1938

A study of the possibilities of cooperation between the General Electric Company and Pittsfield School Department in the improvement of the present program of vocational education.

John Francis Moran
University of Massachusetts Amherst

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A STUDY OF THE POSSIBILITIES OF COOPERATION BETWEEN THE GENERAL ELECTRIC COMPANY AND PITTSFIELD SCHOOL DEPARTMENT IN THE IMPROVEMENT OF THE PRESENT PROGRAM OF VOCATIONAL EDUCATION

MORAN - 1938
A STUDY OF THE POSSIBILITIES OF COOPERATION BETWEEN THE
GENERAL ELECTRIC COMPANY
AND
PITTSFIELD SCHOOL DEPARTMENT
IN THE IMPROVEMENT OF THE PRESENT PROGRAM OF
VOCATIONAL EDUCATION

by

John Francis Moran

Thesis Submitted for Degree of Master of Science
Massachusetts State College    Amherst, Massachusetts
1938
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CHAPTER I
INTRODUCTION

This study had its origin in a course pursued by the writer entitled "A Sociological Philosophy of Education." The emphasis placed upon the necessity for cooperation between school and industry in the organization of a program of vocational education led to a determination on the part of the author to make a study of the possibilities of a working arrangement between the school system and the largest industry in the city. Encouragement in such a project was also given by the State Director of Vocational Education.

There are many reasons why such a study is both timely and necessary. At present there is no adequate vocational program in Berkshire County. In the Pittsfield Public School system a beginning was made (April 1934) by the establishment of a General Vocational Department for boys. This department was organized principally to serve those boys who were not profiting by the regular academic program and who expected to leave school for work at the earliest opportunity. Training was offered in general woodworking, painting and woodfinishing and operation of printing presses. In September of 1934 there was added a General Vocational Department for girls which offered to those who did not meet the entrance requirements for high school, courses in Foods, Clothing and Home Management. In the senior high school there had been in operation since 1920 a state-aided Household Arts course for girls. This course offered to high school girls training in Foods, Clothing,
Table 1. Age-Grade Table: (A) Number (5,103) of Different Resident and Non-Resident Minors (14-16 years of age) Employed in Pittsfield (1921-1933):

(B) Grades Left All (5,073) Minors (14-16) Certificated by Pittsfield (1921-1933).

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<th>5th</th>
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<td>98</td>
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<td>68</td>
<td>48.9%</td>
<td>57</td>
<td>41%</td>
<td>14</td>
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<td>90</td>
<td>40.7%</td>
<td>13</td>
<td>5.9%</td>
<td>90</td>
<td>40.7%</td>
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<th>Normal</th>
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### B. Grades Left by 5,073 Minors

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<th>Above</th>
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<td>142=43.5%</td>
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<td>1930</td>
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<td>105</td>
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<td>88</td>
<td>70</td>
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<td>4</td>
<td>15</td>
<td>193</td>
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<td>154=29.9%</td>
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<td>166=27.5%</td>
<td>6=1%</td>
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Boys: 215; Girls: 217
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<tr>
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<td></td>
<td>236</td>
<td>198</td>
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<tr>
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<td></td>
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### B. Grades Left by 5,073 Minors

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<th>6th</th>
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<td>32.5%</td>
<td>11</td>
<td>2.7%</td>
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</tr>
<tr>
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<tr>
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<td>131</td>
<td>32.5%</td>
<td>11</td>
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</tr>
<tr>
<td>Girls</td>
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<td></td>
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#### 1923

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<th>35</th>
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<td>261</td>
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<td>Total</td>
<td>Retarded</td>
<td>Normal</td>
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<td>191</td>
<td>58.2%</td>
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<td>191</td>
<td>178</td>
<td>369</td>
<td>2</td>
<td>7</td>
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<td>1919</td>
<td>193</td>
<td>160</td>
<td>353</td>
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</tr>
<tr>
<td>A.</td>
<td>B. Grades Left by 5,073 Minors</td>
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<tr>
<td>Number (5,013) of</td>
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<td>Accelerated</td>
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<tr>
<td>Different Minor Normal</td>
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<td>11</td>
<td>12</td>
<td>13</td>
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<td>12</td>
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<td>16</td>
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<tr>
<td>Below Year</td>
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<td>6th</td>
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<td>Total</td>
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<td>58</td>
<td>75</td>
<td>80</td>
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<td>Total</td>
<td>5103</td>
<td>2493</td>
<td>2610</td>
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<tr>
<td>Boys</td>
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<td>38</td>
<td>910</td>
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<td>90</td>
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<td>794</td>
<td>748</td>
<td>564</td>
<td>251</td>
<td>71</td>
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<td>Total</td>
<td>6</td>
<td>19</td>
<td>78</td>
<td>1704</td>
<td>1506</td>
<td>1099</td>
<td>491</td>
<td>151</td>
<td>17</td>
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<tr>
<td>Totals (13 YEARS)</td>
<td>3313=65.3%</td>
<td>1590=31.3%</td>
<td>170=3.4%</td>
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<tr>
<td>Boys: 1721=33.9%</td>
<td>Boys: 775=</td>
<td>Boys: 91=1.8%</td>
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<tr>
<td>Girls: 1592=31.4%</td>
<td>15.2%</td>
<td>Girls: 79=1.6%</td>
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</tr>
<tr>
<td>(Not including years 1919 and 1920)</td>
<td>Girls: 815</td>
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<tr>
<td>IN THE REGULAR SCHOOLS (STUDY MADE IN 1926)</td>
<td>-16.1%</td>
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<tr>
<td>Pittsfield</td>
<td>13.6%</td>
<td>74%</td>
<td>12.4%</td>
<td></td>
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<tr>
<td>State</td>
<td>10.3%</td>
<td>62%</td>
<td>27.7%</td>
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</tbody>
</table>
Dietetics, Home Management and led to a high school diploma.

In Table I there is shown a tabulation of the grades left by all minors 14-16 years of age who were certificated in Pittsfield during the years from 1921 to 1933. A study of this table brings out several significant facts pertinent to our study.

(a) There has been a constant decrease in the number of minors employed from the high point in 1929 to the present. Since under the law minors under 16 years of age must either be at school or at work obviously there is an ever increasing number of minors now in school on a full time basis who under more favorable working conditions would be employed.

(b) A further study of this table shows that of that total number certificated during this period (1921-1933) 65.3% were retarded academically. A study of pupils of the same ages in the regular schools shows only 13.6% so retarded. This means that of this group forced back to school by employment conditions five times as many were unable to profit by the academic program in comparison with those already in the regular schools.

The obvious conclusion is that we must develop our vocational program to care for this new group of full-time students.

Table II presents another phase of the situation which compels our attention. It is a tabulation of the high school enrollments for each year from 1920 to 1937. There has been a constant increase in the secondary school enrollment to such an extent that the number now registered in senior high school is more than double what it was in 1920.
### Table II

**Enrollment-years**

**1920-1937**

<table>
<thead>
<tr>
<th>Year</th>
<th>Enrollment</th>
<th>Remark</th>
</tr>
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<tbody>
<tr>
<td>1920</td>
<td>June 953</td>
<td></td>
</tr>
<tr>
<td>1921</td>
<td>June 897</td>
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</tr>
<tr>
<td>1922</td>
<td>June 897</td>
<td></td>
</tr>
<tr>
<td>1923</td>
<td>June 1009</td>
<td></td>
</tr>
<tr>
<td>1924</td>
<td>June 612</td>
<td>(com'l building a separate unit)</td>
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<tr>
<td>1925</td>
<td>June 888</td>
<td></td>
</tr>
<tr>
<td>1926</td>
<td>June 894</td>
<td></td>
</tr>
<tr>
<td>1927</td>
<td>June 935</td>
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</tr>
<tr>
<td>1928</td>
<td>June 953</td>
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<tr>
<td>1929</td>
<td>June 1036</td>
<td></td>
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<tr>
<td>1930</td>
<td>June 1053</td>
<td></td>
</tr>
<tr>
<td>1931</td>
<td>June 1251</td>
<td></td>
</tr>
<tr>
<td>1932</td>
<td>June 1464</td>
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<tr>
<td>1933</td>
<td>June 1619</td>
<td></td>
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<tr>
<td>1934</td>
<td>June 1665</td>
<td></td>
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<tr>
<td>1935</td>
<td>June 1665</td>
<td></td>
</tr>
<tr>
<td>1936</td>
<td>June 1679</td>
<td></td>
</tr>
<tr>
<td>1937</td>
<td>Present time 2100</td>
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</tbody>
</table>
Furthermore, records on file in the office of the high school show that not less than 20% nor more than 25% of the graduates in any one year go on to higher institutions of learning. Since not over 50% of the entire enrollment is registered in commercial, household arts and college preparatory courses, this means that about 50% of those who complete the high school course are not receiving specific occupational training for their life's work. Nor does this take into consideration the fact that many boys take up commercial courses although not fitted for them, but rather because they offer a definite objective and concrete occupational training.

A change in the apprentice training policy of the General Electric Company has recently eliminated the only previously existing opportunity for specific trade training in Pittsfield. The company's apprentice course is open now only to high school graduates with training for supervisory and technical positions as its major objective. Again, these facts point to a definite need for vocational training.

An employment census taken late in 1936 shows that of 14,212 employed in the city of Pittsfield 9012 were engaged in some form of manufacturing industry. This would indicate that it is an industrial city. The General Electric Company is the dominant employer of labor in Pittsfield. It is the one industry which absorbs more of the working population than any other, in fact it employs more than all other industries taken together. In December 1936 of 9,012 industrial employees in the city the General Electric Company employed 5,940.
The standard basis for justifying any kind of educational activity is that it meets a community need. This is particularly true of a program of vocational education. Any study, therefore, which has as its objective the setting up of a vocational training program in Pittsfield must take as its basis the opportunities for employment to be found in the General Electric Company.

Vocational education in Massachusetts is a state-aided type of education and is authorized by Chapter 74 of the General Laws. The schools therein provided for are not public schools, but are schools "under a distinctive management," intended to furnish education distinctive in aim and character from general education provided for in the public schools. Section II Chapter 74, defines vocational education as "education of which the primary purpose is to fit pupils for profitable employment" and enumerate certain forms of vocational education which may be given state aid. Under these definitions the State Department of Education has formulated standards and consequently an attempt to set up a program of vocational education must keep these standards in mind.

Therefore, the problem narrows itself down to a study of the possibilities of cooperation between the General Electric Company and a state-aided program of vocational education in the Pittsfield Public Schools with an effort to reconcile the profits motive of corporation with the fundamental responsibility of a public school system toward the welfare of its children.
Scope of the problem.

Inasmuch as the organization of the program of vocational education here contemplated would be under the jurisdiction of the Pittsfield Public School Committee, we shall deal only with that part of the program which affects vocational education of less than college grade.

Furthermore, the investigation of the need for expanded vocational facilities in the Pittsfield School system will be based upon the following points.

1. The need on the basis of expected occupational opportunity for boys only in the Pittsfield Works of the General Electric Company. Since there is already well established Household Arts and Commercial Training courses in the High School program which meet the vocational needs of nearly all girls who do not go to the higher institutions of learning, it was deemed advisable to limit this study to the needs of boys.

2. The need on the basis of courses for which the approval of the State Department of Education can be secured as meeting the standards formulated under Chapter 74 of the General Laws.

3. The need on the basis of lack of agencies now giving specific vocational education.

Sources of Material.

Information concerning the occupational opportunities in the Pittsfield works of the General Electric Company was secured directly by a survey of all the payroll jobs in the plant. Permission of the management was given to do this, as well as to secure detailed information concerning jobs for purposes of analysis of material collected.
The administrative regulations of the State Department of Education relating to the establishment of state-aided vocational schools were studied to ascertain the standards necessary to secure approval of any program which might be set up.

The local facilities for vocational education were familiar to the author but information concerning the apprenticeship program of the General Electric Company was secured from the Superintendent of apprentices of that company.

Method of Attack.

First of all, the field of literature was reviewed, to ascertain the growth and importance of vocational schools in general. Schools were visited, and the organization and curricula were studied. Interviews were held with administrators in the field of vocational education, and with representatives of the State Department of Education. Informal interviews were held with workers and officials of industry and business enterprises. All of this was done in order to have a background for the survey, and to formulate plans for proceeding.

Following this preliminary work, the operations of the Federal Board for Vocational Education and the Vocational Education Act were studied. The Massachusetts legislation on vocational education was carefully considered in order to find out the steps which must be taken in order to establish a state-aided program of vocational education in a community.

Preparations were then made with the assistance of the officials of the General Electric Company to survey all the
payroll jobs in the Pittsfield plant for the purpose of ascer-
taining a list of occupations for which it would be practicable
to set up a training program.

A set of criteria were established as a basis for evalu¬
ating this listing of payroll jobs in order to answer the
following questions:

1. Which of these occupations have a theoretical training
value? By theoretical value is meant that a study of the
occupation indicates that effective training can be given in
so far as manipulative and technical content are concerned.

2. Of the occupations having a theoretical training
value, for how many is training practical when we consider
such factors as community attitude, number employed, and
special equipment necessary for the training considered in
connection with the resources of the community?

3. For how many of the occupations possessing a practi¬
cal training value has adequate provision been made elsewhere?

As a result of this eliminating process there appeared a
small group of significant occupations which will serve as the
basis for the training program.

Conferences with plant officials, school officials and
others were held to determine:

1. Administrative setup for such training covering also
entrance requirements.

2. The proper training agencies to be served; curricular
content and type and amount of training necessary.

3. Training procedure (method) to be used.

4. Cost of program.
To summarize then the method of attack, was as follows: Investigation of literature in the field, a survey of payroll jobs with analysis of the same, private interviews, visitation, and observation.

CHAPTER II
Collection of Data

In proceeding with the actual collection of data the payroll survey previously mentioned resulted in the listings shown under Table III. This is a detailed listing of every payroll occupation, separating jobs minutely and showing the fluctuation over a six month's period. This gives an opportunity to note in which jobs employment is on the increase, thus indicating the trend of future employment opportunities.

Since such a listing divided the various jobs into very many small classifications it was necessary to group together those jobs which have a similar fundamental training content and which would therefore serve as a theoretical basis of a training program.

This was done in two ways:

1. By conferences with company officials who were familiar with the training content and skills involved.

2. On those jobs whose classification would not be accurately placed by conference, more detailed information as to their training content was secured by the use of Survey Blank One.
### TABLE III
PITTSFIELD WORKS
General Electric

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<th>Occupation</th>
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PITTSFIELD WORKS
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### PITTSFIELD WORKS

#### General Electric (Continued)

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## PITTSFIELD WORKS

General Electric (Continued)

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**General Electric (Continued)**

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### PITTSFIELD WORKS

**General Electric (Continued)**

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<td>June 30, 1935</td>
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</tr>
<tr>
<td>Mixing Room Operators</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Coating Machine Oper.</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Handling Mandrels - Cyl.</td>
<td>19</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Maching Herk. - Cyl.</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Core &amp; Tube Wind. (Boys) (Learners)</td>
<td>3</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Carbon Workers</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Pressing Thyrite Disc.</td>
<td>17</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Scooping - Hand</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Scooping - Machine</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Mix Thyrite</td>
<td>3</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Chemists</td>
<td>4</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Material Testers</td>
<td>11</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Assemblers</td>
<td>15</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Draftsmen</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Wire Drawing</td>
<td>2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Wire Enameling</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cotton &amp; Paper Cover</td>
<td>15</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Wire Rolling</td>
<td>7</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Die Reaming</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Slitting Paper</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Winding Capacitor Rolls</td>
<td>2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Reeling Wire</td>
<td>22</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Reeling Wire</td>
<td>7</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL—MEN—PITTSFIELD WORKS**

|                      | 2656 | 2375 |
By means of these two steps there was evolved a listing of jobs with the same fundamental training content which would theoretically serve as a basis for the training program. This list is given in Table IV.

The next step was to set up criteria to determine the absorption rate and turnover in these jobs in the Pittsfield Plant with a view toward the eventual placement of graduates of the proposed training program.

Through conference with officials and a study of industrial statistics it was found that the rate of turnover in the jobs listed in Table IV is never below 5% annually. Due to the increase of employment because of the lack of a plant training program during the depression it was found that the present absorption rate in these occupations was not less than 10% annually.

In establishing a training program based on Table IV another important consideration must be the administrative regulations set down by the State Department of Education. These may be summarized as follows:

1. All independent industrial schools shall be organized by departments. A department is an organization of courses, pupils and teachers, designed to give instruction in a trade, craft, manufacturing pursuit or general education.

2. Section 6 of Chapter 74 provides that boards of trustees (school committees) shall appoint advisory committees composed of members representing local trades, industries and occupations.
## JOB ANALYSIS FOR TRAINING CONTENT

### General Vocational Department

#### I. Business

<table>
<thead>
<tr>
<th>Department</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. Employed</th>
<th>No. Available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>hired by</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### II. Nature and Conditions of Work


#### III. Machines Used


#### IV. Time to Learn

<table>
<thead>
<tr>
<th>Labor Supply Trained By</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

#### V. Advantages and Disadvantages


#### VI. Promotional Probability

1
2
3
4

#### VII. Personal Qualifications

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Educational</th>
<th>Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperamental</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race or Nationality Preferred</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

#### VIII. Legal


#### IX. Duties

<table>
<thead>
<tr>
<th>(a) Have to do</th>
<th>(b) Have to know</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>

#### X. Training Content

<table>
<thead>
<tr>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
SUGGESTED TERMS AND EXPLANATIONS FOR USE WITH JOB SPECIFICATION

(Describe Major Characteristics rather than very fine distinctions)

I. Numbers employed and available: If making plant survey give figures related to plant. If surveying community, give figures for locality.

Hired by: Employer - Employment Manager - Personnel Department (If application forms are in use, secure samples).


IV. Time to Learn: days - months - years Labor Supply: casual - school - agency

Trained by: pick-up-work on the job - apprenticeship - school (type)

V. Pay: Per week or month (be specific). Other Considerations - board - room - goods at discount - other.

VI. Sex: Male (M) or Female (F). Age limits or age preferred

Educational: None - read - write. Add, Subtract whole numbers - fractions.

Experience: Required - Desirable - Unnecessary.

Temperamental: Patient - Careful - Tactful

Physical: Height - Weight - Handiness - Strength - Eyesight - Dexterity (e.g., finger).

Race or Nationality Preferred:

Legal: Special factors covered by law.

VII. (a) Cycle of operations, performance of which constitutes the job.

(b) Parallel items of technical knowledge necessary to job performance.

VIII. Material out of VII selected for content of training course.
<table>
<thead>
<tr>
<th>Group No.</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Work with Autos, Trucks, Tractors, etc.</td>
</tr>
<tr>
<td>9</td>
<td>Wiremen &amp; Electricians</td>
</tr>
<tr>
<td>4</td>
<td>Factory Maintenance</td>
</tr>
<tr>
<td>1</td>
<td>Machine Maintenance &amp; Machinists</td>
</tr>
<tr>
<td>6</td>
<td>Testers &amp; Helpers</td>
</tr>
<tr>
<td>1</td>
<td>Lathe &amp; Screw Machine Milling Operators</td>
</tr>
<tr>
<td>1</td>
<td>Drill Machine (Lay out Work)</td>
</tr>
<tr>
<td>1</td>
<td>Press Operator</td>
</tr>
<tr>
<td>2</td>
<td>Assemblers</td>
</tr>
<tr>
<td>8</td>
<td>Tinsmith &amp; Related Soldering</td>
</tr>
<tr>
<td>5</td>
<td>Welders</td>
</tr>
<tr>
<td>3</td>
<td>Winders</td>
</tr>
</tbody>
</table>
3. There shall be a director, who under the executive officer of the board of control, shall be distinctly responsible for the conduct of the school and for all instruction given in the school.

4. There shall be one instructor to not more than twenty pupils, and the number always limited to the size of the group necessary to secure efficient instruction.

5. Approved day schools shall offer at least the same number of weeks of instruction as is provided for the established high school, thirty-five hours per week, five days of seven hours each, and except for approved reasons shall aggregate at least fourteen hundred hours per year, of which at least eleven hundred and twenty hours (80 per cent) shall be for vocational instruction, with at least seven hundred hours (50 per cent) on productive shop work under the direct control of the school.

6. A list of equipment in each school shall be furnished the supervisor of the Department. The equipment shall be sufficient in quantity and variety to enable all departments of the school to give instruction in all the standard methods of the school for which the school proposes to give instruction. In short it should be sufficient in quantity to enable each pupil to keep continuously at work during the shop periods.

7. The Department of Education has a direct duty and responsibility in passing upon the qualifications of instructors.

8. These schools shall be open to applicants who are over fourteen years of age. Admission to the school must be based
upon the applicants' definite conscious aims and desires to pursue the occupations trained for and the applicants' evident ability to profit by the instruction offered; provided that the applicants will be admitted to industrial schools to pursue instruction in one department only.

9. The State Department of Education will reimburse the city to the extent of 50% of the net maintenance cost. This, however, does not include the initial expenditure for such things as plant and equipment.
INTERPRETATION OF THE DATA

It is obvious that the training program is going to be based on the employment opportunities which have come to light in Table IV. These opportunities are briefly summarized in Table V.

Since the criteria set up by the State Department of Education for judging a vocational program is the measure of its effectiveness in training for profitable employment we cannot justify the inclusion of any occupation which does not promise a reasonable opportunity for placement once the skill has been acquired. With this objective in view groups 6, 7, 8, and 9 are eliminated from further consideration in a practical training program.

If placement were our only consideration our problem would be a simple one but other considerations are involved such as lack of sufficient training content and cost of plant and equipment. We shall now apply these criteria to the remaining occupational groups of Table V.

Considering them in the order shown in this table: In Group I consisting of the Machine Trade and allied occupations, we find basic occupational skills requiring a considerable period of training. It might be said that Group I therefore qualifies under the first of our criteria. Now applying the second of our criteria the cost of equipment, we find that this trade requires a great deal of expensive machinery, such as lathes, shapers, milling machines, grinders, drill presses and planers. If this equipment can be provided, Group I should occupy a paramount position in our final training program.
<table>
<thead>
<tr>
<th>GROUP No.</th>
<th>Occupation</th>
<th>Employees</th>
<th>Annual Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Machine Maintenance &amp; Machinist</td>
<td>213</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lathe, Screw Machine, Milling Operators</td>
<td>121</td>
<td>25-50</td>
</tr>
<tr>
<td></td>
<td>Drill Machines (Lay Out Work)</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Press Operators</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>Assemblers</td>
<td>396</td>
<td>24-40</td>
</tr>
<tr>
<td>III</td>
<td>Winders</td>
<td>168</td>
<td>9-16</td>
</tr>
<tr>
<td>IV</td>
<td>Factory Maintenance</td>
<td>145</td>
<td>7-14</td>
</tr>
<tr>
<td>V</td>
<td>Welders</td>
<td>132</td>
<td>6-13</td>
</tr>
<tr>
<td>VI</td>
<td>Testers &amp; Helpers</td>
<td>119</td>
<td>5-10</td>
</tr>
<tr>
<td>VII</td>
<td>Work with Autos, Trucks, Tractors, Etc.</td>
<td>57</td>
<td>3-5</td>
</tr>
<tr>
<td>VIII</td>
<td>Tinsmith &amp; Related Soldering</td>
<td>57</td>
<td>3-5</td>
</tr>
<tr>
<td>IX</td>
<td>Wiremen &amp; Electricians</td>
<td>47</td>
<td>2-4</td>
</tr>
</tbody>
</table>
Following the established order we next consider Group II, that of the assemblers. Applying the skill criteria we find that modern job analysis and motion study have simplified, standardized and reduced assembling skills to a few specialized operations which can be learned in a short training period of from one to five days. This group is therefore eliminated.

In examining Group III the occupation of winder, we find the need for a highly specialized skill, practically confined to the construction of transformers. There is unquestionably a sufficient amount of skill involved to make training worthwhile. The equipment, however, is expensive highly specialized and patent controlled. Here again as in Group I if this equipment can be provided, this occupation should undoubtedly be included.

Group IV, factory maintenance, is an occupation involving the basic skills found in the building trades. It certainly offers sufficient training content to warrant a place in our program. The equipment is comparatively inexpensive and much of it is already in the possession of the school department. There seems to be no obstacle to the inclusion of this group in our final set up.

Welding, because of its wide application in the local plant of the General Electric Company as well as in industry as a whole demands an extensive training. Group V therefore easily qualified under our skill criteria. There is no obstacle offered by necessary equipment as it is neither expensive nor complicated. This group merits serious consideration.
To recapitulate: The only employment groups which have not been eliminated by our analysis thus far are numbers I, III, IV and V. Let us now turn our attention to these remaining groups.

The difficulty in Group I was one of equipment. When the situation was outlined and discussed with the General Electric Company it was found that due to a retooling program they were ready and willing to provide the basic machinery for a complete machine shop. Other local manufacturers were willing to contribute the remaining necessary equipment. The way is thus clear for the establishment of a complete and thorough course in Machine Shop Practice.

The equipment difficulty in Group III was not so easily solved. In the opinion of the General Electric management patent and production difficulties combined with machine costs made it inadvisable from industry's point of view to provide the necessary equipment, materials and outlets for the finished product. As the resources of the city could not bear the burden alone, winding must be eliminated.

Our analysis thus far offers no serious difficulty in providing a training program for Group IV. In fact, the expansion of our already established general metal and woodworking shops can provide adequate training for this group.

Group V, as we have previously stated offers no skill or equipment difficulty and should therefore take its place among the eligible training possibilities.

To summarize: It therefore is apparent that from the
viewpoint of placement opportunity, training content and practical availability of equipment our program must include (1) a basic machine shop course (2) a basic welding course (3) an enlarged general shop to provide training for factory maintenance.
SUMMARY AND CONCLUSIONS

The purpose of this study is to determine the possibilities of a working arrangement between the Pittsfield School System and the General Electric Company in the establishment of a program of vocational education.

The data on employment opportunities and training content were secured by:

1. A payroll survey
2. An analysis of the skill content of 12 basic occupational groups represented in 371 separate types of jobs.

Other criteria by which the training program was to be judged included:

1. Conformity to State Department of Education standards.
2. Teachability of training content and skills.
3. Cost of plant and equipment.

The analysis of these data appear to verify the following conclusions:

1. The vocational program established in Pittsfield should include:
   (a) a basic machine shop course
   (b) a basic welding course
   (c) an enlarged general shop to provide training in factory maintenance.

2. All of the skills represented in the final program should whenever possible be set up on a long and short term
unit basis. The short term units would give those boys who are forced to leave school early completed training in one or more special skills, while the integration of these short term units into a complete trade course will give the boy who stays to the end a thorough grounding in the fundamentals of that occupation. The relationship between short and long term units is perhaps best shown graphically in Chart I.

3. Industry, at least as represented by General Electric Company, is more than willing to cooperate in the establishment of vocational education and to bear its share of the cost.
RECOMMENDATIONS

It will be absolutely necessary to see to it that state standards are maintained with reference to organization, administration procedures and teacher qualifications.

Since the whole program is to be under the executive control of a popularly elected school committee, it is essential that the general public be educated to the needs.

And finally the program must be developed gradually, never attempting more than can be adequately assimilated, always bearing in mind that the success of the project depends to a large extent on the closest cooperation of industry.

It seems to the author and also to representatives of industry who have been consulted that this cooperation could be strengthened to the mutual advantage of both by the schools' assumption of the teaching of the academic phase of the existing General Electric apprenticeship program. As soon as business warrants, the academic instruction previously given to apprentices will have to be resumed. Considerable planning as to type of instruction, time of scheduling classes and other matters would have to be worked out in careful cooperation with industry. It would seem reasonable to believe that this is one of the areas in which the school should be well equipped to serve the vocational needs of pupils.

This may be the beginning of the establishment of the ideal cooperative training plan in which industry teaches the manipulative skills on the job and the school provides the related technical and cultural knowledge.
A. Because some time has elapsed since the inauguration of the basic idea of this thesis, the intervening period has witnessed the fruition of many of the objectives which were set up as goals in the beginning. It would seem therefore, at this time to be necessary to write a brief chronological outline of the resulting accomplishments.

I. DEVELOPMENT OF THE MACHINE COURSE

When the survey had proceeded to a point where definite occupational opportunities in the General Electric Company became evident, a conference was held with the Superintendent of Schools in order to point out the progress that was being made. About this time also, the writer called to the attention of certain General Electric Company officials, the implications of the survey. As a result of all of these talks, there was finally submitted to the General Manager of the General Electric Company, a letter over the signature of the Superintendent of Schools, in which was laid down several important points brought out in the survey.

The reaction of industry was almost immediately one of the utmost cooperation. A Works Committee was appointed to study the problem and many conferences were held between this committee, the Superintendent of Schools, and the writer. It finally culminated in a blanket order from the manager, instructing all executives at the local plant to cooperate with the School Department in the development of a local program of Vocational Education, and specifically to select certain
equipment within the plant which might be donated to the school for the establishment of a machine shop.

At this point an Advisory Committee was selected. This committee consisted of three executives from the General Electric Company, one from the E. D. Jones Company, a local manufacturer of high-grade paper-making machinery, and the president and manager of a small shop which specialized in the rebuilding of automatic screw machines. These men immediately made it their responsibility to thoroughly canvas other industries throughout the city in order to secure the necessary equipment. The response was again very enthusiastic, so that within a very short time we were provided with the following equipment:

1 cylindrical grinder
6 machine lathes
2 milling machines
2 shapers
1 surface grinder
1 planer
1 tool and cutter grinder
1 power hacksaw
4 drill presses

All of this equipment, with the exception of one lathe, the surface grinder, and one drill press which were purchased by the city, was donated by industry. These Advisory Committee members then used their business connections to contact such nationally-known firms as the Greenfield Tap and Die Company, the National Drill Company, and many others for the purpose of soliciting small tools and equipment. The result in brief is that we have a tool room, equipped with approximately fifteen hundred dollars worth of small tools.
The State Department of Education whose officials had been kept informed concerning the progress of this undertaking, now came forward with the proposal that for the first two years of its existence, the state would pay from Federal Funds, the entire salary of two additional teachers necessary to operate the course. During the third year, the reimbursement would be apportioned; three quarters of the salary by the state and one quarter by the city, and during the fourth year the reimbursement would go on a fifty-fifty basis between the state and the city.

In the selection of teachers we were most fortunate in that there was finally chosen two men of considerable practical experience.

The related subjects instructor, a graduate and former teacher in the General Electric Apprentice School has had many years experience in tool making, tool design and apprentice instruction. The shop instructor has had over twenty years experience in the metal-working trades, during the latter part of which he served as general foreman.

The large number of applicants made the selection of pupils a difficult problem. Selection was finally based upon results of the Otis Advanced Intelligence Test Form A and a mechanical aptitude test which had been developed by the General Electric Company Apprentice School. As there were many promising candidates who could not be admitted, a waiting list has been established.

The standards of the State Department of Education with
reference to vocational training which requires that students be trained on practical jobs presented an obstacle which was partially overcome by the cooperation of industry in allowing us to construct machines on which exclusive patent rights were held. For every two machines constructed one was given to industry and one retained by the school as payment for its labor. In addition, other practical work was secured from local small shops, individuals and the municipal departments.

It was the consensus of opinion that both from the standpoint of the cultural and social as well as the economic, this unit trade course should be an integral part of the high school program, leading to a recognized high school diploma. This was accomplished by scheduling the academic subjects such as English, History, and Economics in the regular high school program.

II. EXPANSION OF GENERAL DEPARTMENT TO CARE FOR FACTORY MAINTENANCE COURSE

The general department as organized already provided courses in woodworking, painting, and decorating. Supplemental units of sheet metal work and of public building maintenance have been added to give more diversified training opportunities in factory maintenance. A stockroom has been established to give instruction in the ordering, care and distribution of supplies and equipment.

III. DEVELOPMENT OF PRESS-FEEDING INTO A PRINTING COURSE

Attracted by the possibilities of cooperation as evidenced by the establishment of the machine shop course, identical pro-
cedures were adopted with considerable success in connection with the printing industry. Additional presses and equipment were donated by several firms. A full time instructor thus became necessary and a comprehensive printing course was the result. There is no problem of securing practical work in this department since there is always considerable school printing to be done.

IV. PUBLIC RELATIONS AND PLACEMENT

No educational program can be entirely successful unless it secures the enthusiastic backing of the general public. To secure this three principal procedures were effective:

(1) A series of luncheons, prepared by the Household Arts Department, were served to business and industrial executives after which an informal tour of the school was conducted.

(2) Contacts made at these luncheons led to periodic visits to local industries by the instructors.

(3) An Open House, which has become an annual affair was inaugurated to give the general public an opportunity to see the school in action during a special session held in the evening.

Interest was thus created which aided materially in the establishment of a successful Placement Bureau. Being thoroughly conversant with what the school has to offer, industry and the public at large were ready to seek the aid of the school placement bureau for the purpose of securing new employees.
V. DEVELOPMENT OF THE APPRENTICE PROGRAM

The ideal example of cooperation between school and industry is best represented by an apprenticeship program in which the school teaches the related subjects and industry provides training in the manual skills. Since the General Electric Company already possessed a going apprenticeship program, the attainment of this ideal involved the assumption of the teaching of the related program by the school. An opportunity to make a beginning along this line was offered by the need for the establishment of an apprentice course in the rapidly expanding Plastics Division. The school department undertook to provide the necessary training in Shop Mathematics, Drafting, Plastics, Chemistry and Tool Design. A year's success in this experiment has led to the assumption by the school of the entire related work program of the apprentice course for the Pittsfield plant beginning in September 1938.

VI. EVENING TRADE EXTENSION COURSES

An effective vocational program should offer an opportunity for men already employed in industry to improve and advance themselves on the job. To this end evening trade extension courses were offered utilizing the equipment of the day vocational school. Some three hundred have taken advantage of this opportunity and in many cases it has paid them dividends in increased wages and promotion.

VII. POSSIBILITIES OF FUTURE EXPANSION

As the program develops the possibilities for future ex-
pansion seem almost infinite. As yet, nothing has been done
to train welders, an occupational opportunity which was un-
covered by the survey. Other opportunities in the community
at large remain to be explored and provided for; auto mechanics,
to mention only one. We may look even further and say that
this school, because of its geographical location, may in the
future be called upon to serve as the vocational training
center for the entire county.

We must however, constantly bear in mind the dangers
attendant upon too rapid expansion, ever and always applying
the test of community need and placement opportunity.
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Approved by:

[Signatures]

Thesis Committee

Date May 12, 1938