization	3	
Psych.1,2	Introduction to Psychology; Applied Psy.	3	3
Chem.1,3	General Chemistry	4	4
Econ.160	Labor Economics	3	
B.A.160	Personnel Management		3
Soc.115	Industrial Sociology		3
Ind.Ed.143,144	Industrial Safety Education II	2	2
Ind.Ed.124a,b	Organized and Supervised Work Experience	3	3
Total Semester Hours		18	18

Senior Year

B.A.166	Industrial Relations	3	
B.A.167	Job Evaluation and Merit Rating	2	
Psych.121	Social Psychology		3
Ind.Ed.165	Modern Industry	2	
Ind.Ed.168	Trade or Occupational Analysis	2	
Ind.Ed.164	Shop Organization		2
Ind.Ed.124c,d	Organized and Supervised Work Experience	3	3
	Electives	3	7
Total Semester Hours		15	15

*Required of all University of Maryland Students, with one exception. Sociology is not required in the Chemical Engineering curriculum.

** Required of all Men Students of the University of Maryland.

The Semester Hours of Subjects. The number of semester hours required in various fields of knowledge is as follows:

Subjects	Semester Hours
Chemistry	8
Physics	6 or 8
Mathematics	5 or 6
Industrial Education	37
English and Speech	14
Sociology, History, and Government	15
Business Organization and Management	12
Psychology	9
Economics	6
Military Science	12
Physical Education	4
Electives	10
Total Semester Hours	138 or 141

CHAPTER V

DELINEATION AMONG CURRICULUMS OFFERED BY THE UNIVERSITY OF MARYLAND

Due to the similarities of certain groups of courses included in the Education for Industry program to groups of courses included in other curriculums offered by the University such as the Industrial Education, the Mechanical Engineering, and the Industrial Administration curriculums, it is necessary to differentiate the curriculums particularly with regard to purposes and content. The intent of this chapter is to indicate similarities among the programs and to point out distinguishing characteristics of the Education for Industry curriculum. The American Civilization program of the University of Maryland requires ^{that} all students¹ to take twelve semester hours of English, three semester hours of sociology, three semester hours of government and six semester hours of history. Since this program is a requirement common to all curriculums a discussion of the courses which comprise the program will not enter into this chapter. The four curriculums are included here for the convenience of making comparisons.

¹The 1951-52 University General Catalog, pp.399-401, indicates an absence of sociology in the Chemical Engineering curriculum.

Proposed Education for Industry Curriculum

Freshman Year

		Semester	
		I	II
*Eng.1,2	Composition and American Literature	3	3
*Soc.1	Sociology of American Life	3	
*G and P.1	American Government		3
Speech 7	Public Speaking	2	
Ind.Ed.1,21	Mechanical Drawing	2	2
Ind.Ed.22	Machine Woodworking	2	
Ind.Ed.12	Shop Calculations	3	
Ind.Ed.23,110	Arc and Gas Welding; Foundry		2
Ind.Ed.69	Machine Shop Practice I		2
Math 10 or 15	Algebra or College Algebra		3
**A.S. 1,2	Basic Air Force R.O.T.C.	3	3
*P.E. 1,3	Physical Activities	1	1
Total Semester Hours		19	19

Sophomore Year

*Eng.3,4	Composition and World Literature, or	3	3
*Eng.5,6	Composition and English Literature	3	3
*H.5	History of American Civilization		3
B.A.10,11	Organization and Control	2	2
Phys.1,2	Elements of Physics	3	3
Phys.10,11	Fundamentals of Physics	4	4
Econ.37	Fundamentals of Economics		3
Ind.Ed.24	Sheet Metal Work	2	
Math 11 or 14	Trigonometry and Analytic Geometry, or Plane Trigonometry	2 3	
**A.S. 3,4	Basic Air Force R.O.T.C.	3	3
*P.E. 5,7	Physical Activities	1	1
Total Semester Hours		16-18	18-19

Junior Year

*H.6	History of American Civilization	3	
Psych.1,2	Introduction to Psychology; Applied Psy.	3	3
Chem.1,3	General Chemistry	4	4
Econ.160	Labor Economics	3	
B.A.160	Personnel Management		3
Soc.115	Industrial Sociology		3
Ind.Ed.143,144	Industrial Safety Education II	2	2
Ind.Ed.124a,b	Organized and Supervised Work Experience	3 3	3 3
Total Semester Hours		18	18

Senior Year

B.A.163	Industrial Relations	3	
B.A.167	Job Evaluation and Merit Rating	2	
Psych.121	Social Psychology		3
Ind.Ed.165	Modern Industry	2	
Ind.Ed.168	Trade or Occupational Analysis	2	
Ind.Ed.164	Shop Organization		2
Ind.Ed.124c.d	Organized and Supervised Work Experience	3	3
	Electives	3	7
Total Semester Hours		15	15

*Required of all University of Maryland Students, with one exception. Sociology is not required in the Chemical Engineering curriculum.

**Required of all Men Students of the University of Maryland.

Industrial Education Curriculum

Freshman Year

Ed.2	Introduction to Education	2	
Eng.1,2	Composition and American Literature	3	3
Speech 1,2	Public Speaking	2	2
Soc.1	Sociology of American Life	3	
G and P.1	American Government		3
Ind.Ed.1	Mechanical Drawing	2	
Ind.Ed.21	Mechanical Drawing		2
Ind.Ed.2	Elementary Woodworking	2	
Ind.Ed.22	Machine Woodworking I		2
Ind.Ed.12	Shop Calculations		3
A.S. 1,2	Basic Air Force R.O.T.C. (Men)	3	3
P.E. 1,3		1	1
Total Semester Hours		18	19

Sophomore Year

Eng.5,6	Composition and English Literature, or	3	3
Eng.3,4	Composition and World Literature	3	3
H.5,6	History of American Civilization	3	3
Ind.Ed.23	Arc and Gas Welding	1	
Ind.Ed.110	Foundry	1	
Ind.Ed.41	Architectural Drawing	2	
Ind.Ed.67	Cold Metal Work		2
Chem.1,3	General Chemistry	4	4
Math 10	Algebra		3
A.S. 3,4	Basic Air Force R.O.T.C. (Men)	3	3
P.E. 5,7		1	1
Total Semester Hours		18	19

Junior Year

H.H.Ed.100,101	Principles of Human Development	3	3
Ind.Ed.26	Art Metal Work I		2
Ind.Ed.28	Electricity I	2	
Ind.Ed.69	Machine Shop Practice I	2	
Ind.Ed.24	Sheet Metal Work	2	
Ind.Ed.160	Essentials of Design	2	
Ind.Ed.166	Educational Foundations of Industrial Arts, or		2
Ind.Ed.171	History of Vocational Education		2
Ind.Ed.48	Electricity II		2
Phys.1,2	Elements of Physics	3	3
Ind.Ed.164	Shop Organization and Management		2
	Electives	4	4
Total Semester Hours		18	18

Senior Year

Ed.150	Educational Measurement	2	
Ed.160	Educational Sociology	2	
Ind.Ed.140	Curriculum, Instruction and Observation	3	
Ind.Ed.149	Methods and Practice of Teaching	9	
Ind.Ed.89	Machine Shop Practice II (or Ceramics)		2
Ind.Ed.31	Mechanical Drawing (or Photography)		2
Ind.Ed.42	Machine Woodworking II (or Automotives)		2
Ed.161	Guidance in Secondary Schools		2
Ind.Ed.105	General Shop, or		2
Ind.Ed.163	Trade or Occupational Analysis		2
Econ.37	Fundamentals of Economics		3
	Electives		3
Total Semester Hours		16	16

Mechanical Engineering Curriculum

Freshman Year

Eng.1,2	Composition and American Literature	3	3
Speech 7	Public Speaking		2
Math 14	Plane Trigonometry	2	
Math 15	College Algebra	3	
Math 17	Analytic Geometry		4
Chem.1,3	General Chemistry	4	4
Dr.1,2	Engineering Drawing	2	2
Engr.1	Introduction to Engineering	1	
A.S. 1,2	Basic Air Force R.O.T.C. (men)	3	3
	Physical Activities	1	1
Total Semester Hours		19	19

Sophomore Year

G and P.1	American Government	3	
Soc.1	Sociology of American Life		3
Math 20,21	Calculus	4	4
Phys.20,21	General Physics	5	5
Surv.1	Plane Surveying		2
Dr.3	Advanced Engineering Drawing	2	
Shop 1	Machine Shop Practice	2	
Shop 2	Machine Shop Practice		1
Shop 3	Manufacturing Processes		1
A.S. 3,4	Basic Air Force R.O.T.C. (men)	3	3
	Physical Activities	1	1
	Total Semester Hours	20	20

Junior Year-General Option

Eng.3,4	Composition and World Literature, or	3	3
Eng.5,6	Composition and English Literature	3	3
A.S.101,102	(Advanced Air Force R.O.T.C. - 3 credits per semester may be substituted)		
Math 64	Differential Equations for Engineers	3	
Mech.2	Statics and Dynamics	5	
Mech.52	Strength of Materials		5
E.E.51,52	Principles of Electrical Engineering	4	4
M.E.53	Metallography		3
M.E.54	Fluid Mechanics		3
M.E.100	Thermodynamics	3	
		18	18

Junior Year-Aeronautical Option

Eng.3,4	Composition and World Literature, or	3	3
Eng.5,6	Composition and English Literature	3	3
A.S.101,102	(Advanced Air Force R.O.T.C. - 3 credits per semester may be substituted)		
Math 64	Differential Equations for Engineers	3	
Mech.2	Statics and Dynamics	5	
Mech.52	Strength of Materials		5
E.E.51,52	Principles of Electrical Engineering	4	4
M.E.53	Metallography		3
M.E.55	Fluid Mechanics and Aerodynamics		3
M.E.100	Thermodynamics	3	
	Total Semester Hours	18	18

Senior Year-General Option

Engr.100	Engineering Contracts and Specifications		2
H.5,6	History of American Civilization (or substitute A.S. 103,104)	3	3
M.E.101	Heat Transfer	2	
M.E.102	Heating and Air Conditioning	3	
M.E.103	Refrigeration		3
M.E.104,105	Prime Movers	4	4
M.E.106,107	Mechanical Engineering Design	4	4
M.E.108,109	Mechanical Laboratory	2	2
Total Semester Hours		18	18

Senior Year-Aeronautical Option

Engr.100	Engineering Contracts and Specifications		2
H.5,6	History of American Civilization (or substitute A.S. 103,104)	3	3
Aero.E.113,114	Mechanics of Aircraft Structures	3	3
M.E.101	Heat Transfer	2	
M.E.104,105	Prime Movers	4	4
M.E.106,107	Mechanical Engineering Design	4	4
M.E.108,109	Mechanical Laboratory	2	2
Total Semester Hours		18	18

Industrial Administration Curriculum

Freshman and Sophomore Requirements

English, Composition and American and World Literature	12
Mathematics, Math 5 and 6	6
Economic Geography 1 and 2	4
Economic Developments 4 and 5	4
Organization and Control 10 and 11	4
Government and Politics 1	3
Sociology of American Life 1	3
History of American Civilization 5 and 6	6
Military Training and Physical Activities for Men	16
Hygiene and Physical Activities for Women	8
Accounting 20 and 21	8
Speech 18 and 19	2
Principles of Economics 31 and 32	6
Total specified requirements	66-74

Junior and Senior Requirements

Econ.140	Money and Banking	3
B.A.140	Financial Management	3
Econ.150	Marketing Principles and Organization	3
B.A.150	Marketing Management	3
Econ.160	Labor Economics	3
B.A.160	Personnel Management	3
B.A.130	Elements of Statistics	3
B.A.130,181	Business Law I,II	8
Total Semester Hours		29

Additional Required and Elective Courses:

*B.A.121	Cost Accounting (4)
B.A.122,127	Auditing (3,3)
B.A.132,133	Advanced Business Statistics (3,3)
B.A.153	Purchasing Management (3)
*B.A.163	Industrial Relations (3)
B.A.165	Office Management (3)
B.A.166	Business Communications (3)
*B.A.167	Job Evaluation and Merit Rating (2)
*B.A.169	Industrial Management (3)
B.A.170	Transportation Services and Regulation (3)
B.A.171	Industrial and Commercial Traffic Management (3)
B.A.172	Motor Transportation (3)
*B.A.177	Motion Economy and Time Study (3)
*B.A.178	Production Planning and Control (2)

*Specific requirements for students concentrating in Industrial Administration.

Purposes. The purpose of the Education for Industry curriculum proposed as a new offering of the Department of Industrial Education of the College of Education is to prepare persons for initial employment in industry as technicians and to provide background experiences which would enable them, with further experience in a particular company or industry, to advance to positions of greater responsibility including supervision. The primary purpose of the program

is preparation for industrial employment relating to the production and service phases of various industries.

The purpose of the Industrial Education curriculum offered by the Department of Industrial Education of the College of Education is to prepare persons to teach industrial arts at the secondary school level, to provide professional courses to prepare teachers to meet certification requirements in vocational and occupational schools, and to provide courses for the improvement of teachers in service. The primary purpose of the program is, therefore, teacher preparation.

The Mechanical Engineering curriculum offered by the Department of Mechanical Engineering in the Glen L. Martin College of Engineering and Aeronautical Sciences is provided to prepare persons to design, construct, and maintain machinery and power plants. It also deals with heating, ventilation, refrigeration, and the organization and operation of industrial plants. The purpose of the curriculum is to provide opportunities to develop the basic and fundamental knowledge necessary to enter upon the practice of the profession as a Mechanical Engineer.

The Industrial Administration curriculum in the Department of Business Organization and Administration of the College of Business and Public Administration is designed to acquaint the student with the problems of overall organization and control in the field of industrial management.

The purpose of the proposed new curriculum, Education for Industry, differs from the purposes of the other three curriculums and should, therefore, not be confused with them. The greatest similarity exists between these curriculums in groups of required courses and not in purposes. Even in the course offerings there are distinct differences which will be described later. A similarity in purposes might be inferred between the Education for Industry curriculum and the Industrial Administration curriculum but they differ in that the former aims at preparing persons who will be primarily concerned with production processes and supervision in relation to these processes while the latter aims to prepare persons for more diversified management positions. These two curriculums differ greatly in the background experiences required especially with respect to the technical preparation in shop work, drawing, and in the basic sciences.

Similarities. The greatest similarity exists between the groups of technical subjects required in the Education for Industry and the Industrial Education curriculums. Common to both curriculums are the following shop and drawing subjects: Mechanical Drawing I and II, Machine Woodworking I, Arc and Gas Welding, Foundry, Machine Shop Practice I, and Sheet Metal Work. The following academic subjects are also common to both curriculums: Shop Organization and Management, Shop Calculations, and Fundamentals of Economics. There is also a similarity between the requirements in relation to

the basic sciences of mathematics, physics, and chemistry. Algebra, General Chemistry, Fundamentals of Physics, and Elements of Physics are required in both curriculums. The total number of semester hours required in these basic sciences is nineteen to twenty-two in Education for Industry and twenty in Industrial Education.

The basic similarity between the Education for Industry curriculum and the Mechanical Engineering curriculum is due to the similarity in requirements for mechanical drawing, machine shop practice, and general chemistry. Both curriculums require four semester hours of mechanical drawing in the freshman year, and the Mechanical Engineering curriculum requires an additional two semester hour course called Advanced Engineering Drawing in the sophomore year. The Education for Industry curriculum requires a two semester hour course in machine shop practice while the Mechanical Engineering curriculum requires three semester hours in machine shop practice and another semester hour in manufacturing processes. Both curriculums require eight semester hours of general chemistry.

A slight similarity exists between the Education for Industry curriculum and the Industrial Administration curriculum since they have five courses in common and two courses which are comparable. The courses which are common to both include four semester hours of Business Organization and Control, three semester hours of Labor Economics, three semester

hours of Personnel Management, three semester hours of Industrial Relations, and two semester hours of Job Evaluation and Merit Rating. The two comparable courses are a three semester hour course in Fundamentals of Economics in the Education for Industry curriculum and a four semester hour course in Economic Developments in the Industrial Administration curriculum.

Differences. The first outstanding difference between the Education for Industry and the Industrial Education curriculums is that the former requires the following courses in business administration which the latter does not require: Organization and Control, Personnel Management, Industrial Relations, and Job Evaluation and Merit Rating.

Another outstanding difference between these two curriculums is that the curriculum for the Education for Industry program requires work experiences in industry while the curriculum for the Industrial Education program does not require such experience but recommends it as beneficial for students preparing to teach industrial subjects. The latter requires practice teaching experience while the former does not.

Another difference is the omission of the following education and professional courses from the Education for Industry curriculum which are required in the Industrial Education curriculum: Introduction to Education, Educational Measurements, Educational Sociology, Guidance in Secondary

Schools, Methods and Practice of Teaching, Curriculum Instruction and Observation, Educational Foundations of Industrial Arts or History of Vocational Education, and General Shop. In the Education for Industry curriculum the required course, Industrial Sociology, is comparable to the course, Educational Sociology, which is required in Industrial Education. Students in the Education for Industry curriculum would be required to take more courses in psychology than students in the Industrial Education curriculum. Students majoring in Education for Industry would be required to take three courses of three semester hours each as follows: Introduction to Psychology, Applied Psychology, and Social Psychology. Students majoring in Industrial Education have the following option: they may take a four hour course in Principles of Human Development or a three semester hour course in Advanced Educational Psychology. Two semester hours of speech are required in the Education for Industry curriculum while four semester hours of speech are required in Industrial Education. More semester hours are required in economics in the Education for Industry curriculum than in Industrial Education. In addition to Fundamentals of Economics which is common to both curriculums, the Education for Industry curriculum requires a three semester hour course in Labor Economics. Another difference in professional courses may be noted in that four semester hours are required in Industrial Safety Education and two semester hours in

Modern Industry in the Education for Industry curriculum while there are no comparable requirements in Industrial Education.

There are also differences in the technical requirements of both curriculums. The Industrial Education curriculum requires more shop laboratory subjects, thirty-two semester hours, than the Education for Industry which requires only twelve semester hours. In addition to Mechanical Drawing I and II, Machine Wood I, Arc and Gas Welding, Foundry, Machine Shop Practice I, and Sheet Metal Work which are common to both curriculums, the Industrial Education curriculum requires the following two semester hour courses: Elementary Woodworking, Mechanical Drawing III, Architectural Drawing, Cold Metal Work, Art Metal Work I, Electricity I and II, Essentials of Design, Machine Shop Practice II, and Machine Woodworking II.

The major differences between the Education for Industry curriculum and the Mechanical Engineering curriculum are to be found in the requirements pertaining to the basic sciences, the applied sciences, and the applied engineering courses. In the basic sciences of mathematics, physics, and chemistry the Education for Industry requires nineteen to twenty-two semester hours depending upon the selections made in the options in mathematics and physics. In Mechanical Engineering the requirements are more comprehensive with a total of thirty-eight semester hours being required, twenty semester

hours in mathematics, ten semester hours in physics, and eight semester hours in chemistry. In the Education for Industry curriculum five or six semester hours are required in mathematics as follows: three semester hours of Algebra or College Algebra and two semester hours of Trigonometry and Analytic Geometry or three semester hours of Plane Trigonometry depending upon the mathematical preparation the student has had in high school. In the Mechanical Engineering curriculum the entrance requirements include three and one-half units of mathematics including solid geometry. A student may enter lacking one unit of advanced algebra and one-half unit in solid geometry but he must devote five hours a week to making these up during the first semester. He then takes the first semester requirements during the second semester and makes up the second semester requirements during the summer session. The mathematics requirements in this curriculum include three semester hours of College Algebra, two semester hours of Plane Trigonometry, four semester hours of Analytic Geometry, eight semester hours of Calculus, and three semester hours of Differential Equations for Engineers.

The requirements for physics include either six semester hours of Elements of Physics or eight semester hours of Fundamentals of Physics in the Education for Industry curriculum and ten semester hours of General Physics in the Mechanical Engineering curriculum. Both the Education for Industry and the Mechanical Engineering curriculums require

eight semester hours of General Chemistry.

The Education for Industry curriculum has no requirements in the applied sciences. The Mechanical Engineering curriculum requires the following courses in this category: Statics and Dynamics, Strength of Materials, Metallography, Fluid Mechanics, Thermodynamics, Heat Transfer, Heating and Air Conditioning, and Refrigeration.

The Mechanical Engineering program includes the following applied engineering courses which are characteristic features of engineering curriculums: Plane Surveying, Prime Movers, Mechanical Engineering Design, and Mechanical Laboratory. The Education for Industry curriculum has no comparable characteristics.

Other differences between the Education for Industry curriculum and the Mechanical Engineering curriculum include the difference in requirements for work experience and shop laboratory courses. The Education for Industry curriculum requires work experience in industry while the Mechanical Engineering program has no similar requirement. The Education for Industry program requires twelve semester hours of shop laboratory courses described previously in this chapter. The Mechanical Engineering curriculum requires four semester hours of shop work as follows: three semester hours in machine shop practice and one semester hour in manufacturing processes. However a portion of many of the engineering courses is devoted to laboratory work.

The major differences between the Education for Industry and the Industrial Administration curriculums are to be found in the requirements pertinent to the fields of industrial education, business administration, basic sciences, and psychology. In the fields of industrial education, the Education for Industry curriculum has thirty-seven semester hours of required studies including twelve semester hours of internship work in industry. The Industrial Administration curriculum has no requirement in this field. The general catalog (30,p.270) description of this curriculum states that "the student is required to go on inspection trips, and when feasible is expected to secure first-hand information through both observation and participation." Since no provision is made in the curriculum for direct participation in industry and no credit is allowed for any activities of this nature, any experiences of this kind are on a voluntary basis.

The Education for Industry curriculum includes twelve semester hours of business administration as a requirement; the Industrial Administration curriculum requires forty-nine semester hours of business administration. In the basic sciences mathematics, chemistry, and physics there are outstanding differences. In mathematics the Education for Industry curriculum requires five or six hours of algebra, trigonometry and analytic geometry or plane trigonometry plus three semester hours of shop calculation. The Industrial Administration curriculum requires six semester hours in

general mathematics and mathematics of finance. Requirements in this field are strengthened by the following business administration and economic courses: eight semester hours of Principles of Accounting, three semester hours of Financial Management, three semester hours of Elements of Statistics, four semester hours of Cost Accounting, and three semester hours of Money and Banking.

In chemistry, the Education for Industry curriculum requires eight semester hours of general chemistry while there is no requirement for chemistry in the Industrial Administration curriculum. In physics the required courses in the Education for Industry curriculum include either six semester hours of Elements of Physics or eight semester hours of Fundamentals of Physics while there is no requirement for physics in the Industrial Administration curriculum. In psychology the Education for Industry curriculum requires nine semester hours of studies while there is no requirement in this field in the Industrial Administration curriculum.

Summary. The comparison of the proposed Education for Industry curriculum with the three curriculums, Industrial Education, Mechanical Engineering, and Industrial Administration is summarized in Table II on page 108. The purpose of the Education for Industry curriculum differs from the purposes of the other three programs. The most striking similarities exist between the kinds of subjects offered in the four curriculums and the greatest differences lie in the

combinations of the subjects and the amount of concentration required.

TABLE II

A Comparison of Subject Requirements of Four Curriculums
Expressed in Semester Hours

	E D U C A T I O N	I N F O R M A T I O N	I N D U S T R I A L	E N G I N E E R I N G	A D M I N I S T R A T I V E
Chemistry	8	} 20		8	0
Physics	6 or 8			10	0
Mathematics	5 or 6			20	6
Shop and Drawing	12	32		12	0
Business Organization and Management	12	0		0	49
Psychology	9	3		0	0
Economics	6	3		0	17
*English	12	12		12	12
Speech	2	4		2	2
*Sociology, History and Government	12	12		12	12
Industrial Sociology	3	0		0	0
**Military Science	12	12		12	12
**Physical Education	4	4		4	4
Electives	10	14		0	22
Education(Professional)	0	17		0	0
Engineering(Applied Science and Professional)	0	0		58	0
Industrial Education (Professional)	25	9		0	0
Totals	138-141	142		150	136

*A constant in all curriculums as part of the American Civilization program.

** Required of all men.

CHAPTER VI

A SURVEY OF SELECTED MARYLAND INDUSTRIES RELATIVE TO THE PROPOSED EDUCATION FOR INDUSTRY PROGRAM

The data presented in this chapter are compiled from a survey of selected Maryland industries. This survey was conducted, according to procedures described in Chapter I, for the purpose of obtaining information which would be of value in the development of a tentative four-year college program emphasizing technical and pre-supervision preparation for employment in manufacturing and selected service industries.

General Survey Information. One hundred and thirty-nine companies were asked to respond to the ten general questions (See Appendix E, p.176) pertinent to the establishment of a new program and to complete a checklist for determining the relative values of the five broad areas of studies and experiences included in the program. As an optional part of the survey, the industrialists were asked to rate the values of specific courses required in the curriculum.

Sixty companies, 43 per cent of those contacted, responded to the survey. Fifty-four companies, 90 percent of those which replied, submitted usable data. The data from six of the companies which responded could not be used for the following reasons: one company official completed

the survey forms in terms of the requirements of the company's home plant which is out-of-state; the representative of another company could not comply due to upset conditions and extra office work caused by a conversion process; and the results from four companies were received too late to be included in this report. Eighteen companies did not complete the survey forms. However, their letters which indicated no need or a very limited need for graduates of the program were included as negative responses in compiling the data pertinent to the determination of the need for the type of personnel considered in this study.

Of the fifty-four companies which submitted usable data, thirty-six or 66 per cent answered the ten general questions; thirty-three or 61 per cent completed the checklist on the values of the broad areas; and twenty-six or 48 per cent also checked the optional checklist on the values of the specific courses in the proposed program. In order to present the data obtained from the survey in a logical order, the responses will be discussed in the sequence in which they appeared on the survey form (Appendix E, pp. 175-182).

Need for Program. The survey indicated that there has been and there is at the present time a definite need in Maryland industries for employees with the type of preparation the Education for Industry program purports to provide. This past and present need is indicated by the fact that thirty-one company representatives pointed out that during

the last five years their companies had filled between 906 and 917 positions where the qualifications of persons so prepared would have been desirable, and they estimated that the average current yearly need for this type of personnel is between 196 and 201 persons. When such a relatively small number of companies report a need for this many employees it may be assumed that the statewide need is considerably greater. Table III on page 112 shows the distribution of need by size of companies. The returns of this survey not only justify the establishment of the Education for Industry program but reveal potentialities for the early expansion and rapid growth of this type of program.

Supervisory Preparation. If one may generalize from the results of this survey, Maryland industries can definitely profit from supervisory preparation. This is especially true of the smaller industries employing less than one thousand persons. Two out of twelve companies employing more than one thousand people indicated a lack of formal training programs for supervisory preparation. On the other hand, only four out of twenty companies employing less than one thousand persons gave indications of organized programs for the preparation of supervisors. Only sixteen companies, one-half of the thirty-two responding to the question, gave responses which indicated the existence of some type of in-service training for supervisors. Twelve companies reported that their supervisors received their preparation

TABLE III

Extent of Need for Program, Size of Company, and Willingness
to Participate Expressed in Numbers of Employees
and Student Trainees

C O M P A N Y	N U M B E R O F E M P L O Y E E S	P E R C E N T O F T H E E M P L O Y E E S	C O M P A N Y S I N T H E I N D U S T R Y	N U M B E R O F S T U D E N T T R A I N E E S	
* 1.	22,500	500	100	19-38	Aircraft
* 2.	5,000	0	3-4	4	Communications equipment
* 3.	5,000	55	11	2	Cargo airplanes
* 4.	3,500	42	5	5	Electronics equipment
* 5.	3,500	-	?	?	Fabrication of metal
* 6.	2,500	100	20	5	Tires and tubes
* 7.	2,200	50	10	?	Portable electric tools
* 8.	1,831	20-30	3-5	3-5	Stainless steel
* 9.	1,678	5	.33	2	Paper and carbon
* 10.	1,328	?	?	0	Porcelain insulators
* 11.	1,250	-	1-2	1-2	Automobile bodies
* 12.	1,100	10	2	2	Metal packers cans
* 13.	986	1	0	0	Rubber heels, soles
* 14.	971	16	6	?	Blast cleaning
* 15.	919	10	2-3	0	Stainless steel sheets
* 16.	750	6	2	4	Electric relays
* 17.	400	4	6	3-5	Electronic instruments
* 18.	356	10	3	?	Foundry and machine work
* 19.	300	-	4	3-6	Wood and plastic boats
* 20.	260	6	6	2	Flooring, cabinet work
* 21.	236	0	0	0	Oil burners, fuel oil
* 22.	200	25	5	3-4	Steel fabrication
* 23.	188	10	2	0	Wire screens, filters
* 24.	180	10	2	2	Heavy duty stoves
* 25.	170	4-5	0	5	Custom plastic molders
* 26.	108	10	2	1-2	Gas apparatus
* 27.	90	1	0	0	Steel kitchen cabinets
* 28.	80	1	.2	1	Boat building
* 29.	75	0	.06	0	Non-ferrous castings
* 30.	35	5	-	10	Screens, storm windows
* 31.	?	5	1	1-3	?
Totals	906-917	196-201	78-109		

* Indicated a willingness to cooperate in the internship phase of the program.

on-the-job; this was the most frequently mentioned method of training. Three companies stated that job rotation was used for training purposes.

Nineteen of the thirty-six companies which responded to the question on upgrading indicated that they had some form of in-service training for this purpose with on-the-job training being utilized by nine companies and job rotation being used by five companies. The data on questions three and four of the survey (Appendix E, p.176) indicate that the kind of supervisory preparation which the Education for Industry program intends to provide would be beneficial to Maryland industries, especially those employing less than one thousand persons.

Industrial Changes. Two of the assumptions made at the beginning of this study: (1) The increasing complexity of modern industrial processes and production machinery calls for greater competency in technicians who work with these processes and who operate and maintain intricate equipment, and (2) The supervision of production workers involves greater responsibility in modern industry today than it did formerly, and a broader type of preparation is needed, are supported in part by the data reported in this section. Twenty-six industrialists replied to the question concerning changes which have occurred in industry or in specific job requirements which would justify the establishment of the Education for Industry program. Their responses indicated

that some of the changes in modern industry include technological advances with greater specialization, the use of new materials and processes, the use of more efficient management methods, improved personnel policies with better employer-employee relationships, the neglect of apprenticeship and supervisory training, an increase in the responsibilities of supervisors, and changes in the methods of supervision.

Several anecdotes are included here to indicate the changes in industry and the changes in the status and functions of the first level supervisor which the industrialists reported.

1. Technical as well as psychological and social
2. Technological changes and advances have created a greater demand for technical trained help.
3. Tendency towards a greater specialization in industry
4. Stronger competition
5. Increasing demand for personnel having a formal industrial education as against general college training
6. A greater need for practical experience along with formal education
7. The need for better employer-employee relationships
8. Increasingly important changes in the human relations aspect of supervision
9. General upping of information given workers by company and union
10. Position of labor unions in industry

11. The fact that apprentice training and on-the-job preparation for supervisory positions has been greatly neglected has caused a serious shortage in this type of personnel and an educational program to prepare for replacing the rapidly diminishing force of trained personnel is greatly desirable.
12. The change in method of supervision in industry over the past 20 years certainly indicates that such a program would be desirable.
13. The job of foreman is not complex in itself - but the foreman must have a good technical background, as well as a flair for human relations. He must know where to look for aid.
14. There has been a growing realization during the past twenty years that the supervisor at the first levels must be an integral part of management. During this time supervision has attained a truly professional status. Today's supervisor is not merely a master technician called upon to oversee or "boss" the work of others; he is responsible for all three prime responsibilities of management with regard to schedule, quality and cost. In effect, he is a manager of a business within a business.

Four industrialists mentioned specialization in industry as the change which justified the establishment of the program. This was the only change which was stated more than once by those who responded to this question in the survey.

Willingness to Cooperate. In order for the proposed Education for Industry program to be successful, it will be necessary for the Department of Industrial Education to obtain the cooperation of Maryland industries in the internship phase of the program and in the placement of graduates. Considerable substantiation is lent to the practicability of establishing the program by the data in the Need for Program section of this chapter and by the fact that twenty-four

companies, 63 per cent of those who checked and returned the survey forms, indicated a willingness to participate in the on-the-job work experience phase of the proposed program. These companies also indicated they could provide temporary employment for 78 to 109 students as trainees (Table III, p.112). The types of jobs they could provide trainees included production and assembly work, testing, and supervisory trainees. Table IV on page 117 lists the jobs which were indicated and the frequency of their mention.

Initial Employment Outlook. As pointed out earlier in this chapter in reporting the need for the Education for Industry program, thirty-one companies estimated their average current yearly need to be approximately two hundred persons. The kinds of jobs which the companies stated they could offer graduates of the program as their initial employment is even more diversified than the types listed as possibilities for the student trainees. Table V on page 118 lists the initial employment outlets and the frequency of their mention.

A longer-range view of job opportunities for graduates of the program is even more encouraging. Table VI on page 119 lists the kinds of technical or supervisory positions that the industrialists said the graduates of the Education for Industry program could hope to attain after four or five years of experience with their companies.

TABLE IV

Types of Jobs For the Work Experience Phase of the Program
and the Frequency of Their Mention

Kind of Job	No. of Times Listed
1. Production Work	5
2. Engineering	4
3. Assembly Work	3
4. Inspection	3
5. Drafting	2
6. Machine Shop Practice	2
7. Production Control	2
8. Quality Control Program	2
9. Supervisory Trainees	2
10. Testing	2
11. Assistant Expeditors in Engineering Dept.	1
12. Blueprint Production	1
13. Blueprint Reading	1
14. Cabinet Work	1
15. Carpentry	1
16. Detail Manufacturing Tooling (sheet metal and machine shop)	1
17. Electric Wiring	1
18. Foundry Work	1
19. Industrial Safety	1
20. Laboratory Technician (electrical)	1
21. Machine Operations	1
22. Maintenance	1
23. Marine Engine Installation	1
24. Planning and Scheduling Trainees	1
25. Purchasing	1
26. Sales Work	1
27. Sheet Metal Work	1
28. Shop Experience in Production Engineering Department	1
29. Time Study	1
30. Various Phases of Manufacturing	1
31. Work in Development-Testing Dept.	1
32. Work in Estimating Dept.	1

TABLE V

Initial Employment Possibilities for Graduates
and the Frequency of Their Mention

Type of Job	No. of Times Listed
1. Junior Engineer (Project, Design, Metallurgical, Development, General Industrial, Research, and Mechanical)	10
2. Specialized Clerical Work (Production Control, Purchasing, and Shop)	7
3. Draftsman	5
4. Supervisory Trainee (Foreman)	5
5. Blueprint Production or Reading	2
6. Inspectors	2
7. Junior Estimator	2
8. Junior Time Study Man	2
9. Laboratory Assistants, Technicians	2
10. Cabinet Work	1
11. Chemists	1
12. Compression and Injection Molding Work	1
13. Employment Interviewers	1
14. Foundry Man	1
15. General Workers (first year), Working Leaders (second year)	1
16. In Reserve Labor Pool (to be transferred to various processing departments as need arises)	1
17. Instrument Repair and Maintenance Man	1
18. Machine Operators	1
19. Machine Shop Work	1
20. Mathematician (Determining weights, stresses, and aerodynamics)	1
21. Mold Making (plastic)	1
22. Non-supervisory positions (to gain more experience and demonstrate completely ability to handle additional responsibility)	1
23. Personnel Relations	1
24. Sheet Metal Layout	1
25. Shop and Sales	1
26. Supervisory Field Engineer	1
27. Trainee for Junior Executive	1

TABLE VI

Employment Outlook for Graduates
After Four or Five Years of Experience

Position	No. of Times Listed
1. Supervisors (first level foremen)	15
2. Engineers (Process, Production Control, Sales, Design, and Development)	6
3. Assistant Engineers (Project, Production, Industrial)	4
4. Customer Contact Man (salesman)	3
5. Department Head	3
6. Production Coordinator (staff assignment)	3
7. Assistant Department Head	2
8. Draftsman	2
9. Time Study Analyst	2
10. Assistant Plant Engineer	1
11. Assistant Superintendent	1
12. Chemists	1
13. Erecting Superintendent	1
14. Estimators	1
15. Job Analyst	1
16. Key Positions in Costing, Planning, Administration	1
17. Machinist	1
18. Mold Makers	1
19. Senior Production Engineer	1
20. Specification Work	1
21. Tool Designer	1
22. Training Supervisors	1

Note: One industrialist stated that, "Supervisory promotions occur frequently. Any graduate could be assured of progressing within limits of his ability."

Since this survey shows the estimated current yearly need in thirty-one companies for technically prepared personnel to be about two hundred persons, and since it reveals twenty-four companies are willing to provide temporary employment for 78 to 109 student trainees it is apparent that the Education for Industry program can be started with assurance and with a greater potential than can be realized at the outset.

Semi-professional or Technical Level Qualifications.

The more important personal and technical qualifications which are expected in new employees at the semi-professional or technical levels were listed by the industrialists in answering question ten in the survey (Appendix E, p.177). These qualifications and the number of times they appeared in the responses are enumerated in Table VII on page 121.

The data obtained in this section of the survey indicate the need for a broad type of college preparation which cuts across several educational fields. Experiences leading to the meeting of the majority of the technical qualifications apparently needed are provided for in the Technical and the On-the-Job Areas of the proposed program, the exceptions being mechanical engineering, hydraulics, applied physics, and heating engineering. Preparation for all of the communications qualifications listed is included in the Communications Area of the program. Most of the human relations, administrative, and leadership qualifications are

TABLE VII

**Personal and Technical Qualifications
for Semi-professional or Technical Level Employees**

Qualifications	No. of Times Listed
Personal Qualities and Attitudes	
1. Cooperativeness	12
2. Ambition	3
3. Interest in Type of Work	3
4. Willingness and Ability to Assume Responsibility	3
5. Ability to Act - Size Up Problems and Reach Decisions	2
6. Ability to Think for One's Self	2
7. Alertness to New Ideas	2
8. Appropriate Personality	2
9. Dependability	2
10. Enough Interest in Work to Disregard Immediate Earnings to Gain Experience	2
11. Industrious	2
12. Initiative	2
13. Level Head and Commons Sense	2
14. Mechanical Inclination	2
15. Patience	2
16. Ability to Learn and Apply One's Self	1
17. Ability to Learn from Participation and Observation	1
18. Adaptability	1
19. Agreeableness	1
20. Alertness	1
21. Diplomacy	1
22. Loyalty to Employer	1
23. Tolerance	1
24. Sincere Motivation	1
25. Sound Judgment	1
Technical Knowledges and Skills	
1. Machine Shop	4
2. Mechanical Drawing	4
3. Chemistry	3
4. Mechanical Training	3
5. Metallurgy	3
6. Blueprint Reading	2
7. Electricity	2
8. Mathematics	2
9. Mechanical Engineering	2
10. Shop Practices	2

TABLE VII (Continued)

Personal and Technical Qualifications
for Semi-professional or Technical Level Employees

Qualifications	No. of Times Listed
Technical Knowledges and Skills (continued)	
11. Ability to Make Charts	1
12. Analytical Ability	1
13. Applied Physics	1
14. Design Ability	1
15. Flow Charts	1
16. Foundry	1
17. Heating Engineering	1
18. Hydraulics	1
19. Industrial Costs, Including Waste	1
20. Job Simplification	1
21. Knowledge of Job	1
22. Lumber, Woodworking, and Finishing	1
23. Machines and Metals for Fabrication(steel)	1
24. Manufacturing Processes	1
25. Metals (especially springs)	1
26. Plastics (theory and practice)	1
27. Radio Fundamentals	1
28. Safety	1
29. Sheet Metal Fabrication and Design	1
30. Sheet Metal Layout	1
31. Shop Organization	1
32. Utilization and Care of Basic Tools and Equipment	1
Communication Knowledges and Skills	
1. Public Speaking	2
2. Report Writing	2
3. Present Ideas Effectively	1
4. Skill in Effective Self-expression	1
5. Sound Training in Fundamentals (Foundation for Continuing to Learn for One's Self)	1

TABLE VII (Continued)

Personal and Technical Qualifications
for Semi-professional or Technical Level Employees

Qualifications	No. of Times Listed
Human Relations and Leadership Understandings and Abilities	
1. Human Relations	3
2. Industrial Management	3
3. Leadership Ability	3
4. Ability to Deal Effectively with the Public and Employees	2
5. Ability to Gain Cooperation and Respect	2
6. Economics	2
7. Labor Relations	2
8. Planning and Organizing	2
9. Time Study	2
10. Ability to Supervise Within Limits Set Up by Management Policies and Union Activities	1
11. Broad Understanding of Labor Unions, Booms, and Depressions	1
12. Budgetary Control	1
13. Curiosity About What Makes Organization "Tick"	1
14. Delegation of Responsibilities	1
15. Development of Personnel	1
16. Industrial Psychology	1
17. Motion Economy	1
18. Quality Control Statistics	1
Social and Civic Understandings	
1. Appreciation of Fact That All Wealth is the Result of Production and not Created by Government and Politicians	1
2. Broad Understanding of Government	1

prepared for through the Human Relations and Leadership, and the Social and Civic Areas of the proposed Education for Industry program. Substantial support is indicated for including the five broad areas of the program.

Reaction to Broad Areas. Twenty-nine of the thirty-one companies which indicated a need for employees with the type of college preparation the Education for Industry program provides checked completely the section of the survey to determine the relative values of the five broad areas: the Technical, the Communications, the Human Relations and Leadership, the Social and Civic, and the On-the-Job. One company checked three of the five areas and one company omitted this section of the survey.

The Technical Area was rated highly essential by twenty-seven industrialists or 90 per cent of the thirty companies. This area was rated desirable by three industrialists or 10 per cent of those who indicated a need for the program and checked the value of the area. No companies rated the technical area as unessential. All thirty companies or 100 per cent considered the Technical Area highly essential or desirable.

The Communications Area was rated highly essential by six companies or 20 per cent of the thirty companies, and was rated desirable by twenty-one companies or 70 per cent of the thirty companies. This area was rated unessential by three companies or 10 per cent. The Communications Area was

considered highly essential or desirable by twenty-seven companies or 90 per cent of those indicating a need for the experiences comprising the area.

The Human Relations and Leadership Area was rated highly essential by twenty or 68.9 per cent of the twenty-nine companies. This area was checked as desirable by nine or 31 per cent of the companies. No companies considered the area unessential. The Human Relations and Leadership Area was considered highly essential or desirable by 100 per cent of the twenty-nine companies.

The Social and Civic Area was rated highly essential by only 3.6 per cent or one of the twenty-eight companies. It was rated desirable by thirteen or 46.4 per cent of the twenty-eight companies. Fourteen companies or 50 per cent considered the area unessential. The Social and Civic Area was considered either desirable or highly essential by fourteen companies or 50 per cent of the twenty-eight companies. Only twenty-eight of the thirty-one companies which indicated a need for the program were used in tabulating the data pertinent to this area because, in addition to the two companies which omitted checking, the representative of a third company placed the circle between the desirable and the unessential columns making it impractical to determine the value indicated. The three companies were therefore omitted from the tabulation.

The On-the-Job Area was considered highly essential by 46.6 per cent or fourteen of the thirty companies. It was rated desirable by 50 per cent or fifteen of the thirty companies. Only one company checked this area as unessential. Twenty-nine companies, 96.6 per cent of the thirty companies, considered this work experience phase of the program as either highly essential or desirable.

The data obtained to determine the reaction of industrialists to the five broad areas reveal extremely favorable agreement for the inclusion of the Technical, the Communications, the Human Relations and Leadership, and the On-the-Job areas. A 50 per cent favorable reaction was indicated for the Social and Civic area. Inclusion of this area was not a main consideration in this study since the courses in this area are required of nearly all University of Maryland male students, the block requirement being known as the American Civilization program. However, it can be substantiated further than this section would indicate in that experiences in this area should aid in the development of many of the personal qualifications expected by the industrialists in semi-professional or technical level employees as listed in Table VII on page 121.

Reaction to Specific Courses. The companies were requested in the optional part of the survey to check relative values of each of the required courses in the

Education for Industry program. Twenty-six companies checked this part of the survey. Three of these companies had indicated no need for employees of the type which would be prepared by the program so their responses were omitted in tabulating the data in this section. Six of the twenty-three companies did not check all the subjects so there will be minor discrepancies in the totals. Table VIII presents a summary of the reactions to all of the required courses in the proposed Education for Industry program with the exception of the required courses in the American Civilization program which were omitted from this section of the survey since they are already required of nearly all male students.

In the percentages of favorable responses, sixteen of the twenty-six courses received a total rating of 75 per cent or more while only one course, Machine Woodworking, was rated less than 50 per cent.

Suggested Experiences. Provision was made at the end of the survey forms for the respondents to add any other subjects or experiences which they felt a student should have in the program. Fifteen suggestions were made by eleven persons. Three subjects, Industrial Supervision, Time Study and Cost Control, were each mentioned twice. All the others were listed once. The experiences which were suggested are as follows: (1) all technical courses available, (2) pattern making, (3) additional courses in engineering drawing would be desirable, (4) basic metallurgy in lieu of foundry

TABLE VIII

Reaction to Specific Courses in the Program
Expressed in Number of Responses and Percentages

	R E S P O N S E S	H I G H L E N T A L	P E R C E N T	D I S C R I B I N A R Y	P E R C E N T	U N S A T I S F A C T O R Y	P E R C E N T	P E R F E C T L Y
Chemistry	21	7	33.3	7	33.3	7	33.3	66.6
Physics	22	15	68.2	6	27.3	1	4.5	95.5
Algebra	21	11	52.4	5	23.8	5	23.8	76.2
Trigonometry and Analytic Geometry	22	12	54.5	7	31.8	3	13.6	86.4
Mechanical Drawing	22	15	68.2	6	27.3	1	4.5	95.5
Shop Calculations	22	15	68.2	5	22.7	2	9.1	90.9
Machine Woodworking	23	4	17.4	3	13.0	16	69.6	30.4
Arc and Gas Welding	23	9	39.1	11	47.8	3	13.0	87.0
Foundry	22	7	31.8	6	27.3	9	40.9	59.1
Sheet Metal Work	23	11	47.8	3	13.0	9	39.1	60.9
Machine Shop Practice I	23	12	52.2	9	39.1	2	8.7	91.3
Industrial Safety	22	11	50.0	9	40.9	2	9.1	90.9
Shop Organization and Management	23	12	52.2	7	30.4	4	17.4	82.6
Modern Industry	22	8	36.4	12	54.5	2	9.1	90.9
Trade or Occupational Analysis	22	6	27.3	10	45.5	6	27.3	72.7
Public Speaking	23	9	39.1	8	34.8	6	26.1	73.9
Fundamentals of Economics	22	7	31.8	8	36.4	7	31.8	68.2
Labor Economics	22	11	50.0	4	18.2	7	31.8	68.2
Introductory and Applied Psychology	22	8	36.4	8	36.4	6	27.3	72.7
Social Psychology	20	6	30.0	9	45.0	5	25.0	75.0
Industrial Sociology	22	8	36.4	7	31.8	7	31.8	68.2
Organization and Control	22	9	40.9	10	45.5	3	13.6	86.4
Personnel Management	22	13	59.1	7	31.8	2	9.1	90.9
Industrial Relations	22	12	54.5	8	36.4	2	9.1	90.9
Job Evaluation and Merit Rating	22	8	36.4	11	50.0	3	13.6	86.4
Work Experience	22	12	54.5	9	40.9	1	4.5	95.5

practice, (5) industrial supervision, (6) several courses dealing with case problems of typical supervisory situations, (7) conference leading, (8) human relations in industry, (9) public relations, (10) cost control, (11) methods and time study, (12) time and motion study, (13) department budgeting and cost control, (14) salesmanship which may be offered through psychology courses, and (15) all composition training possible.

Summary. The survey questionnaire was sent to one hundred and thirty-nine selected Maryland industries. Sixty companies responded giving a return of 43 per cent, with fifty-four companies submitting usable data. Of the fifty-four usable returns 66 per cent contained answers to the ten general questions, 61 per cent were checked relative to the values of the broad areas of the program, and 48 per cent included reactions to the optional checklist pertaining to the values of the specific courses of the program.

The representatives of thirty-one companies reported a need during the past five years for over nine hundred employees with the type of preparation the Education for Industry curriculum purports to provide. The estimated average current yearly need for this type of personnel was given as 196 to 201 persons. Twenty-four companies expressed a willingness to cooperate in the program and said they could provide temporary employment for 78 to 109 student trainees. The survey also revealed a bright employment outlook for graduates.

Maryland industries, especially the smaller companies employing less than one thousand persons, can profit from the Education for Industry program. They reported changes in industrial processes, management methods, personnel policies, and in the status and functions of supervisors as justifiable bases for the establishment of the program.

The technical and personal qualifications which the company officials stated they expected in new employees at the semi-professional or technical level imply the need for a broad type of college preparation which cuts across several educational fields. Substantial support was given for the inclusion of all five broad areas of the program. The Technical and Human Relations and Leadership areas received a 100 per cent favorable reaction; the On-the-Job area rated a 96.6 per cent favorable reaction; the Communications area obtained a 90 per cent favorable reaction; and the Social and Civic area received a 50 per cent favorable reaction.

The specific courses required in the program were substantiated highly with the exception of one course. Sixteen of twenty-six courses received a 75 per cent or more favorable response meaning they were either highly essential or desirable.

CHAPTER VII

GENERAL SUMMARY AND CONCLUSIONS

This study has been concerned with a proposal for a four-year college level program in industrial education called Education for Industry. This new curriculum, to be administered by the Department of Industrial Education, College of Education, University of Maryland, is designed to prepare persons for initial employment in industry as technicians. The program aims further to provide background experiences to enable them, after acquiring additional industrial experience and training, to advance to positions of greater responsibility including supervision.

General Summary. The purposes of the study were to obtain information which would be helpful in the development of the program, to procure an indication of the extent of the need in Maryland for the type of personnel the program would prepare, and to determine the reaction of Maryland industrialists to the proposed program.

Procedures used in the study included the examination of pertinent literature, a search for similar programs in other institutions of higher learning and the examination of their curriculums, the study of the training programs of large industrial concerns, the development of survey forms, and the survey of selected Maryland industries.

A considerable amount of literature is available pertinent to the preparation of industrial supervisors. However, little information is to be found in published form concerning four-year college level programs similar to the program considered in the study, except for college catalog descriptions.

Eight institutions of higher learning were found to have similar programs leading to a baccalaureate degree. The emphases in these curriculums are on the technical preparation. The amount of shop and drawing work ranges from eighteen and two-thirds semester hours to fifty-eight semester hours. Mathematics is required in seven of the programs with a range of four to twenty-three and one-third semester hours. The physics requirements in the six programs requiring this subject range from four to twenty-eight and two-thirds semester hours. Chemistry is required in five curriculums with the requirements varying from two to eleven semester hours. Three of the institutions require industrial work experience in their programs.

Five of the programs require from two to seven semester hours in psychology. Seven institutions have requirements in business management with a range of three to twenty-one semester hours. Six of the programs require from three to six semester hours in economics.

The required number of semester hours in English, speech, and literature are about the same with a range of

eight to twelve semester hours in the eight programs. Two institutions require an additional three semester hours in technical writing. The number of semester hours required in history, government, and other social studies varies from two to ten semester hours in the six programs requiring these subjects.

Electives are provided in all the programs the amount varying from twelve to forty-three semester hours. The total number of semester hours required in the eight programs varies from one hundred and twenty to one hundred and fifty-three.

The study of the training programs of large industrial concerns indicated their great interest in the development of supervisory personnel and the improvement of the technical competence of their employees. Five of these companies have cooperative agreements with colleges, universities, technical institutes, and high schools to provide the professional and technical preparation required for engineering students, management personnel, and technicians. One company operates its own technical institute.

In the company training programs emphasis is placed upon the interpretation of company policies, and secondary emphasis is given to the development of general understandings and vocational competency. It is in the latter fields that the university can be most helpful in preparing people to become more proficient employees in modern, progressive industries.

The proposed Education for Industry program leading to the Bachelor of Science degree requires educational experiences in five areas of competency: the technical, the communications, the social and civic, the human relations and leadership, and the industrial internship. The facilities of five colleges of the University are utilized and the requirements in semester hours include the following subjects: chemistry 8, physics 6 or 8, mathematics 5 or 6, industrial education (professional) 25, shop and drawing 12, English and speech 14, sociology-history-government 15, business organization and management 12, psychology 9, economics 6, military science 12, physical education 4, and electives 10. Graduation requires successful completion of 138 to 141 semester hours in accordance with conditions set forth in the academic regulations of the University.

A comparison with three comparable curriculums offered by the University revealed that the proposed Education for Industry program has distinguishing characteristics. The new program differs in purpose and it provides for more diversified experiences with less concentration in a major field. The most striking similarities exist between the kinds of subjects offered in the four curriculums and the greatest differences lie in the combinations of these subjects and the amounts of concentration required.

In the survey of selected Maryland industries, sixty companies responded and fifty-four submitted usable data.

Thirty-one of these companies reported a need during the past five years for more than nine hundred employees with the type of preparation the Education for Industry curriculum purports to provide. The estimated average current yearly need for this type of personnel was given as 196 to 201 persons. Twenty-four companies expressed a willingness to cooperate in the program and said they could provide temporary employment for 78 to 109 student trainees. A bright employment outlook for graduates was also indicated. Maryland industries, especially the smaller companies employing less than one thousand persons, could profit from the Education for Industry program.

The technical and personal qualifications which the companies stated they expected in new employees at the semi-professional or technical level imply the need for a broad type of college preparation which cuts across several educational fields. Extremely favorable reaction was expressed relative to four of the five broad areas of the proposed program and substantial support was given for the inclusion in the program of all five broad areas. The specific courses required in the program were substantiated highly with the exception of one course. Sixteen of the twenty-six required courses received a 75 per cent or more favorable response meaning they were rated either "highly essential" or "desirable".

Conclusions. The following conclusions are drawn from the data presented in this study:

1. There is a definite need in the state of Maryland for a four-year college level program for the preparation of semi-professional or technical personnel.

2. The increasing complexity of modern industrial processes and production machinery calls for greater competency in technicians who work with these processes and who operate and maintain intricate equipment.

3. The supervision of production workers involves greater responsibility in modern industry today than it did formerly and hence a broader type of preparation is needed.

4. The coordination of the elements of production and the supervision of workers requires a person with sufficient understanding of technical procedures to supervise manufacturing processes in accordance with established qualitative and quantitative standards and to meet production schedules through the effective organization of people.

5. The technical and personal qualifications expected in new employees at the semi-professional or technical level imply the need for a diversified type of college program which cuts across several educational fields.

6. It will not be difficult to obtain the cooperation of an adequate number of Maryland industries which are willing to provide temporary employment for student trainees in positions of educational value.

7. The employment outlook for graduates is good with an indication that the companies have a much greater need than the program could now hope to meet. They indicated they would offer attractive positions as the initial employment after graduation.

8. The prospects for the advancement of graduates to positions of greater responsibility after four or five years of additional experience and training are very promising since the companies indicated the possibility of attaining very responsible positions.

9. The proposed Education for Industry curriculum would meet many of the needs of students preparing for technical and pre-supervisory positions in industry.

10. The proposed program is in line with programs having similar purposes in other institutions of higher learning.

11. The University of Maryland by utilizing existing facilities can provide a valuable service to students and the manufacturing and service industries of the state by offering a program for the preparation of semi-professional or technical personnel.

Recommendations. As a result of this study the following recommendations are made:

1. The Education for Industry curriculum in the form proposed should be approved and put into operation as soon as possible.

2. A person should be named to head up the program; his functions and responsibilities would include the organization, development, and administration of the program.

3. The cooperation of the University Admissions Office and the College of Special and Continuation Studies should be sought in making the existence of the program and its requirements known to prospective students. Similarly the high school principals and guidance officers in the secondary schools should be apprised of the new program.

4. The companies which expressed a willingness to cooperate in the internship phase of the program should be further contacted to determine the educational values of the positions for student trainees and to develop working agreements between the University and the companies.

5. Dual requirements and evaluation instruments should be developed in the industrial education courses so that students pursuing the Education for Industry curriculum would have requirements especially suited to meet their needs with evaluations made in terms of these requirements.

6. Separate sections should be established in the industrial education courses for Education for Industry students as soon as their enrollments in a course permit this to be administratively practical in order that the instruction may be specifically directed toward the meeting of the needs of the several groups.

7. After a reasonable trial period the program should be subject to revision in light of the results obtained and it should be continuously revised to meet changing needs and conditions.

8. Electives should be used to meet specific needs which have developed through internship experiences.

9. Electives should also be used to obtain some of the additional experiences suggested by the industrialists in the survey.

10. A continuing advisory committee, composed of representatives of management, labor, and the public at large, should be formed to advise the person in charge of the program.

Further Studies Needed. Relative to the Education for Industry program the following future studies are suggested:

1. A similar study with emphasis on the needs of service industries in Maryland and an analysis of the employment possibilities for graduates in these industries would be helpful since the emphasis in this study was on Maryland manufacturing industries.

2. A follow-up study of the temporary jobs which the companies indicated they would provide is needed to determine the exact nature of the work experiences and the learning situations involved.

3. A study of cooperative work-study programs of institutions of higher learning would probably be valuable

in working out the administrative details of the internship phase of the program.

4. A study similar to the one presented here is needed to determine the need for technicians with two-year college preparation of a terminal nature.

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65. General Motors Institute. Cafeteria Counter of Management Training Materials. Flint, Mich.: No. M-C219. 52pp.
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67. Greiner, R. G. Training Supervisors for More Efficient Plant Operation. (Reprint from Mill & Factory, October 1949). Milwaukee, Wisconsin: Allis-Chalmers, No. 25E7354. 3pp.
68. International Harvester Company. Off-Hour Education Program Fall Term 1949-50 Louisville Works. Chicago, Ill.: 8pp.
69. _____. Off-Hour School Program 1950-51 Canton Works. Ibid., 20pp.
70. _____. Progressive Students Course - General Line Sales General Plan. Ibid., ET-107-KK. 10pp.
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73. Johnson & Johnson. Communications in Business and Industry. New Brunswick, N.J.: 1949. 31pp.
74. _____. Conference Leadership Training. Ibid., 1945. 47pp.
75. _____. Economics Training. Ibid., 30pp.
76. _____. Job Instructor Training. Ibid., 1951. 21pp.
77. _____. Memo and Report Writing. Ibid., 49pp.
78. _____. Reading Improvement Training. Ibid., 1951. 42pp.
79. _____. Training Department Activities. Ibid., 1947. 88pp.

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81. _____. St. Joseph Mill - Mill Trainee Program. Ibid., June 1, 1949. 36pp.
82. Radio Corporation of America Victor Division. Supervisory Training. Camden, N.J.: Mimeographed material. 21pp.
83. San Francisco Naval Shipyard. Work Improvement Program Supervisor Training Book Two - Training. San Francisco, California: 1947. 170pp.
84. _____. Supervisor Training Book Three - Organization and Management - Related Technical Material - Relationships with Organized Labor. Ibid., 1948. 91pp.
85. _____. Supervisor Training Book Four - Procedures, Systems, and Practices of the Navy Department Internal Policies Based on Regulations of the Navy Department and the Civil Service Commission. Ibid., 1948. 174pp.
86. _____. Supervisor Training Book Five - Dealing With People. Ibid., 1949. 102pp.
87. Joseph E. Seagram & Sons, Inc. The Administration of Education Programs. Louisville, Kentucky: 1948. 70pp.
88. Standard Oil Company of California. The Company's Personnel Relations Program. San Francisco, Cal.: October 1949. 15pp.
89. _____. Management Teamwork. Ibid., 1949. 6pp.
90. _____. Management Conference Program. Ibid., 4pp.

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91. Thompson Products Inc. Supervisor Induction Program.
Euclid, Ohio; Fall 1947. 15pp.
92. _____. Supervisor's Manual of Duties and Responsibilities.
Tapco Plant, Cleveland, Ohio; 1948. 102pp.
93. United States Naval Ordnance Plant. Supervisory
Training Materials - Supervisor Development Program.
Indianapolis, Ind.: 1950. 241pp.
94. Western Electric Company. A Design for Supervision.
Kearny, N.J.: 24pp.
95. _____. Program Planning - Supervisory Training Text.
Ibid., 1945. 35pp.
96. _____. Supervisory Development Program. Ibid., 1948.
26pp.
97. _____. Supervisory Orientation Conferences for Section
Chiefs. Ibid., 1949. 22pp.
98. York Corporation Training Department, Industrial
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Program. York, Penn.: February 1951. 7pp.
99. _____. The College Graduate Training Program. Ibid., 1949.
18pp.
100. _____. Shop Manual, College Graduate Training Program.
Ibid., 1951. 108pp.

APPENDIX A

1. The first part of the appendix contains a list of the names of the persons who have been appointed to the various offices of the government since the year 1800.

2. The second part of the appendix contains a list of the names of the persons who have been appointed to the various offices of the government since the year 1800.

3. The third part of the appendix contains a list of the names of the persons who have been appointed to the various offices of the government since the year 1800.

4. The fourth part of the appendix contains a list of the names of the persons who have been appointed to the various offices of the government since the year 1800.

UNIVERSITY OF MARYLAND
COLLEGE PARK

DEPARTMENT OF INDUSTRIAL EDUCATION
COLLEGE OF EDUCATION

Dear Sir:

Preliminary to the development of a college program in industrial education for the training of production line supervisors and technicians in manufacturing industries and laboratories, I am making a survey of various universities, colleges and technical schools to determine what is being offered elsewhere in similar programs. I am interested in both two-year terminal programs and in baccalaureate degree granting programs. Excluded from my study are industrial engineering and business management programs.

I am particularly concerned about information pertaining to:

1. Purpose(s) of the program(s)
2. Admission requirements
3. The course offerings which constitute the program
4. The time required for a student to complete the program
5. Types of industries cooperating in the training program, their size, the facilities they provide for training, administrative difficulties encountered, etc.
6. Credits allowed toward graduation for work experience in industry, either for employment prior to entrance to the program or for work experiences gained while enrolled in the program
7. Extent of correlation between job placement in work-study program and on-campus studies
8. Degrees and diplomas conferred or awarded
9. Job placement record of graduates
10. Success of graduates in procuring promotions and their rate of advancement

I am not asking for specific answers to the above items but rather for general information which you may be able to supply and the name of the person directly in charge of any similar program you have at your institution. College catalogues, department bulletins, dittoed or mimeographed announcements, curriculum schedules, and the like may prove quite helpful to me at this stage of my study.

Sincerely yours,

William F. Tierney
Graduate Assistant

APPENDIX B

UNIVERSITY OF MARYLAND
COLLEGE PARK

DEPARTMENT OF INDUSTRIAL EDUCATION
COLLEGE OF EDUCATION

(COPY)

October 18, 1951

York Corporation
Education and Training Department
Roosevelt & Smith Streets
York, Penn.

Gentlemen:

Preliminary to the development of a college program in industrial education for the training of production line supervisors and technicians in manufacturing industries and laboratories, I am making a survey of various training programs in private industry, universities, colleges, and technical schools.

I would greatly appreciate copies of your publications entitled "College Cooperative Training Program", "The College Graduate Training Program", and "Shop Manual, College Training Program" plus any general information relative to your training programs which you feel might be helpful to me. If you do not have these items for distribution I would appreciate them on a loan basis.

Thank you for any consideration you may give this request.

Sincerely yours,

William F. Tierney
Graduate Assistant

WFT/mt

Age Group	Percentage of Respondents
18-29	~65%
30-49	~75%
50-69	~80%
70+	~85%

[illegible]

1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 26

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10

EDUCATION FOR INDUSTRY

A Four- Year College Program for the Preparation of
Industrial Technicians and Supervisors.

Industrial Education Department
University of Maryland
College of Education
1952

Education For Industry

The Industrial Education Department of the University of Maryland is contemplating the establishment of a four year program for the purpose of preparing students for positions in industry, starting as production or inspection technicians and advancing with experience to positions of greater responsibility including supervision. This college program will differ from industrial engineering programs in that it will provide more diversified experiences with less specialization. It will differ from present business administration programs in that it will provide for more technical experiences and will offer more opportunities to observe and experience industrial problems both on campus and on the job in appropriate learning situations.

Present plans for the program include experiences in the following areas: the technical, the communications, the social and civic, the human relations and leadership, and the industrial work experience phase organized and supervised to provide on-the-job opportunities of educational value.

OK

Education For Industry Curriculum Required Courses

AREA I

Technical Experiences

General Chemistry
Elements of Physics
Fundamentals of Physics
Alg. & Analytic Geometry
or Plane Trigonometry
Algebra or College Algebra
Machine Woodworking
Shop Calculations
Mechanical Drawing
Arc & Gas Welding
Foundry
Machine Shop Practice
Sheet Metal Work
Industrial Safety
Organization & Management
of Modern Industry
Grade or Occupational Analysis
Shop Organization and
Management

AREA II

Communications Experiences

Composition & American Literature
Composition & World Literature or
Composition & English Lit.
Public Speaking

AREA III

Social & Civic Experiences

*Sociology of American Life
*History of American Civilization
*American Government
Labor Economics
Fundamentals of Economics
*Basic Air Force R.O.T.C.
*Physical Activities

AREA IV

Human Relations & Leadership

Social Psychology
Personnel Management
Business Organization & Control
Job Evaluation & Merit Rating
Introduction to Psychology
Applied Psychology
Industrial Sociology
Industrial Relations

AREA V

On-the-Job Experiences

Organized & Supervised Work
Experience
(4 internship periods of
ten weeks each of full-
time employment)

Required of all University of Maryland Students.

Electives - Ten semester hours in senior year.

Course Descriptions

(2)

- Ind. Ed. 1 (cont.) This course carries through auxiliary views, sectional views, dimensioning, conventional representation and single stroke letters.
- Ind. Ed. 22. Machine Woodworking I (2) - Second semester. Two laboratory periods a week. Machine woodworking I offers initial instruction in the proper operation of the jointer, band saw, variety saw, jig saw, mortiser, shaper, and lathe. The types of jobs which may be performed on each machine and their safe operation are of primary concern. The mediums of instruction are school-shop equipment, hobby items, and useful home projects.
- Ind. Ed. 12. Shop Calculations (3) - Shop calculations is designed to give the student an understanding and working knowledge of the mathematical concepts related to the various aspects of Industrial Education. The course includes phases of algebra, geometry, trigonometry, and general mathematics as applied to shop and drawing activities.
- Ind. Ed. 23. Arc and Gas Welding (1) Second semester. One laboratory period a week. A course designed to give a student a functional knowledge of the principles and use of electric and acetylene welding. Practical work is carried on in the construction of various projects using welded joints. Instruction is given in the use and care of equipment, types of welded joints, methods of welding, importance of welding processes in industry, safety considerations, etc.
- Ind. Ed. 110. Foundry (1) - First semester. One laboratory period a week. Bench and floor molding and elementary core making. Theory and principles covering foundry materials, tools and appliances.
- Ind. Ed. 69. Machine Shop Practice I (2) - First semester. Two laboratory periods a week. Bench work, turning, planing, milling, and drilling. Related technical information.
- Ind. Ed. 24. Sheet Metal Work (2) - First semester. Two laboratory periods a week. Articles are made from metal in its sheet form and involve the operations of cutting, shaping, soldering, riveting, wiring, folding, seaming, beading, burring, etc. The student is required to develop his own patterns inclusive of parallel line development, radial line development, and triangulation. Common sheet metal tools and machines are used in this course.
- Ind. Ed. 143, 144. Industrial Safety Education II (2,2) Advanced.
Ind. Ed. 143 studies exemplary safety practices, while Ind. Ed. 144, thru conference discussion, plant visits, and class demonstrations, covers actual industrial situations and formulates evaluative criteria in safety education.

Course Descriptions

(3)

- Ind. Ed. 165. Modern Industry (2) - This course provides an overview of manufacturing industry in the American social, economic, and culture pattern. Representative basic industries are studied from the viewpoints of personnel and management organization, industrial relations, production procedures, distribution of products, and the like.
- Ind. Ed. 168. Trade or Occupational Analysis (2) - First semester. Provides a working knowledge of occupational and job analysis which is basic in organizing vocational industrial courses of study.
- Ind. Ed. 164. Shop Organization and Management (2) - Second semester. This course covers the basic elements of organizing and managing and Industrial Education program including the selection of equipment and the arrangement of the shop.

Area II Experiences for the Development of Competency in the Art of Communications.

- *Eng. 1,2. Composition and American Literature (3,)(3) First and second semesters. Required of freshmen. Grammar, rhetoric, and the mechanics of writing; frequent themes. Readings are in American literature.
- *Eng. 3,4. Composition and World Literature (3,3) - First and second semesters. Practice in composition. An introduction to world literature, foreign classics being read in translation.
- or
- *Eng. 5,6. Composition and English Literature (3,3) - First and second semesters. Practice in composition. An introduction to major English writers.
- Speech 7. Public Speaking (2) - Second semester. The preparation and delivery of speeches, reports, etc., on technical and general subjects.

Area III Experiences for the Development of Social & Civic Competency.

- *Soc. 1. Sociology of American Life (3) - First and second semesters. Sociological analysis of the American social structure; metropolitan, small town, and rural communities; population distribution, composition and change; social organization.

Course Descriptions

(4)

*H. 5,6. History of American Civilization (3,3) - First and second semesters. Required for graduation of all students.

*G. and P. 1. American Government (3) - Each semester. This course is designated as the basic course in government for the American Civilization program, and it or its equivalent is a prerequisite to all other courses in the Department. It is a comprehensive study of governments in the United States - national, state, and local - and of their adjustment to changing social and economic conditions.

Econ. 160. Labor Economics (3) - First and second semesters. The historical development and chief characteristics of the American labor movement are first surveyed. Present-day problems are then examined in detail: wage theories, unemployment, social security, labor organization, and collective bargaining.

Econ. 37. Fundamentals of Economics (3) - First and second semesters. A survey study of the general principles underlying economic activity. Designed to meet the needs of special technical groups such as students of engineering, home economics, agriculture and others who are unable to take the more complete course provided in Economics 31 and 32.

A.S. 1,2. Basic Air Force R.O.T.C. (3,3). Two hour periods of Leadership, Drill and Command. Three one-hour periods of class instruction. Subject taught: World Political Geography.

*A.S. 3,4. Basic Air Force R.O.T.C. (3,3). Two hour periods of Leadership, Drill and Command. Three one-hour periods of class instruction, one hour of laboratory. Subjects taught: Aerodynamics, Meteorology, Navigation, Applied Air Power.

*P.E. 1,3. Conditioning and Fitness Exercises (1,1) Three hours a week. First and second semesters. Conditioning and body building activities, instruction in techniques of various sports activities, limited competition in selected sports. Men not physically qualified must substitute work in the adaptive program.

*P.E. 5,7. Sports and Other Recreational Activities (1,1). Three hours a week. First and second semesters. Sophomores may elect from the following: Badminton, basketball, boxing, gymnastics and individual skills, soccer, softball, tennis, touch football, track and field, tumbling, volleyball, weight lifting, and wrestling.

AREA IV Experiences for the development of Competency in Human Relations and Leadership.

Psych.121. Social Psychology (3) - First and second semesters. Psychological study of human behavior in social situations; influence of others on individual behavior, social conflict and individual adjustment, communication and its influences on normal social activity.

Psych. 1 Introduction to Psychology (3) - First and second semesters.
An introductory course, intended to bring the student into contact with the major problems confronting psychology and the more important attempts at their solution.

Psych.2. Applied Psychology (3) - First and second semesters. Application of research methods to basic human problems in business and industry, in the professions, and in other practical concerns of everyday life.

B.A. 160. Personnel Management (3) -
This course deals with the problems of directing and supervising employees under modern industrial conditions. Two phases of personnel administration are stressed, the application of scientific management and the importance of human relations in this field.

B.A. 10,11. Organization and Control (2,) (2) - First and second semesters.
A survey course treating the internal and functional organization of a business enterprise. B.A.11 includes industrial management, organization and control.

B.A.167. Job Evaluation and Merit Rating (2)
The investigation of the leading job evaluation plans used in industry, study of the development and administrative procedures, analyzing jobs and writing job descriptions, setting up a job evaluation plan, and relating job evaluation to pay scales. Study of various employee merit rating programs, the methods of merit rating, and the uses of merit rating.

Soc. 115. Industrial Sociology (3) - Second semester.
Social organization of American industry; functions of members of industrial organization, status, social structure, patterns of interaction, and relations of industry and society.

B.A.163. Industrial Relations (3) - Second semester.
A study of the development and methods of organized groups in industry with reference to the settlement of labor disputes. An economic and legal analysis of labor union and employer association activities, arbitration, mediation, and conciliation; collective bargaining, trade agreements, strikes, boycotts, lockouts, company unions, employee representation, and injunctions.

EDUCATION FOR INDUSTRY

A Four- Year College Program for the Preparation of
Industrial Technicians and Supervisors.

Industrial Education Department
University of Maryland
College of Education
1952

Junior Year

. 6	History of American Civilization	3					
psych.1,2	Introduction to Psychology; Applied Psy.	4	4	1	2	3	4
chem.1,3	General Chemistry	3	3	1	2	3	4
econ.160	Labor Economics	3		1	2	3	4
1. 160	Personnel Management		3	1	2	3	4
1.115	Industrial Sociology		3	1	2	3	4
1.Ed.143,144	Industrial Safety Educ.II	2	2	1	2	3	4
1.Ed.124a	Organized & Supervised Work Experience	3		1	2	3	4
124b			3				
Total Semester Hrs.		13	18				

Senior Year

.A. 163	Industrial Relations	3		1	2	3	4
.A. 167	Job Evaluation & Merit Rating	2		1	2	3	4
psy. 121	Social Psychology		3	1	2	3	4
nd.Ed.165	Modern Industry	2		1	2	3	4
nd.Ed.163	Trade or Occupational Analysis	2		1	2	3	4
nd.Ed.164	Shop Organization		2	1	2	3	4
nd.Ed.124c	Organized & Supervised Work Experience	3					
124d			3	1	2	3	4
Electives		3	7				
Total Semester Hrs.		15	15				

1. Do you feel that Maryland industries have a need for employees with this type of college preparation? Does your industry have such a need?
2. If you feel there is a need, what do you estimate the need to be in terms of numbers or ratio?
3. What changes have occurred in industry or in specific job requirements which would justify the establishment of this program?
4. How many positions have you filled in the last five years where the qualifications of a person so prepared would have been desirable? _____
Average yearly need? _____
5. What are some of the more important qualifications which you would expect in a new employee at the semi-professional or technical level?

Technical

Personal Attitudes & Understandings

6. How do persons in your company who are employed in supervisory positions receive their preparation?
7. What type of in-service training for upgrading does your company provide?
8. Would your company be willing to participate in the cooperative work experience phase of the proposed program?
9. For how many students could you provide temporary employment as trainees?

In what types of work?

10. What kinds of jobs could you offer graduates of this program as their initial employment?

APPENDIX D

UNIVERSITY OF MARYLAND
COLLEGE PARK

DEPARTMENT OF INDUSTRIAL EDUCATION
COLLEGE OF EDUCATION

On many occasions representatives of Maryland industries have asked the University of Maryland to establish a program which would prepare graduates for positions in industry, starting as production or inspection technicians and advancing with experience to positions of greater responsibility including supervision. Such a college program, they say, should differ from industrial engineering programs in that it should provide more diversified experiences with less specialization. Likewise, it should differ from present business administration programs in that it should provide for more technical experiences and offer more opportunities to observe and experience industrial problems.

Present proposed plans for such a program include experiences in the following broad areas: the technical, the human relations and leadership, the communications, and the social and civic. Formal college class work would be supplemented by four on the job work periods, organized and supervised to provide the student with direct business and industrial experience. Each of these work periods would be at least ten weeks long and full time employment would be required.

In order to design a program that will satisfy the needs of the greatest number of Maryland industries, we of the Industrial Education Department are conducting a survey to ascertain what those needs are. We ask your cooperation in answering ten questions and in completing the check list so that we may refine the proposed program with the needs of your industry in mind. Your responses will in no way be construed as commitments of any kind. An immediate reply will be gratefully appreciated.

Sincerely yours,

William F. Tierney
Instructor

APPENDIX E

Company Data

Name of Company _____

Type of Product _____

Number of Employees _____

Person Completing Questionnaire _____

Position in Company _____

This information will be used to determine the spread of the industries reporting in the survey. It will not be used for any other purposes and will be kept confidential.

Please return this sheet with the survey form.

EDUCATION FOR INDUSTRY

A Four-Year College Program for the Preparation of
Industrial Technicians and for the Pre-Service
Training of Supervisors

Industrial Education Department
University of Maryland
College of Education
1952

Areas of Concentration in the
Education For Industry Program

Technical Area

General Chemistry
Elements of Physics (or)
Fundamentals of Physics
Trig. & Analytic Geometry
 or Plane Trigonometry
Algebra or College Algebra
Machine Woodworking
Shop Calculations
Mechanical Drawing
Arc & Gas Welding
Foundry
Machine Shop Practice
Sheet Metal Work
Industrial Safety
Organization and Management
 of Modern Industry
Trade or Occupational Analysis
Shop Organization & Management

Human Relations & Leadership
Area

Introduction to Psychology
Social Psychology
Applied Psychology
Industrial Sociology
Personnel Management
Business Organization & Contr
Job Evaluation & Merit Rating

Social & Civic Area

*Sociology of American Life
*Hist. of Amer. Civilization
*American Government
 Fundamentals of Economics
 Labor Economics
**Basic Air Force R.O.T.C.
*Physical Activities

Communications Area

*Composition & American
 Literature
*Composition & World
 Literature (or)
Composition & English
 Literature
Public Speaking

On-the-Job Area

Organized & Supervised Work
Experience
 (4 internship periods of
 ten weeks each of
 full-time employment)

*Required of all University of Maryland Students.
**Required of all Men Students of the University of Maryland.

Electives - Ten semester hours in senior year.

Proposed Curriculum - Education For Industry

Freshman Year

		Semester Value	
		I	II
*Eng. 1,2	Composition and American Literature	3	3
*Sociology 1	Sociology of American Life	3	
*G & P 1	American Government		3
Speech 7	Public Speaking	2	
Ind.Ed.1,21	Mechanical Drawing	2	2
Ind.Ed.22	Machine Woodworking	2	
Ind.Ed.12	Shop Calculations	3	
Ind.Ed.23,110	Arc & Gas Welding; Foundry		2
Ind.Ed.69	Machine Shop Practice I		2
Math 10 or 15	Algebra or College Algebra		3
*A.S. 1,2	Basic Air Force R.O.T.C.	3	3
*P.E. 1,3	Physical Activities	1	1
Total Semester Hours		19	19

Sophomore Year

*Eng. 3 or 5	Composition & World Lit.;Comp.&Eng.Lit.	3	
*Eng. 4 or 6	Composition & World Lit.;Comp.&Eng.Lit.		3
*H. 5	History of American Civilization		3
B.A. 10,11	Organization & Control	2	2
Phys.1 or 10	Elements of Physics:Mechanics,Heat,Sound	3 or 4	
Phys.2 or 11	Fund. of Physics:Magnetism,Elec.,Optics		3 or 4
Econ. 37	Fundamentals of Economics		3
Ind.Ed. 24	Sheet Metal Work	2	
Math 11 or 14	Trigonometry & Analytic Geometry (or)		
	Plane Trigonometry	2 or 3	
*A.S. 3,4	Basic Air Force R.O.T.C.	3	3
*P.E. 5,7	Physical Activities	1	1
Total Semester Hours 16, 17, or		18	18 or 19

Junior Year

*H. 6	History of American Civilization	3	
Psych. 1,2	Introduction to Psychology; Applied Psy.	3	3
Chem. 1,3	General Chemistry	4	4
Econ. 160	Labor Economics	3	
E.A. 160	Personnel Management		3
Soc. 115	Industrial Sociology		3
Ind.Ed.143,144	Industrial Safety Education II	2	2
Ind.Ed.134a,b	Organized & Supervised Work Experience	3	3
Total Semester Hours		18	18

Senior Year

B.A. 163	Industrial Relations	3	
B.A. 167	Job Evaluation & Merit Rating	2	
Psy. 121	Social Psychology		3
Ind.Ed. 165	Modern Industry	2	
Ind.Ed. 168	Trade or Occupational Analysis	2	
Ind.Ed. 164	Shop Organization		2
Ind.Ed. 124c,d	Organized & Supervised Work Experience	3	3
	Electives	3	7
	Total Semester Hours	15	15

* Required of all University of Maryland Students.

** Required of all Men Students of the University of Maryland.

Semester Hours Required in Various Subject Fields

Subjects	Semester Hours
Chemistry	8
Physics	6 or 8
Mathematics	5 or 6
Industrial Education	37
English & Speech	14
Sociology, History, & Government	15
Business Organization & Management	12
Psychology	9
Economics	6
Military Science	12
Physical Education	4
Electives	10
Total Semester Hours	138 or 141

EDUCATION FOR INDUSTRY

A Four-Year College Program for the Preparation of
Industrial Technicians and for the Pre-Service
Training of Supervisors

A Survey
To Determine the Reaction of Industrialists
Toward the Proposed Program
and the
Extent of the Need For Persons
Prepared Through a Program of this Type.

Survey Conducted by William F. Tierney, University of Maryland
College Park, Maryland

1. Do you feel that your industry has a need for employees with the type of college preparation described in the attached letter and the "Information" sheets?

2. Approximately how many positions have you filled in the last five years where the qualifications of a person so prepared would have been desirable? _____

Average current yearly estimated need? _____

3. How do persons in your company who are employed in supervisory positions now receive their preparation? (A brochure or bulletin published by your company may contain answers to questions 3 and 4. If so, a copy of the publication may be sent and considered the response.)

4. What type of in-service training for upgrading does your company provide?

5. What changes have occurred in industry or in specific job requirements which would justify the establishment of this program?

6. Would your company be willing to participate in the on-the-job work experience phase of the proposed program? (Answers will not be considered as commitments.)
7. For how many students could you provide temporary employment as trainees? (Answers will not be considered as commitments.)

In what type of work?

8. What kinds of jobs could you offer graduates of this program as their initial employment? (Answers will not be considered as commitments.)
9. What kinds of technical or supervisory positions could graduates of this program hope to attain after four or five years of experience with your company?
10. What are some of the more important qualifications which you would expect in new employees at the semi-professional or technical level?

Technical
Knowledges and Skills

Personal
Attitudes and Understandings

Survey of Reaction and Need

In terms of your particular industry and in terms of the stated purposes of this curriculum, please examine the following list of areas and courses and indicate the relative value of each by encircling a number at the right.

	Highly Essential	Desirable	Unessential
Opinions concerning values of the various areas:			
TECHNICAL AREA - Chemistry, Physics, Mathematics, Representative Courses: Shopwork, Drawing, Safety.	1	2	3
COMMUNICATIONS AREA - English composition, Literature, and Public Speaking.	1	2	3
HUMAN RELATIONS AND LEADERSHIP AREA - Social and Applied Psychology. Industrial Sociology, Labor Economics, Personnel Management, Industrial Relations, Business Organiza- tion and Control.	1	2	3
SOCIAL AND CIVIC AREA - Sociology of American Life, U.S. History, American Government, Military Science, Physical Education.	1	2	3
ON-THE-JOB AREA - Representative Experience: work experience - four, ten-week periods of full-time employment.	1	2	3

Opinions concerning values of the specific courses:

The remainder of the questionnaire is optional. Your reactions to specific courses will be appreciated but if time does not permit you to respond, please return the part of the questionnaire to which you have reacted.

OPTIONAL PART OF QUESTIONNAIRE

General Chemistry	- Two lectures, one quiz, and two two-hour laboratory periods per week for one year.	1	2	3
Elements of Physics	- A survey course in general physics covering mechanics, heat, sound, magnetism, electricity, and optics.	1	2	3
Algebra	- Fundamental operations, factoring linear equations, exponents and radicals, logarithms, quadratic equations, variation, binomial theorem, and theory of equations.	1	2	3
Trigonometry and Analytic Geometry	- Trigonometric functions, identities, addition formulas, solution of triangles, coordinates, locus problems, the straight line and circle, conic sections, and graphs.	1	2	3
Mechanical Drawing	- Multi-view and isometric drawing. Courses cover working drawings, machine design, pattern layouts, details, assemblies, tracing, and reproduction. Two two-hour laboratory periods per week for one year.	1	2	3
Shop Calculations	- A course in applied mathematics covering practical applications of algebra, geometry, trigonometry, and general mathematics.	1	2	3
Machine Woodworking	- A laboratory course including instruction and practice in the proper operation of the jointer, planer, variety saw, band saw, jig saw, mortiser, shaper and wood lathe. The types of jobs which may be performed on each machine and their safe operation are of primary concern.	1	2	3
Arc and Gas Welding	- A laboratory course designed to develop a functional knowledge of the principles and use of electric and acetylene welding. Instruction covers the use and care of equipment, types of welded joints, methods of welding, importance of welding processes, safety considerations, etc.	1	2	3

Foundry	- A laboratory course covering theory and principles of bench and floor molding, elementary core making, foundry materials, and tools and appliances.	1	2	3
Sheet Metal Work	- A laboratory course covering the use of common sheet metal tools and machines. Operations include parallel line development, radial line development, triangulation, cutting, shaping, soldering, riveting, wiring, folding, seaming, beading and burring.	1	2	3
Machine Shop Practice I	- A laboratory course including instruction in the operation of lathes, milling machines, shaper, drill presses, and tool grinders. Tool bit grinding, bench work and related technical information are also included.	1	2	3
Industrial Safety-	A course covering exemplary safety practices. Actual industrial situations are covered and evaluative criteria in safety education are covered through conference discussions, plant visits, and class demonstrations.	1	2	3
Shop Organization- and Management	This course covers the basic elements of organizing and managing a shop laboratory. Selection and arrangement of equipment are stressed.	1	2	3
Modern Industry	- This course provides an overview of manufacturing industry in the American social, economic, and cultural pattern. Representative basic industries are studied from the viewpoints of personnel and management organization, industrial relations, production procedures, distribution of products, and the like.	1	2	3
Trade or Occupational Analysis	- This course provides a working knowledge of occupational and job analysis which is basic in organizing instructional programs.	1	2	3

Public Speaking	- A course involving the preparation and delivery of speeches, reports, etc., on technical and general subjects.	1	2	3
Fundamentals of Economics	- A survey study of the general principles underlying economic activity. Designed to meet the needs of technical groups.	1	2	3
Labor Economics	- The historical development and chief characteristics of the American labor movement are first surveyed. Present-day problems are then examined in detail.	1	2	3
Introductory and Applied Psychology	- A course covering the major problems confronting psychology, the more important attempts at their solution, and the application of research methods to the basic human problems in business and industry.	1	2	3
Social Psychology	- Psychological study of human behavior in social situations, the influence of others on individual behavior, social conflict and individual adjustment, communication and its influences on normal social activity.	1	2	3
Industrial Sociology	- Social organization of industry; functions of members of industrial organization, status, social structure, patterns of interaction, and relations of industry and society.	1	2	3
Organization and Control	- A course treating the internal and functional organization, control, and management of a business enterprise.	1	2	3
Personnel Management	- This course deals with the problems of directing and supervising employees under modern industrial conditions. Two phases of personnel administration are stressed; the application of scientific management, and the importance of human relations in this field.	1	2	3

Industrial Relations	- A study of the development and methods of organized groups in industry with reference to the settlement of labor disputes. An economic and logical analysis of labor union and employer association activities, arbitration, mediation, and conciliation; collective bargaining, trade agreements, strikes, boycotts, lockouts, company unions, employee representation, and injunctions.	1	2	3
Job Evaluation and Merit Rating	- The investigation of the leading job evaluating plans used in industry, study of the development and administrative procedures, analyzing jobs and writing job descriptions, setting up a job evaluation plan, and relating job evaluation to pay scales. Study of various employee merit rating programs, the methods of merit rating, and the uses of merit rating.	1	2	3
Organized and Supervised Work Experience	- Four ten-week periods of full-time employment to provide students with opportunities for first-hand experiences with business and industry.	1	2	3

All undergraduate students at the University of Maryland are required to have twelve semester hours of English, and twelve semester hours distributed among sociology, government and politics, and American history. Men students must also take four semesters of Air Force Reserve Officer Training and four semesters of physical activities. Since these courses are required, they are omitted from the last part of this survey.

Please add any other subjects or experiences which you feel a student should have.

UNIVERSITY OF MARYLAND
COLLEGE PARK

DEPARTMENT OF INDUSTRIAL EDUCATION
COLLEGE OF EDUCATION

Dear Sir:

In compiling the returns from the survey which I am conducting for the University of Maryland concerning a proposal for a new "Education for Industry" program, I find that I have not received a return from your Company.

If you have questions about the survey which I might answer I shall be glad to respond to them. If you have referred the survey to some other person I would appreciate it if you would check to see if he has questions.

I am enclosing another copy of the information and questionnaire in the event that the originals have been lost or misplaced. Since I am trying to get as complete returns as possible I would appreciate anything that you may do to expedite the completion of this survey.

Sincerely yours,

William F. Tierney
Instructor

WFT/mt