ROYAL COMMISSION
ON
INDUSTRIAL TRAINING
AND
TECHNICAL EDUCATION

REPORT OF THE COMMISSIONERS

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ROYAL COMMISSION

ON

INDUSTRIAL TRAINING AND TECHNICAL EDUCATION

REPORT OF THE COMMISSIONERS

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ROYAL COMMISSION ON INDUSTRIAL TRAINING AND TECHNICAL EDUCATION.

OTTAWA, 31st May, 1913.

The Honourable T. W. CROTHERS, K.C., M.P.,

Minister of Labour.

SIR,—By direction of the Royal Commission on Industrial Training and Technical Education we most respectfully submit Volume II of Part III of the Report.

JAS. W. ROBERTSON,
Chairman.

THOS. BENGOUGH,
Secretary.

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GERMANY.

CHAPTER XL: INTRODUCTORY.

The German Empire as created in June, 1871, is made up of 26 different States. The area of the Empire, exclusive of those parts covered by water, contains 208,510 square miles. According to the Census of 1910, the population was 64,903,423. The Kingdom of Prussia had 40,163,333, or 61.8 per cent of the population, and contained 64.5 per cent of the area. The smallest 20 States contain about 10 per cent of the population, and 9.6 per cent of the area. The density of population varies greatly in different districts; that for the whole Empire in 1910 was 310.4 per sq. mile, while in Prussia it was 224 and in Saxony 829.5 per sq. mile.

German is the mother tongue of 92 per cent of all the inhabitants.

Emigration, which at the beginning of the 80's amounted to over 200,000 persons per annum, has decreased to between 20,000 and 30,000 per annum during the last decade. In 1910 it was 25,531.

Occupations.

In 1900 there were fourteen towns with over 200,000 inhabitants each; seven with over 300,000; and five with over 400,000. In 1900, 54.3 per cent of the population lived in town communities with more than 2,000 inhabitants each, and 45.7 per cent lived in the country including places of less than 2,000 inhabitants. In 1871 when the German Empire was formed the figures were: town population, as above, 36.1 per cent; country population, 63.9 per cent.

The transition from an industrial minority in the population to an industrial majority was brought about between 1880 and 1900. In 1895, of the total population 35.7 per cent were occupied in agriculture; 39.1 in mining, manufactures and building; 11.5 in commerce and trade; 5.5 in the army, civil service and other professions; all others (without occupation or no occupation stated), 8.2.

The social grades in the various divisions of occupations have some bearing upon the system and method of education required.

In 1895 of the total 18.9 millions of persons earning a livelihood in the three principal divisions, viz.: Agriculture, Industries, Trade and Commerce, 28.9 per cent were their own masters; 3.3 per cent were employed principally in commercial and technical establishments; and 67.8 per cent were handworking wage-earners.

Industrial Groups.

There are two large groups in the domain of industrial activity; (1) those actually engaged in manufacturing and in the handicrafts, employing 78 per cent of all in industry; (2) those engaged in commerce, transportation, providing lodgings and inn-keeping, 21 per cent.

The largest number of persons are employed in the group for the manufacturing and cleaning of clothes, with 13.5 per cent. Next to that comes the commercial division with 13 per cent; then follow the building trades with 10.2 per cent; the manufacturing of foods and articles for consumption, 10 per cent; textile industries with 9.7 per cent; metal working trades with 6.2 per cent; wood industries, 5.8 per cent; instrument making industries 5.7 per cent; quarrying and brickmaking, 5.4 per cent; mining, foundries and salt works, 5.2 per cent; various other occupations each with a smaller per cent. There are reported to be 320 different kinds of industry, employing 10¼ millions of persons—7,930,000 men and 2,340,000 women.

Industrial production has kept pace with the increase in the use of mechanical power. Improvements in organization, in the application of science and in the technological qualifications of managers and workers have allowed a full application in the industries of the law of increasing returns.

Agriculture.

The climate and quality of soil are the most important factors which determine the agricultural possibilities of a country. Where these are widely different a corresponding variety may be expected in the nature of the agricultural pursuits followed and in the agricultural products of the country. The German Empire extends from the high level of the Alps to the low country lying about the North Sea and the Baltic. The coldest districts are those east of the Baltic, the mountain district of the Hartz, the Swabian and the Bavarian plateau, and the Alpine region which extends throughout Bavaria, Wurttemberg and Hohenzollern. In these parts the Spring can scarcely be said to begin before April and the early coming on of winter nips all vegetation in field and meadow. On the other hand in Silesia, which lies in the centre of the Empire, Thuringen and Saxony, the milder climate brings out the buds in March. The Rhine provinces, Rhinegau and the valley of the Rhine are among the warmest regions. There the vineyards ripen in abundant sunshine. .

The rainfall varies in the different districts between 15.7 inches and 67 inches. Besides the differences in the conditions of climate there are even greater differences in the nature of the soil and in its productiveness.

Sizes of Holdings and Kinds of Farming.

The agricultural population is divided into large estate owners, small farmers and agricultural labourers. Of the total number of 5,558,317 holdings of farming land there are 25,061 farms and estates each with 100 'hectares' of land and over; 281,767 large farms with from 20 to 100 'hectares' each; and 998,804 farms with from 5 to 20 'hectares.' Each of these three grades, in the aggregate, has about an equal area of land, and half as much land in the aggregate is held as small peasant farms and small holdings by 4, 252,685 persons. The 'hectare' is equal to about 2½ acres (2.47 acres).

One does not find in Germany large districts where one or the other system of farming is carried on exclusively. There are a number of localities where the conditions are so constant as to cause some particular branch of farming to be the prevailing one. The form of agriculture most generally followed at the present time is that of the simple or modified rotation of crops. Stock breeding in Germany is dependent upon the smaller farms. The agricultural industry of Germany has always been based upon field husbandry and the latter, therefore, plays an important part in the agricultural activity of the nation. Notwithstanding this Germany does not provide sufficient bread stuffs for her own population. Considerable quantities of wheat, rye, barley and oats are imported annually from abroad. The increase in crop production has been largely due to the discoveries in natural science and their application to methods of agriculture. Drainage has been applied to the general advantage of the German farm.

Areas and Yields of Crops.

48.6 per cent of the total area of land devoted to agriculture and forestry is under cultivation for field crops and market gardening. This area is divided according to the crops grown as follows:—

Cereal	61.1	per cent.
Hoed crops and vegetables	17.5	"
Fodder	10.1	"
Pasturage and fallow land	8.7	"
House and fruit gardens	1.9	"
Other crops	.7	"

Of the grain crops the total area is made up as follows:—

Rye	38	per cent.
Oats	26	"
Wheat	13	"
Barley	11	"
Legumes	11	"

Throughout Germany the average yield is as follows:

Wheat	27.2	bushels	per acre.
Rye	27.72	"	"
Spring Barley	33.54	"	"
Oats	44.36	"	"

The highest and lowest yields of crops reported for the several States are as follows:—

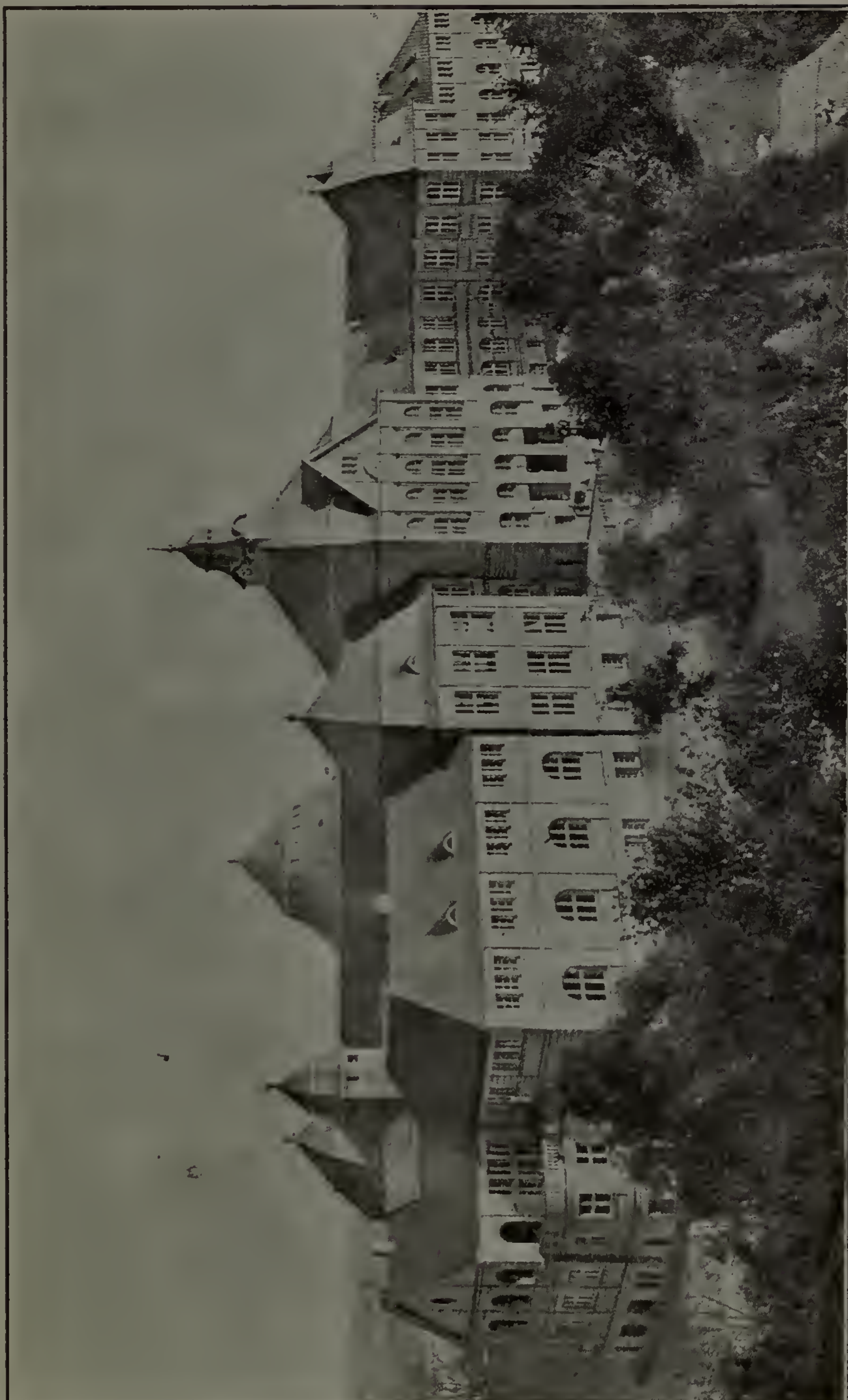
		Bushels per acre.	State or Province.
Wheat,	Highest,	37.92	Anhalt and Schleswig-Holstein.
	Lowest,	20.87	Wurttemberg.
Rye,	Highest,	33.39	Schaumburg-Lippe.
	Lowest,	18.11	West Prussia.
Barley,	Highest,	44.46	Anhalt.
	Lowest,	26.27	Westphalia.
Oats,	Highest,	59.66	Brunswick.
	Lowest,	34.76	Hohenzollern.

Conditions of Living.

No systematic investigation was made as to the cost of living. Observations were made of what might be termed standards of living, so far as these were evident in the physical development of the men and women, boys and girls, in the appearance of their dress and houses and in the apparent contentment or otherwise of the workers as discerned by rather superficial observation. This could not be taken as a serious or exhaustive study of conditions of living. A period of over a month was spent in going about among the people in the industrial and commercial centres and, by road as well as by train, through the country parts. That furnished some data for the formation of a general idea of the condition of the working people; and also shed light on the problems and matters which were being studied in their relation to Industrial Training and Technical Education.

The first impressions, that the pupils in the Industrial and Technical Schools were interested in their work and earnest about it, were confirmed by further observations. Evidently they liked their work and did it well because they understood the meaning of it. On all sides in schools and in civic affairs evidence was abundant of the characteristics of thoroughness and courteousness. The courteous demeanour was evidently the outflow of an attitude of mind towards life, of a robust and self-respecting people, rather than conventional formality to others, fellow-citizens or strangers.

From conversations and observations one concluded that the spirit of racial and community solidarity was deeply rooted and powerful. The maintenance and growth of that spirit were attributed in large measure to the association of the young men in Continuation Schools from 14 to 18 and afterwards in training in military service. Men who learn together, work together and play together are sure to develop many and strong bonds of mutual understanding.



COMMERCIAL HIGH SCHOOL AT COLOGNE. (See page 1182)

CHAPTER XLI: OUTLINE OF THE EDUCATIONAL SYSTEMS.

INTRODUCTORY.

There is no Imperial Ministry for public education; and no uniform school system prevails throughout all Germany. Each State of the Empire has its own system. These systems agree in essentials, but show many differences in detail. This is true of the ordinary academic schools, and still more true of the vocational schools that have sprung up during the last thirty years.

In general the school system is divided into: (I) Elementary or Lower Schools; (II) Secondary or Middle Schools; (III) High Schools.

I. The Elementary system consists of:—

A. Volksschulen and Burgerschulen, the latter being sometimes a higher grade of Elementary School and sometimes a kind of Elementary School at which higher fees are charged, with a tendency to segregate pupils according as their parents are more or less well off;

B. Lower Vocational Schools, including (1) Continuation Schools of various kinds; (2) Schools for Handicrafts.

II. The Secondary or Middle School system includes:—

A. (1) The Pro-Gymnasia; (2) The Pro-Realgymnasia; (3) The Realschulen; (4) The Gymnasia, which are classical schools with a nine years' course, pupils entering usually at 10 years of age, after 4 years in the Elementary School; (5) The Real-Gymnasia, which teach Latin but not Greek; length of course and preparation for admission as above; (6) The Ober-Realschulen, which are schools teaching modern languages instead of the classics; length of courses and preparation for admission as above;

Numbers 1, 2, and 3 are lower grade Secondary Schools. They have a course of six years, usually beginning at 10 years of age. They differ in the subjects taught, but they all grant to their graduates the coveted 'Einjahrigenschein' which allows one year of voluntary service in the German army to take the place of two.

Numbers 4, 5 and 6 are of equal rank legally, but the classical schools stand higher in the estimation of the scholastic world of Germany.

All these schools are for boys. Girls' schools are less thoroughly organized, and less thoroughly equipped, although marked developments are in progress.

B. Secondary Technical Schools for Industrial, Agricultural and Commercial Education; Schools of Art; Seminaries for Training Teachers; and Polytechnika. These schools and the schools indicated under I. B are the ones which are described more fully in the body of this Report.

III. The High School System includes:—

(A) Universities;

(B) Technical, Commercial and Agricultural Colleges;

(C) Academies for special purposes, such as Mining, Forestry, Commerce, Art, Agriculture, and Military Science;

(D) Other academic institutions.

SECTION I: ADMINISTRATION AND ORGANISATION OF THE SCHOOLS.

The control of all matters pertaining to general education in Prussia is lodged with the Ministry of Public Worship and Instruction and Board of Health, usually called the 'Kultus-Ministerium.' At the head of the Ministry stands the Kultus-Minister, who is the Minister of Education.

On the other hand the control of all affairs of industrial education is under the Ministry of Commerce and Industry.

The educational department of the 'Kultus-Ministerium' is divided into two sections, each under a director. One section controls the Universities, Scientific Institutions, Higher Boys' and Girls' Schools, Schools of Technical Art and Education; the other controls the Elementary and Normal Schools, Schools for Physical Training and Institutions for Idiots, the Deaf, the Dumb and the Blind.

The Kultus-Minister is the final authority on all matters pertaining to education. He, with his directors, after due deliberation and conference with experts, decides the policy which must be pursued. He interprets the existing laws and decides all questions which may arise in administering them.

Provincial Authorities.

Between the Ministry and the school stands the Provincial School Board, one of which is found in each of the twelve provinces into which the Kingdom of Prussia is divided. The head of the Board is the highest official in the province, the Ober-Präsident, who is assisted by four or five Counsellors (Schulrate). This Board has jurisdiction in the following matters:—

1. All subjects bearing on the educational aim of the school.

2. The organization of the school.

3. The examination of new, and revision and confirmation of already existing ordinances and regulations.

4. Provisions for the removal of abuses, which have crept into the school system.

5. Examination of text-books in use; decision as to which are to be dispensed with or what new ones are to be introduced.

6. The appointment of Commissions to hold leaving-examinations.

7. The supervision, direction and inspection of all schools which prepare for the University.

8. The appointment, promotion, discipline, suspension and dismissal of teachers in these institutions.

9. The control of financial affairs.

City School Boards.

All State Schools are directly responsible to the Provincial School Board. City schools, on the other hand, are only indirectly responsible to it. They are directly responsible to the local School Board, which usually consists of the mayor, members of the city council, and several directors of the higher schools. The members of the local Board must be confirmed by the Provincial School Board. The local Board elects the director of the school and the teachers, pays their salaries and pensions, and has jurisdiction in the external affairs of the school, but has no direct authority in matters of discipline or instruction.

All Public Schools are under the general control of the State and are subject at all times to inspection. The examination of the pupils is likewise a State matter.

The Ministry does not deal with the schools directly but through the Provincial School Board.

The administration and organization in other States of the Empire are said to be similar although not identical. It does not appear that any useful purpose would be served by presenting a statement of the differences and points of agreement.

SECTION 2: ELEMENTARY AND INTERMEDIATE SCHOOLS.

The Elementary School in Germany is not an Imperial institution; it is managed independently by each separate State.

The Elementary School system includes all institutions in country and city which every child is compelled to attend up to the age of fourteen or thereabouts, unless he can prove to the authorities that he is receiving a similar education elsewhere. School attendance is compulsory in Germany. The State Governments feel bound to provide a certain degree of training for all their people in order to enable them to co-operate in dealing with the problems of the State; and, therefore, reserve to themselves the inspection of the schools and the general control of the school system by laws and ordinances.

Although the schools are regulated, not by Imperial law, but by the ordinances of individual States, there is a general agreement throughout the Empire that no citizen shall be permitted to keep his children from school during the period required. Parents who fail to send their children to school are punished by fine or imprisonment, or both.

Unity But Not Uniformity.

The general character and aim of the schools, and the training and duties of the teachers are similar throughout Germany. In outward circumstances there are differences between the schools of the several federal States and also between parts of one and the same State. Uniformity in outward arrangement is not to be found. Indeed, dissimilarity is great between the village school with its one class and the municipal school with its large buildings with all modern improvements and numerous classes in the larger towns.

The States exercise control over each sub-division of the system within their borders and they allow Local Authorities considerable latitude in the arrangement of the courses and in the management of the schools. Local Authorities have introduced inexpensive experiments and improvements in smaller limited districts which could never have been initiated by legislation applicable to all parts of the country; as for example the introduction of Sloyd, of housekeeping for girls, Supplementary Schools for backward children, sanitary regulations and medical control over all the pupils of the Elementary Schools.

Some Common Features.

Among some of the features which are common to all of the Elementary Schools are the following:—

1. In all these schools the teaching is exclusively entrusted to teachers educated for their profession on strictly methodical lines and certificated by the State. These teachers, except comparatively young probationary masters, hold permanent positions for life. They all have the right to a fixed salary, to superannuation and provision for their families after death. This security of position produces a class of teachers technically trained for their profession and otherwise qualified to maintain and improve the school methods.

2. Another important feature is the enforcement of compulsory school attendance—the age differs slightly in various German States, the limits being 6 and 14 years. The compulsory period usually includes eight years, from six to fourteen. In Bavaria, however, and for girls in Alsace-Lorraine, it is from six to thirteen. In Württemberg it is from seven to fourteen. In Alsace-Lorraine, Bavaria, and Württemberg, the pupil is released from the Elementary School when he has passed a satisfactory examination. A pupil doing unsatisfactory work may be kept in school from one to two years longer.

3. The demands made by the Elementary School on the bodily and mental capabilities both of pupils and teachers are generally severe. The aims of the school presuppose diligence, conscientiousness, performance of duty and earnestness on the part of both teachers and scholars .

The proportion of male to female teachers in public Elementary Schools in 1901 in Germany was 22,339 female teachers to 122,145 male teachers. In 1906 in Prussia the figures for all public schools were: in graded city and town schools 11,860 female teachers and 43,604 male teachers; in rural schools 5,924 female teachers and 59,160 male teachers.

Intermediate Schools.

The term 'Intermediate Schools' (Mittelschulen) indicates in Prussia and a few other North German States, a kind of school with aims beyond those of the Elementary School. It occupies a middle position between the Elementary School and the Secondary School such as Realsschule and Pro-Gymnasium. In the Kingdom of Saxony such schools go under the name of Intermediate or Higher

Elementary Schools; in Baden they are called the advanced division of Elementary Schools. In Hesse the 'expanded' Elementary Schools of some towns are in this class. Most of these schools have nine classes from 6 or 7 to 15 or 16 years of age. In their lower classes they parallel the Elementary School.

Girls' Schools.

The elementary teaching of girls in the Primary Schools is organised in exactly the same manner as that of the boys. For girls also compulsory education begins at the age of six and continues in most federal States to the age of fourteen, in some States only to the end of the thirteenth year. There are also for girls in many towns Higher Elementary Schools (so called Middle-Class Schools). There are also Higher Girls' Schools. The establishment and maintenance of these was for a long time left exclusively to private enterprise and in Roman Catholic parts of the country they were in the hands of prevailing conventual institutions.

Three quarters of the Higher Girls' Schools, that are not exclusively boarding schools, supply also Elementary Education. Children enter the lowest class of the preparatory school, at the sixth year and pass through a nine or ten years course. In Prussia the normal duration of the course is nine years but with the addition of an extra course with optional subjects. In the selection and treatment of the whole of the subjects of instruction, stress is laid on what is practical and stimulating, as for example: "Circumstances of the present time are to be considered particularly. Summaries of names and dates that have no personal or stimulating interest, and that can be received by the memory only in a mechanical way, are most strictly to be avoided, and this applies especially to the teaching of history."

In quite recent years Gymnasium and Real-gymnasium courses have been established in several towns enabling girls to obtain a leaving certificate that qualifies for the University.

The teaching of Domestic Economy and special branches of girls' education are provided for in the general extension course of the Elementary Schools. These are in addition to the technical, that is the commercial or industrial extended instruction. The extending of the education of girls in the Elementary Schools to include domestic subjects is obligatory in several federal States. In some cases a few evening or Sunday hours every week are devoted to it.

SECTION 3: SECONDARY SCHOOLS.

The name of "Higher Educational Institutions" (Higher not High) is, in Prussia, bestowed on those schools that form the connecting link between the Elementary Schools on the one hand and the Universities on the other. In the Southern German States these institutions are often called "Middle-class Schools" whereas in Prussia, by "Middle-class Schools" is understood Higher Elementary Schools. There are three kinds of complete higher educational institutions, viz:—Gymnasia, Real-gymnasia, and Higher (or Ober) Realschulen.

To these correspond three kinds of less complete institutions, viz—Pro-gymnasia, Real-pro-gymnasia and Realschulen. The complete institutions have nine classes each beginning with pupils about 10 years of age. In all the federal States these schools have preparatory classes from 6 or 7 to 10 years of age. In the Gymnasia the teaching is always with the main stress on the two classical languages, with attention to literature, history and mathematics.

Realschulen arose originally as Higher Burgher's Schools, not for the learned professions but for civil and commercial life, and the classical languages were replaced in them by French and English and special stress was laid on mathematics and natural science. In 1882 the Realschulen of the first order, with teaching of Latin, received generally in Prussia the name of Real-gymnasia, a designation which had already occurred in the other federal States. The Pro-gymnasia, Real-pro-gymnasia and Realschulen have six classes each, beginning with pupils about 10 years of age. Their curricula correspond to the six lower classes of the corresponding but more complete institutions. The courses are arranged in such a manner as to afford a reasonably well-rounded education for those who are to leave school at about 16 years of age.

SECTION 4: THE POSITION OF TEACHERS.

It may be laid down as a general principle in Germany that any person who is entrusted with a duty to perform must be trained for the performance of that duty. This principle is rigidly adhered to in the school. A German does not make use of the teaching profession as a stepping-stone to something different, but adopts it as his life's work. The several States provide well for the teacher. In return the State expects and demands that the teacher be qualified to teach.

We are in the habit of saying that the teacher is the all-important factor in the school but we do not exercise anything like the care taken in Germany to train the teacher. There they not only say that the teacher is the all-important element in the school, but they prove their faith in the statement by requiring every teacher from the highest to the lowest to go through a rigid course of training before he is allowed to experiment on the youth entrusted to his care.

The Elementary teachers receive their professional education in preparatory institutions and Seminaries. In some States there are only Seminaries without separate Preparatory Schools. The Seminary Course lasts, as a rule, six years. Pupils must have reached the age of 14 and have passed the prescribed time in the Elementary School. Instead of the Elementary School they may have attended an Intermediate School or the lower classes of a Secondary School.

Salaries and Pensions.

Salaries according to a scale are prescribed for teachers in State schools. No public school is allowed to pay less. As a matter of fact, many of the city schools pay more. As a servant of the State—and nearly all teachers in Germany are indirectly State servants—he knows that the State will provide for him when he is no longer able to provide for himself.

Every teacher in a school which is under State control has a right to a fixed salary, to superannuation, and, in case of death, to provision for the family. The amount of the pension and the conditions of its payment may be seen from the following conditions which prevail in Prussia:

Every teacher who is incapacitated is entitled to a pension after ten years of service. If he is incapacitated before he has served ten years, he may receive a pension, provided his incapacity is due to illness contracted in the performance of his duty; otherwise he receives a pension only by the express permission of the King. At the age of sixty-five every teacher is entitled to claim superannuation.

The amount of the pension is based on the entire income, including rent allowance, and is calculated as follows: Between the tenth and eleventh year the pension equals $\frac{20}{60}$ of the income, it is increased each year by $\frac{1}{60}$ till the thirtieth year; from this time on it is increased yearly by $\frac{1}{120}$ till the pension equals $\frac{40}{60}$ of the income, after which there is no further increase.

There is likewise a pension for widows and orphans. A widow receives $\frac{40}{100}$ of the pension to which the deceased would have been entitled if he had been retired at the time of his death. This sum ranges from 300 to 3500 marks.

Children, whose mother is living, and who at the death of the official is entitled to a widow's pension, receive each one-fifth of the widow's allowance. Children, whose mother is dead or who at the time of the official's death is not entitled to a widow's pension, receive each one-third of widow's allowance. The widow's and orphans' pension together must not exceed the amount to which the deceased would have been entitled if he had been retired at the time of his death.

SECTION 5: UNIVERSITIES.

The German Universities are exclusively State institutions. There is no prohibition or obstacle in the way of private foundation for Universities except that they would not have the prerogatives bestowed on the Universities by law of the States or Empire unless they acquired them by special concession. Revenues are obtained in some cases from endowments, subsidies from independent public funds devoted to special purposes, fees, and proceeds arising from the clinical hospitals; but in general by far the larger portion of the total University expenses is covered by direct State subsidies.

Rector, Faculties and Professors.

The chief representative of the University is the Rector, and in some Universities the Pro-rector—especially when the reigning Sovereign or a Prince of the Royal House occupies the honorary position of Rector Magnificentissimus. The Rector is elected, by processes differing in the various Universities, by the total number of ordinary Professors—in one University by a general meeting embracing also the Extraordinary Professors. He is chosen from their midst for one year. The Rector directs the current business and presides at the meetings of the Senate and the various committees.

The Universities are divided, according to the chief branches of learning cultivated in them, into Faculties. The Faculties in a narrower sense are composed of the Ordinary Professors that belong to them; but in the wider sense of the total number of teachers and students of the respective branches of learning. The Faculties superintend the instruction in their respective subjects and are responsible for its regular operation and completeness. In case of vacancy of a Chair they are allowed, partly by transmitted custom and partly by explicit regulations in the statutes, to propose to the Government persons fit and proper for the succession.

The Ordinary Professors are appointed by the reigning Sovereign on a motion of the Ministry, who as a rule take into consideration the proposals of the Faculty. They form the real permanent teaching staff of the University and, as a rule, they alone have the right to vote as occasion presents itself. From their midst also proceeds the Representative whom, according to the current constitutional regulations, the Universities delegate to the Diet of the State.

Qualifications of Students.

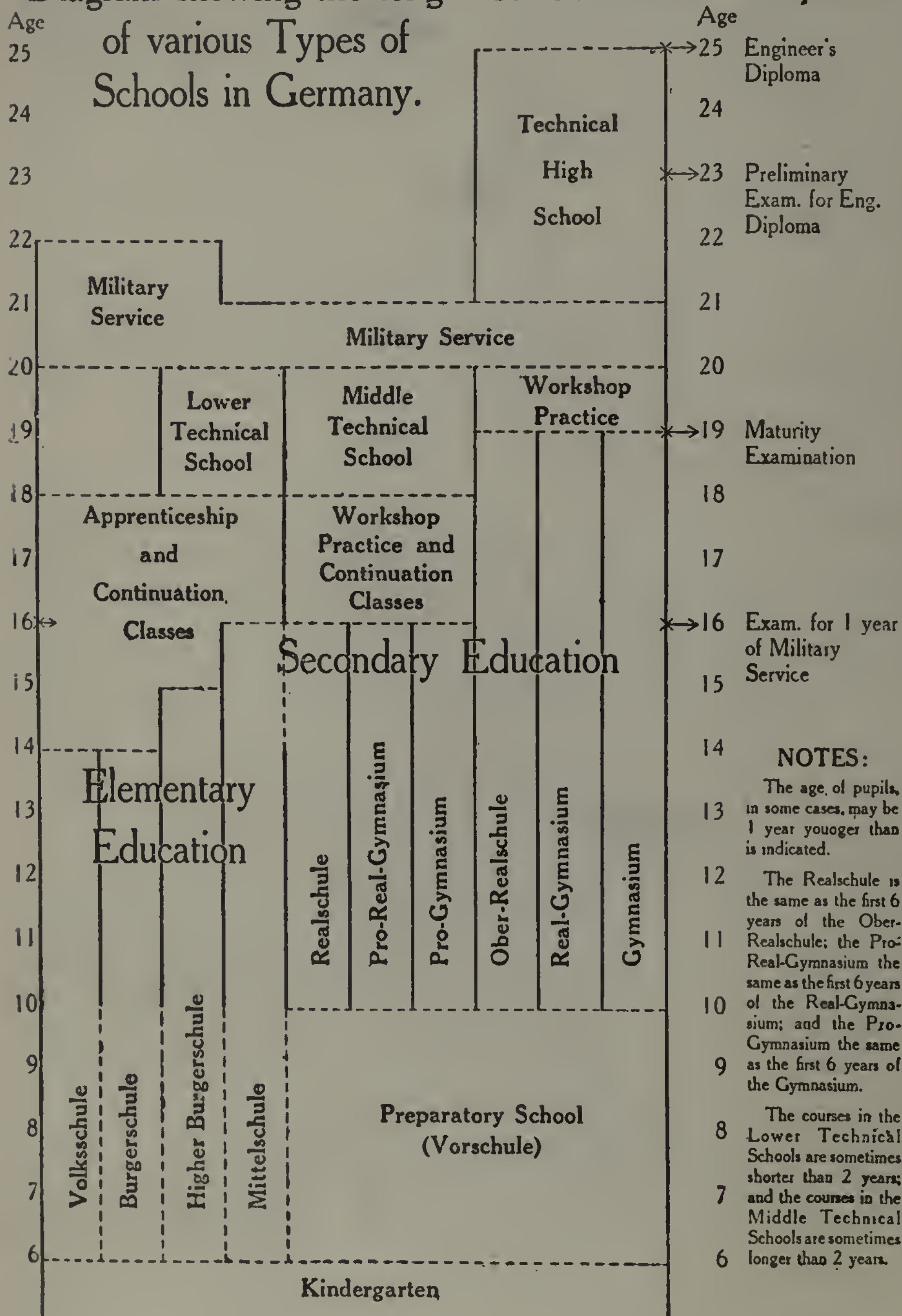
For admission to the University the normal qualification is the possession of the leaving certificate of a higher educational institution with nine classes. These nine classes follow the three or four classes which are common to all Elementary Schools. Formerly in most Universities only those who had obtained the leaving certificate of a Gymnasium (or classical Secondary School) were entitled to full Immatriculation. Since 1901 in Prussia, those with the leaving certificate of a German Realgymnasium and of a Prussian Higher Realschule, or of a German one that is on an equal footing with the latter, are admitted. Not only almost all Prussian Faculties but also most of the non-Prussian ones demand unconditionally the leaving certificate or certificate of *maturity* of a school with nine classes. In recent times the number of admissions from the Realgymnasium has continuously increased.

In addition to the full Immatriculation there is so called "Little" Immatriculation for which no leaving certificate is required but only some other kind of evidence of the existence of an education sufficient for following the lectures.

In order to encourage students to make scientific investigations of their own, prize essays are offered in all the Faculties. The prizes are provided partly by the Government and partly based on endowments. The direct influence of the University work on Technical Education comes through the fact that many of the professors and teachers of mathematics and science in the Technical High Schools are graduates of the Universities.

Many other details concerning the organization of the Universities have no direct bearing on the work of this Commission. Details can be found in publications devoted to that subject.

Diagram shewing the length of course and sequence of various Types of Schools in Germany.



NOTES:

The age of pupils, in some cases, may be 1 year younger than is indicated.

The Realschule is the same as the first 6 years of the Ober-Realschule; the Pro-Real-Gymnasium the same as the first 6 years of the Real-Gymnasium; and the Pro-Gymnasium the same as the first 6 years of the Gymnasium.

The courses in the Lower Technical Schools are sometimes shorter than 2 years; and the courses in the Middle Technical Schools are sometimes longer than 2 years.

CHAPTER XLII: ORGANISATION AND ADMINISTRATION OF INDUSTRIAL TRAINING AND TECHNICAL EDUCATION.

SECTION 1: INTRODUCTORY.

The opinion prevails in Germany that the nation which has the best means of training individuals as workers, as citizens and as members of the race, is best prepared for winning in the industrial warfare and also in the competition for other places in the sun. Neither money nor personal effort seem to be grudged for the establishment and maintenance of institutions, schools, classes or other means which will accomplish these ends.

The development of Continuation and Technical Schools, if not the cause of the industrial and economic growth, has accompanied the progress of science and the applications of it to the activities of life. The advancement in all localities has not been equal. Wherever industrial life has been most highly developed, there one finds the most advanced and active industrial and technical schools. Probably each is in measure a contributing cause of the other, and also in part a result from it.

Not under Imperial Control.

Industrial training and technical education are not under Imperial control and are not carried on under Imperial laws. The Imperial Government touches it at practically only three points—(1) by means of the trade regulations of the Empire, which prescribe the qualification of persons who wish to carry on some particular industry or occupation; (2) by the laws which prescribe the powers and duties of the Guilds, and (3) through the laws which require apprentices and other young workers to attend Continuation Schools where such schools exist.

Under the Imperial authority the various Guilds and Associations have the right to organize and maintain schools for the training of handicraftsmen, and to adopt rules governing attendance by apprentices at these schools. The Guilds cannot compel apprentices to attend but can apply compulsion to masters who do not send their apprentices. Under the Imperial laws authority is given to the communities and to semi-public associations to require all male workers under 18 years, and all working girls of the same age who are employed in commerce, to attend a Continuation School. In general, therefore, while compulsory attendance at Continuation Schools is not directly a matter of Imperial legislation it receives the support of such legislation.

State Control with Local Liberty.

The systems of education in the several States have been developed separately and independently, so much so that they are in many cases different in both the content and the form of education; but on the whole the aims are similar.

Each State contributes about one half of the total cost of all education within its borders and exercises only moderate control and direction over the schools. A great deal is left to each Local Authority in determining the kind of education which shall be provided for the young people of its area. The general belief is that this policy has had a beneficial influence upon the educational attainment and attitude.

While there is no Central Authority,attempting to regulate or bring the different efforts throughout the Empire into harmony for efficient co-ordination and economy, the existence of three large Associations for the Promotion of Industrial Education tends to make what has been found best, and best suited to any one locality, known throughout the whole Empire. These Associations by means of their journals and papers, addresses and discussions at meetings held in every part of Germany, facilitate the exchange of ideas between individuals, localities and States.

Nearly all educational effort is under public control, although there are some privately controlled institutions which carry on education for profit. On the other hand there is a large measure of voluntary assistance in the way of contributions and service to institutions which are in the main supported by public funds. In general, the higher forms of institution for Technical Education, the Technical High Schools and Technical Universities, are supported by the State. The Secondary and lower schools are supported by the community, the district and the State. The proportion of control, and the proportion of the contribution for support from each, varies so greatly that no general rule or system would apply to them all.

Institutions Suited to Needs of Pupils.

The aims of the institutions maintained by public funds, which are engaged in Technical Education, differ according to the careers or positions for which their students are being prepared. The educational content or subject matter and the method of instruction and training also differ accordingly. The degree of preparation of the pupils determines the kind and amount of instruction and training which they can receive. That again is modified by the time the pupil is able to give to the work of the school. Sometimes the pupil may be able to give all of his time, and in other cases as little as a few hours per week. The effort is made to place as much opportunity as the student can avail himself of, considering his limitations of time, ability, preparation and object.

Two Plans of Organization.

There are two distinct plans according to which industrial training and technical education have been established and carried on..

1. Under the first plan, technical schools are separated from those in which general education is provided. Such technical schools devote their attention directly and chiefly to technical training. Each type of school offers courses of technical training of different grades, and each is complete in itself. Such technical schools are not preparatory schools for the Technical High Schools (Technical Universities). A few students advance to the Technical High School but this is not the ordinary route towards that goal.

2. The other system or plan combines the Middle and Lower Technical Schools with schools of general education, such as the Realschulen. Such technical schools may include two or more different kinds of technical training.

The first plan of the separate organization of the technical schools is general in Prussia. The second plan is more common in Bavaria. The Technical School system of Saxony follows in the main the first plan; but the Industrial Academy comes in between the Technical Middle School and the Technical High School or Technical College. A similar plan is followed in some of the other States, and special technical institutions are organized to serve the needs of different industries. Such an institution may contain a Middle and Lower Technical School under one direction. The usual name for these combination schools is Technikum.

Co-operation of Men Who Know Industries.

Experience has led to the conviction that the interests of commerce and industry are very much interwoven with the development of systems of Industrial and Commercial Education. The industrial schools play a very important part in advancing the industries of the various portions of the country. In every case the authorities seek to utilize the services of men who know education and men who know the industries. It is recognized that employers, workmen and school men should all have a share in the management of the industrial schools, as members of an Advisory Council or Board of Directors. A Technical Council of experienced men from the industries, employers and others is of special value in the lower grade of industrial schools. Such men are able to make suggestions for the content of the course of study, for its organization, and for the method in which the practical work shall be undertaken and conducted. The people engaged in industries as employers and employes take more interest in education and in the school, when they exercise an immediate influence and control upon its management.

SECTION 2: CONTROLLING AUTHORITIES.

At one time or other, the Ministry of Education has had charge of industrial and technical schools in every State in Germany. They have also been under the Ministry of Commerce and Industry, and sometimes under the Ministry of Interior; sometimes they are partly under one and partly under the other.

In Prussia, from 1879-1884, industrial and technical schools were under the Minister of Education. In 1884, while Prince Bismarck, Chancellor of the German Empire, was also Minister of Commerce and Industry for Prussia, they were transferred to the control of the Ministry of Commerce and Industry, where they still remain. A recent arrangement provides for a National Industrial Bureau to advise the Ministry and give technical and expert help. This is set forth at length under the organization of Industrial Training and Technical Education in Prussia.

THE PRUSSIAN SYSTEM.

The following information is taken from or based upon the Report of the State Industrial Office to October 1909. It contains a brief historical review. All the affairs of Industrial Education under the Prussian Government were transferred from the Minister of Religious, Educational and Medical affairs to the Minister of Commerce and Industry by an order issued on September 3rd. 1884. Prince Bismarck, Imperial Chancellor for the German Empire, was at the same time also Minister of Commerce and Industry in Prussia. On many occasions he had shown a warm interest in the trades and industries and their organization.

In the appropriation bills of Prussia for the following year a transfer of the funds relating to industrial schools was made from the funds for the general school system to that of the Ministry of Commerce and Industry. At that time when the budget was submitted to the House of Deputies, (the lower House of the Prussian Legislature) it was accompanied by a Memorial which pointed out the fact that the system of secondary industrial schools of Prussia, including the Institutions of Industrial Art and the Schools of Design, were not on a level with like systems of other German States and of foreign countries, and that in order to raise the system to a higher level of efficiency, much more support and careful aid for its promotion would be required in the future than it had received in the past. The following is a portion of that Memorial:—

The importance of the promotion and financial support of the industrial system left to each individual State has increased to a higher degree during recent years than formerly, owing to the course the development of the National economic life has taken; and the increased demands made upon this branch of the Royal Administration have shown that the latter stands in intimate relation to the lower and secondary industrial system of instruction as well as to the promotion of industrial art, and that it cannot satisfactorily perform its duty so long as these institutions belong to the administration of another department. In such questions as that of the steps to take for the economic uplift of certain parts of the State through the awakening of new, or the development of existing branches of industry, as that of the improvement of the condition of small trades in competition with large factory production, or that of the maintenance or promotion of the competitive capacity of native industries against encroaching foreign industries, the establishment and management of industrial vocational schools play so decisive a role that the Ministry of Commerce and Industry finds itself constantly hindered in its activity so long as it is denied the power of initiative and of authoritative influence upon the system of the schools, which in the nature of the case should be its prime sources of assistance. On the other hand, questions such as for what branches of industry, to what extent and at what places should mono-technical schools be established; what purposes they should keep in view, and others, can be solved with certainty and for longer periods of time, and in due relation to the entire interests of the State, only by the authorities created for the purpose of promoting the national industry, which authorities should also have the required means of acquainting themselves with the conditions of industrial development and of gaining a comprehensive view of its local needs, and at the same time should be able to keep in touch with all the various related agencies, such as chambers of commerce, guilds, and other industrial corporations, from which co-operation in the solution of such questions is to be expected.

POLICY DEFINED.

The programme for the further development of the new branch of service of the Ministry of Commerce and Industry was defined clearly and without the least ambiguity, as: Promotion of Industrial Continuation and Vocational Schools in the service of the interests of commerce, industry and handicraft, and the fostering of such a system of instruction as an inseparable part of the national economic policy.

The development of the past 25 years has made it more and more evident that the system of secondary technical instruction can flourish in accord with this programme only if the Ministry of Commerce and Industry seeks and maintains intimate connection with those agencies which are engaged in manufacture and other industrial pursuits, for which it is bound to provide skilled laborers; if the ever changing needs of commerce, trades, and factories find careful consideration and if it is remembered that industrial failure is threatened when the schools, instead of serving industry, merely serve their own purposes.

The peculiarity of the system of secondary technical schools and of the elementary industrial continuation schools is found in this, that their aim is to make the matter of instruction immediately applicable to industrial life. This is the essential difference between them and the schools belonging to the Ministry of Worship and Education. Despite this essential difference it should not be forgotten that the industrial continuation and vocational schools build upon the foundations laid by the general system of schools, and that the boundaries of the two administrations are contiguous throughout, that the teachers of the two systems are interchanged and that through this action very close relations are established.

ADMINISTRATION BY MINISTRY.

The Ministry of Commerce and Industry, faithful to the programme it had prepared beforehand, was determined to take no steps without securing the advice of authoritative experts from trades, factories and business firms in directing the local administration of the schools. First, a Commission for Vocational Schools was appointed whose special object it was to collect such advice. This Commission, however, was not homogeneous and too large for the purpose intended; consequently it met but seldom.

It has since been replaced by a number of Advisory Industrial Councillors, who periodically meet and offer suggestions to the Central Office and to the Minister concerning the exigencies arising in the various labor centres. As a result of these deliberations misunderstandings and uncertain orders have been prevented and the Central Administration has received many valuable suggestions.

In order to obtain the expert advice which is essential to this office, there are four permanent assistants in the Minister's Office, these being respectively a building official, a machine engineer, a schoolman, and an architect with special training in industrial art. In addition, the Director of the Central Bureau of the Textile Industry can be called in when matters affecting his industry come up. In addition, special technical experts are lent to the District Presidents as advisors in technical educational subjects.

NATIONAL INDUSTRIAL BUREAU.

Since 1909 further improvements in administration are in progress. The Minister has had the aforementioned five technical experts at his disposal, and these in the nature of things cannot be expected to cover all the branches of their respective professions. Since it is obviously impossible to multiply the number of experts indefinitely, it is therefore proposed to set up a "National Industrial Bureau," and to attach to this a standing Advisory Board of experts, at the same time discontinuing the present system. This arrangement has been successfully carried out in some of the Southern German States.

Whilst the National Industrial Bureau acts as a permanent advisory body to the Minister, and assists him in the inspection of technical organizations, the main object is to organize a body which will bring this Bureau into actual touch with practical life and its needs. The National Industrial Bureau has therefore permanent national duties to fulfil, in that it is a subordinate public body, directly under the Minister of Commerce and Industry, its members being appointed as officials. The Advisory Board, on the other hand, only meets at stated intervals as an organ of the Minister, to discuss definite questions put before it on the importance and development of industrial training. The Board, in addition to the members of the Bureau who act on it, also includes other experts, called in for a definite period as required.

The National Industrial Bureau has to see that the regulations and arrangements published by the Minister are carried out, to test the efficiency or otherwise of these regulations, etc., and to propose alterations where required. Its operations cover the whole field, including buildings, courses of study, equipment, teachers, and the encouragement of industrial training in whatever form is considered most suitable, by organizing advanced courses, exhibitions of machinery, models, etc., encouraging guilds, supervising apprentices, collecting and publishing printed matter from other countries on subjects connected with industrial education, and issuing periodical reports on the progress of industrial training and the development of industry.

Constitution of the Bureau.

This body consists of a President, vice-presidents, ordinary (life) members, and extraordinary members appointed for definite periods, for the purpose of advising on those subjects which would not provide for one member's whole time. It further ensures that those technical branches which are represented by life members shall not be governed entirely by the views of one member alone. As extraordinary members, specially competent men may be appointed from among Industrial School Directors, District and Industrial Advisers and other experts. The President and ordinary members are to be appointed by the King, the extraordinary members by the Minister.

In order to keep a close relation between the Minister and the National Industrial Bureau, the Presidency of the Bureau is to be given as a rule to the Director of that branch of the Minister's work which treats of Industrial School and labor matters, and in case of his inability, to some other high official of the Ministry of Commerce and Industry. For the same reason, representatives of the Minister are to take part in the sessions and vote at the same.

The ordinary members must be selected from among men fully conversant with the subjects to be taught in the schools, in order that they may adapt the courses to the requirements of practical life, decide upon textbooks, appliances and methods and select teachers. Hence they must have had experience in school work as well as thorough technical knowledge. Such men can only be secured and retained if suitable arrangements are made as to salary, status and title, etc. It is therefore proposed to give them a salary ranging from 5700 to

7500 marks in addition to lodging allowance of 900 marks and a bonus of 1800 marks after the first 5 years with the title of "National Industrial Adviser," and after 3 years more that of "Privy Councillor."

Constitution of the Advisory Board.

The Advisory Board is to be composed of the ordinary members of the previous body, together with experts selected by the Minister from the most varied number of industries and interests, whilst the Central Boards of industrial schools are to be invited to send representatives. This Advisory Board is to deal with all matters of fundamental and general importance, and is to be divided into "General" and "Special" sections, the latter dealing only with matters pertaining to a special class of technical school, whilst the former takes up subjects concerning several or all technical schools. The "General" section is to be formed at once, and called every 2 years, to discuss all important developments, and advise where necessary as to alterations in organization, etc. The "Special" sections are to be organized as soon as necessary. The meetings of both sections are to be presided over by the President of the Industrial Bureau, unless the Minister himself does so. Members of the Advisory Committees are appointed for 5 years, with the provision that in the General Section there must be at least one representative of each branch. The Minister is empowered to call in other experts to single sessions, where special cases require it, but the number of members must not be permanently increased. Members of this Advisory Board receive no payment beyond travelling expenses and daily allowances, as provided by law.

Local Industrial Advisers.

The local and Industrial School District Advisers have to advise the District Presidents, and to inspect the various technical schools in their district. They are responsible for seeing that the Government regulations and recommendations are carried out, and have to assist the people of the locality in developing the Industrial School system. One of their most important duties is the supervision of private schools, which frequently require very close inspection. The main part of their work is therefore in the Provinces, and they may only be called to headquarters in very exceptional cases, where this can be done without injury to their proper work.

It is regarded as especially important that the Local Boards and Trustees of the various schools should have members, as their articles of incorporation prescribe, who are expert industrialists representing the trades and occupations which the respective schools are to serve, so that the schools may duly consider the needs of practical life in their courses of study and methods of teaching.

Twenty Five Years of Growth.

Under the Ministry of Commerce and Industry the work of industrial education has been greatly extended. During the 25 years of development in national commerce and industry the need for the development of Secondary Technical Instruction and Continuation Classes has been recognized and the means placed at the disposal of the State and communities for that purpose have been largely increased. The following table represents the growth in numbers in towns and cities. The opinion is generally expressed that there has been a corresponding increase in efficiency.

Year.	Continuation Classes.	Students in Attendance.	Secondary Technical Schools.	Students in Attendance.
1884	664	58,400	56	8,000
1909	2,100	360,000	218	44,000

It is to be noted that of the 44,000 students enrolled in the Secondary Technical Schools 40,000 were following two year courses. In addition to the 218 Secondary Technical Schools mentioned above there are 35 Navigation Schools and 53 Schools of Mining.

The regular expenditure by the State of Prussia for the whole system of Industrial Instruction in 1884 was about \$47,600; and by 1910 the expenditure had increased to \$3,094,000. The Government expenditure is to be regarded as subsidies to bodies which carry on the schools and courses. Much larger sums are expended by grants from provinces, communities, corporations, guilds and private firms for the maintenance of a Technical School system.

The communities provide the school buildings for the Continuation Schools and also, aided by corporations, they erect the buildings for Secondary Technical Schools and with very few exceptions keep them in repair.

The report of the Prussian State Industrial Office continues:

However satisfactory the development during the last 25 years may appear, much remains to be done. An urgent necessity seems to be the further improvement of the Continuation Schools. The 410 000 pupils of such evening and secular Sunday Schools in Prussia (including about 50,000 pupils in rural or agricultural schools) represent in the course of three years about 140,000 new pupils a year. Yet the 6,400,000 pupils of the elementary and advanced, rural and city schools of the State have an army of recruits of 800,000 pupils a year. This proves that only 18 per cent of all the young folk of the ages for Continuation Schools (between the 14th and 17th years of age) are attending such schools. Another fact deserves attention, namely that the 300 graduates of mechanical engineering and machine building in the technological Universities this year will find only 875 graduates of the secondary or middle Machine Building Schools to assist them, while experience shows that at least ten times that number of young men, technically prepared in the Middle Schools, can be utilized in the labor market of the nation. The total number of male youth in the Elementary or Advanced Elementary Schoo's in eight yearly courses, viz., 3,200,000 if compared with the total number of students in Secondary Vocational Schools in two-yearly courses, viz., 40,000, and which in the eight yearly courses would at least be 160,000, shows plainly how necessary is the further development and extension of the Vocational School system.

WÜRTTEMBERG.

In Württemberg the control of Industrial Schools is divided between the two Ministries, the Minister of the Interior controlling the Textile Schools and the Schools for Mechanics, the Minister for Church and Educational Affairs controlling the Schools for Builders, the Schools of Industrial Art and the Industrial Continuation Schools. The Ministries are aided by a subordinate body known as the Central Commission for Commerce and Industry. This Commission is composed of certain Government officials, several Industrial School Inspectors and a number of special advisers chosen by the Chambers of Commerce of Württemberg and by the Boards of Trade. It appears therefore that the directive control of the Industrial School is in the hands of a commission of practical men and expert schoolmen, headed by a Chairman, who represents the Minister of the Interior, while the Commission itself is responsible to the Minister of Education.

BADEN.

In the Grand Duchy of Baden the arrangement is somewhat similar to that of Württemberg. The administration of the Industrial Schools since 1893 has been vested in the Industrial School Council, which is subject to the Minister of Justice, Religion and Education. However, a member of the Ministry of the Interior, who is the adviser on industrial matters, acts as presiding officer of the Industrial School Council. The two Ministries are thus enabled to co-operate, one having to do chiefly with educational method, and the other chiefly with the aims of the Industrial Schools. When important questions of organization, of courses of study, or of the inspection of schools are brought before the Industrial School Council, this body has power to add special members as Extraordinary Advisers. The Industrial School Inspectors, whose duty it is to make at least annual tours of inspection of all Industrial Schools, are under the direction of the Industrial School Council.

BAVARIA.

In the Kingdom of Bavaria all the Industrial Continuation Schools and the Technical Schools are subject to the Minister for Church and Educational Affairs. The Industrial Museums, Industrial Exhibitions and the special Masters' Courses are under the control of the Minister of the Interior. The immediate inspection of the Industrial Continuation Schools is in the hands of the Rectors of the Realschulen and the district School Inspectors; and the special Trade and Technical Schools are inspected by teachers of the Technical Universities and certain other institutions of similar rank.

SECTION 3: FINANCIAL SUPPORT.

There is almost invariably some participation by the State in the support of schools which are primarily for local service and the immediate benefit of those who will be employed in the locality. Where a school purposely serves an area of population larger than the town where it is located, it is likely to have owed its establishment and a large part of its maintenance to the action of the State or some business, trade or philanthropic organization. When the State and city combine in meeting the expenses of such institutions, the State usually takes the larger share of the burden particularly for the highest institutions. The benefits which come directly to the individual, to the city and to the State are not separable. Moreover, whatever is of direct and real benefit to the community is thereby of advantage to the State, and therefore to some extent the State is warranted in meeting part of the cost.

It is recognised that the lack of suitable training and of Technical Education has held back the economic development of entire districts and of considerable industries. It is also true that some communities which derive immediate and direct benefit from Technical Education are unable to assume or bear the whole burden of cost themselves. Rather than have the community go unserved in this way, the State comes to its assistance. No uniform rule is followed in settling the amount to be contributed respectively by the local community and the State.

The representatives of the industries of the place, either through a Guild or Association or otherwise, often contribute to the maintenance. The reason for this lies in the obvious and immediate advantage to the industry from a supply of thoroughly trained and competent workers.

As a rule, for all except the institutions of the highest grade which serve the State as a whole, the local communities provide the buildings and maintain them.

As compared with the expenses of general education, the costs are higher in the case of Industrial Training and Technical Education. The buildings and equipment are more expensive for the number of pupils they can accommodate, as is also the maintenance of the plant up to requirements. Competent teachers who are in touch with industry, and at the same time able to teach acceptably, although not scarce, command relatively high remuneration.

What is Done in Prussia.

All the German States are increasing their payments to the support of the Technical School systems and the sums paid from the public purse are higher every year. In Prussia, by far the largest state, as has been mentioned already, the State expenditure for Industrial Instruction in Continuation, Trade and Technical Schools amounted in the year 1884, in round figures, to $47,600; in 1893, to $552,000; in 1903, to $1,512,000; and attained in the year 1910 to the height of $3,094,000. The State expenditure represents only a portion of the total amount. The following tables show the comparative amounts paid by the State in 1903 for the four kinds of Schools indicated, and the amount contributed to those schools from other sources. The average cost per pupil might be calculated, but as a division of the expenditure between Day Scholars, and Sunday and Evening Scholars is not practicable, the calculation would not indicate the relative cost per pupil in the different kinds of institution. The cost per pupil in the institutions furnishing the highest grade of education is, of course, immensely higher than in the Continuation Schools.

Sources of Revenue.

A number of schools of different kinds have been selected to show the relative amounts for support received from different sources. They are representative of others in so far as one school can be representative when all differ in some respect.

City and Kind of School.	Number of Pupils.	Financial Support from		
		State.	City.	Fees.
		Marks.	*Marks.*	*Marks.*
Cologne—				
I. Continuation Schools—				
(A) Vocational........	1,643 Summer..... 1,696 Winter.	11,027	47,431 (including fees).	
(B) Compulsory.......	3,308 Summer..... 3,454 Winter.	23,086	75,049	Nil.
(C) Commercial....... (General)	840 Summer..... 780 Winter.	4,417	18,822 (including fees).	
(D) Higher Commercial	474 Summer..... 410 Winter.	1,470	21,253 (including fees).	
II. Handelsrealschule...... (Secondary School)	500 Regular...... 16 Commercial.	Nil.	115,405	43,545
III. Commercial High School. (University Grade).	470 Regular...... 316 Special...... 1,616 Evening.....	Endowment. 65,000	Chamber of Comm. 16,000 City 304,000	120,000
IV. Royal United Engineering (Machine Construction) School.	250 Yearly. 340 Evening..... 277 Special.	150,000	30,000	40,000
Duisburg—				
Royal School of Machine Construction and Metallurgy..................	320	147,000 Rhineland Prov.	5,000 10,000	18,000
Aix-la-Chapelle—				
Vocational Day School.....	250....	55,000	55,000	15,000
Royal Building Trades.....	150	70,800	11,700	37,500 (estimated)
Mining..................	83	Total cost paid by Mining Corporation.		
Crefeld—				
I. Continuation School....	3,320	26,000	56,000	17,900
II. Mechanics and Industrial Art...........	50 Day......... 250 Evening.....	28,000	23,000	8,000
III. Spinning and Weaving..	300	80,000	30,000	140,000
IV. Dyeing and Finishing..	90	80,000	40,000	35,000

City and Kind of School.	Number of Pupils.	Financial Support from		
		State.	City.	Fees.
		Marks.	*Marks.*	*Marks.*
Barmen-Elberfeld— Royal Building Trades.....	116 Summer..... 198 Winter.	110,000	24,000	24,000
Bremen— Industrial Continuation....	2,477	Nil.	114,000	30,000
Technikum...............	444 Summer..... 568 Winter.	Nil.	180,000	91,000

Summary Respecting Four Kinds of Schools.

Kinds of Schools.	No. of Schools.	State Allowance.	Allowance from Towns, Societies, etc.	School Fees.	Total Expenditure.*	No. of Students.
		in Dollars	in Dollars.	in Dollars.	in Dollars.	
Metal Trades and Engineering........	19	203,230	60,894	59,509	326,024	2,102 Day 908 Evening and Sunday.
Building Trades......	22	294,478	67,107	139,074	541,277	1,900 Summer 5,077 Winter.
Pottery, Artisans, Industrial Art........	21	171,825	150,013	49,237	383,364	1,719 Day 10,126 Evening and Sunday.
Textile Industries.....	16	88,965	49,729	35,966	190,821	697 Day. 850 Evening and Sunday.
	78	758,498	327,743	283,786	1,441,486	

*It will be observed that the total expenditure does not agree with the three items of revenue, but that is doubtless accounted for by other sources of revenue such as endowments or gifts from individuals.

CHAPTER XLIII: CLASSIFICATION OF SCHOOLS.

INTRODUCTORY.

Three groups of schools may be distinguished according to the grade of training which they provide. As one of the leaders says, "German industry and trade require, precisely like the German Army, a number of intellectually highly trained officers, a number of well trained subalterns and an army of efficient soldiers." In consequence provision is made for technical education for three distinct types or classes of occupations or careers, the lower, middle and higher. The preparation for the lower career is provided for in the Continuation Schools and the Improvers' Schools. Those intending to follow the middle career, such as foremen and the minor directive positions, have an opportunity in the Continuation Schools and also in the numerous institutions with many different names, such as "Werkmeister School", "Building Trades School", "Middle Trades School", "Technikum," etc. Those who look forward to the higher positions in technical careers, such as superintendents of works, or factories, professional engineers, etc., sometimes obtain qualification through the Middle Technical Schools. For admission to such schools the candidate requires a certificate qualifying for one year's service in the Army. That means ten years of successful attendance at school, from 6 to 16 years of age, the latter six of which would be in a Secondary School. A second requirement of qualification is one or two years of workshop practice. A considerable number of successful professional engineers have had only a Middle Technical School training.

For those preparing for the highest positions as Technical Engineers, Superintendents and Managers, opportunities are provided in the Technical High Schools. Qualification for admission to these schools is successful attendance at a Secondary School. That means thirteen years of attendance, of which the latter nine are in a Secondary School, either Gymnasium, Real-Gymnasium, or Ober-Realschule.

The institutions which provide in general for the three classes of careers may be considered in four main classes. While all the institutions in any one class are not necessarily alike they may be considered as doing work on substantially the same plane or level in the educational field.
These are:

I. The Industrial Continuation Schools;
II. The Lower Technical Schools;
III. The Middle Technical Schools;
IV. The Technical High Schools.

SECTION 1: INDUSTRIAL CONTINUATION SCHOOLS.

The aims of the several Industrial Continuation Schools are somewhat alike in so far as they all seek to give all the workers in the industries and handicrafts some further qualification in the way of knowledge and technical training for their occupation. In practically all of them a good deal of attention is paid to Drawing. In most of them, in addition to the special features of industry which are taken up, some attention is given to bookkeeping and business calculations. The worker in a large factory has less interest in these than the worker who is preparing for conducting a small business of his own in the handicrafts.

Schools of this class which might be designated as technical workmen's schools are spread all over Germany. They are known as Continuation Schools, factory schools, apprentices' schools, Sunday and evening schools. Their essential characteristic is that the attendance at school generally runs parallel with the training in practical work. In all large and most small towns of Germany, apprentices and other youthful workers are under the obligation of attending a Continuation School for from six to nine hours weekly during the working days. This Continuation School must as far as possible take the practical work of the apprentice as the basis of its teaching. In some few cases factories have established schools as part of their organization, in which every apprentice without exception receives higher instruction for from two to four hours daily.

Features Illustrated at Berlin.

Information in detail is given in the chapter devoted to Continuation Schools. In this connection only a few remarks are offered on what was observed on a visit to the Continuation Schools in the City of Berlin. Those maintained by the city are of two types. There are the Compulsory Continuation Schools for boys from 14 to 17 and optional or voluntary Continuation Schools for men and women. Besides these there are Continuation Schools maintained by societies and partly supported by the city. These are (a) for boys, Commercial Schools by the Trade Corporation of Berlin; (b) for girls, Industrial and Commercial Schools and (c) for boys and girls, Continuation School of the Berlin Hand-workers' Union.

In all cases the teachers' opinions were that compulsory attendance at Continuation Schools was desirable and necessary because young people did not know what was best for them. The workmen, as a rule, favor the application of compulsory attendance; on the part of the employers, the exceptions are among some of the larger manufacturers. The Director of Continuation Schools said he expected to see compulsory attendance required for girls also.

Very wide provision of courses and teaching material is made for young people following different trades. An example may be taken from the Shoemaking trade. There were specimens of leather showing all the stages and processes of leather making; a hide of leather was marked to show how it could be cut with the least waste of material; provision was made for giving to students some practice in all the operations of making a shoe. It was said that probably none of the young people in the class would be permitted to make the whole shoe in the workshop in the employer's time. One of the objects of the school is to give the pupil an idea of the whole process. At the other extreme were models and teaching material showing the anatomy of normal feet and abnormal feet.

Similar equipment was provided for other classes suited to their trades such as glass work, saddlery and harness making, silver smithing, etc., etc. In all departments care was taken to acquaint the pupils with all the different materials employed in the trade; with the processes of their manufacture, or preparation, up to the time they were to be used in the trade; with their relative values and also their geographical origin. In addition to the particular studies for the special trade, all classes received some instruction in German, in literature, in citizenship, in personal hygiene and public health.

Emphasis on Drawing.

The recognition of Drawing as a cultural subject for industrial workers was noteworthy. If any group of artisans might without loss dispense with skill in Drawing, one would have supposed that shoemakers would constitute one such group. However, extended experience has shown that Drawing is a means of such good training, in observing, in estimating quantities and values of the materials handled and in controlling the hands for fine work, that one third of the whole time during the three years of the Continuation Classes for Shoemakers is devoted to Drawing.

SECTION 2: THE LOWER TECHNICAL SCHOOLS.

These are intended to provide education for middle and lower officials in industry, for the foremen of the larger industries and managers of independent works in the handicrafts or small industries.

The qualifications for admission require a good general education, as in the Elementary Schools, some technical training especially Drawing, as in the Continuation Classes, and several years of experience in a trade, or, at least, a completed apprenticeship in a trade.

The courses are sometines more on the practical side, and sometimes more on the theoretical side. In other cases, about equal time and attention are paid to each. In all cases attention is given to mathematics and science, to the technology of the industry concerned, and to Technical Drawing.

The length of the courses varies from a few months to two or even three years. Some of the Lower Technical Schools do work in their upper classes somewhat similar to that of the Middle Technical Schools, others have as their sole object the training of the artisans. The Lower Textile Schools are examples of these.

The Courses of Study include scientific subjects, by means of lectures and otherwise, class room work, laboratory and shop practice. Sometimes these schools are organized in separate buildings and with their own staff; other times they are united with general Technical Institutions. In this connection the Continuation Schools sometimes have the use of the physical equipment and teaching staffs of such a technical school or one of the Lower Technical Schools.

In both of the foregoing classes of education special schools provide for the different occupations in groups of trades or singly, as for example,—

Building Trades;
Metal Trades and Metal workers;
Woodworkers;
Textile Industries;
Printing and Lithography;
Other trades such as Bakers, Watchmaking, Leather-making, etc.

There are also,—

Industrial Art Schools;
Handwork Schools, specially for the art handicrafts;
Commercial Schools;
Agricultural Schools;
Schools of Navigation;
Schools for Fishermen;
Industrial and Housewifery Schools for Girls and Women.

Training of Foremen.

In addition to these schools there exist a great number of Lower Technical Schools for the training of foremen, engine-fitters, masters, or other lower officials for the constructive and business departments of works and factories. The conditions of admittance are graduation from the primary school (with 8 classes) followed by at least 4 years' practical work. In other words, only thoroughly trained workmen are received in these schools. The period of instruction varies from 1 to 2 years. Foremen proper, as required in industries, that is to say, workmen placed at the head of a group of other workmen in factories, are not as a rule qualified by training in any class of school at all. These men must be possessed not only of sufficient technical experience but also of special qualities of character, which are inborn and cannot be acquired in a 2 years' school curriculum. In the opinion of most German manufacturers it is best to take these foremen from the ranks of the most capable workmen. What they lack in technical training is supplied by the technical schools.

Most technical schools, even those which say they only aim to train working artizans, have men attending them who have had long experience in their handicraft, but come to the school to qualify themselves for higher positions.

Foremen vs. Office Men.

It is not devoid of interest to note the answers given by leaders in industry to enquiries lately made by the "German Committee for Technical Schools" with a view to more thorough organization. They point out that it matters little how far the pupil advances in the different subjects of instruction; but it matters a great deal whether he is thoroughly grounded in them; that it is not a question of increasing theoretical knowledge, but of enlarging practical experience; that these Lower Technical Schools train too many office men and too few foremen, fitters and masters; that their chief aim should be to develop readiness of apprehension, the ability to draw, business capacity, and interest in natural science; that men who have passed through the State schools have on an average a better general and technical education than the pupils of private schools and that it would therefore be in the interest of industry if all technical schools in Germany were exclusively in the hands of the State.

As illustrative of the work of some of these schools the following notes are taken from the visit to the Handworkers' School in Berlin.

Handwerker Schule (Hand Workers' School).

The aim is to give instruction to those engaged in trades, especially apprentices and assistants as a necessary supplement to workshop experience. Here, also there are students who are prospective teachers for Continuation Classes. There are various trade classes with full course of instruction in drawing and decorative painting, modeling, arithmetic, mathematics, physics, chemistry, mechanics, electrical technology, machinery, book-keeping. The school contains thirty or forty branches, all evening classes. The course for day classes continues for one year. Some of those who have taken two years in the Continuation Classes may come to this school.

A feature is made of calculations, these being produced and extended to include cost of materials and suitability of thing to be produced, to its fitting into conditions, and the purpose, considered economically, for which it is to be used. Special training in such calculations is given eight times a year. This school is attended by about 2,500 pupils, of whom 1,200 are day pupils.

A general class for young men, who have not yet chosen occupation or profession, is attended by them to discover what they are particularly fitted for. Parents come and talk over the matter with the teachers. Such pupils are from 17 to 18 years of age and some older.

Some pupils in day or evening classes may be those who are at the same time attending compulsory Continuation Classes. They come here for some special work. Some pupils who have special aptitude or talent may be excused from attending Continuation Classes, and give more attention to some subjects other than Continuation Classes provide for.

Some pupils attend day school seeking to improve themselves in their own occupation and to fit themselves for advancement, as for example into draughting rooms and other superior positions. Some of these day pupils who have for a time given up occupations receive State and municipal scholarships, 600 marks per year. About two and a half per cent of day pupils have such scholarships. The nominations to scholarships originate with the Director and are awarded on diligence, talent, merit and worthiness. The scholarships are awarded by a committee of municipal authorities on the nomination of the Director. The Director did not know of any instance or tendency to obtain such scholarships by family, social, or political influence. The consideration of pupils for scholarships occurs as a rule when they are in evening classes.

Ceramic workers come here to extend their knowledge and improve their ability in art directions.

Teachers: The assistant teachers had been engaged in practical occupation, in industries. These at first gave a few hours to teaching and gradually developed into giving full time.

Drawing: Objects from nature, such as flowers, leaves, butterflies, are used for design, and then pupils go on to make full conventional designs from unit. Drawings were of high order, with complete specifications; as for instance for the installation of complete lighting plant at a house, ready to work from. Actual conditions for application of thing to be made and work to be done from drawings were always considered.

SECTION 3: THE MIDDLE TECHNICAL SCHOOLS.

These institutions are intended to give education to managing officers of the larger industries, who need to know how to follow independently any advance in technical processes. They give training to professional men whose qualifications in scholarship and academic knowledge are not regarded as being as high as those who have been trained at the Technical High Schools. They often require a large amount of practical acquaintance with and experience of industries and affairs.

In general, the qualifications for admission to the Middle Technical Schools require the possession of the certificate entitling the student to one year of voluntary service in the army, also some practical experience in a workshop, factory or occupation, varying from one to two years. In some cases the workshop experience may be obtained in the workshop of the technical school during the course. In other cases the practical experience is gained in especially selected workshops.

In Prussia from 1884 to 1909 the number of schools had grown from 56 to over 200, all of which are subsidized by the State. The number of students at these institutions increased during the same period from about 8,000 to 40,000. The State expenditure towards these schools, which was less than $100,000 in 1885, amounted to over $1,800,000 in 1909. This does not include any of the State expenditures on the Continuation Schools or the Technical High Schools.

In 1904 there were in Germany 536 public institutions of various types occupying this middle position between the Continuation Schools and the Technical High Schools.

Institutions and Professional Titles.

Graduates from the Middle Technical Schools as a rule adopt the title of Engineer. The title is not reserved by law or by custom. It is adopted also by the graduates from the Technical High Schools. Those who have received their technical education in the Continuation Schools, Workmasters' Schools and Institutions of similar grade are named Workmasters (Werkmeister), Machine Masters (Machinenmeister), Mechanics (Mechaniker). Some of the Middle Schools approach nearly to the Technical High Schools and contain several departments with a course extending to several years. This type of school is not represented in Prussia. The Industrial Academy at Chemnitz is a good example. It has departments of mechanical and chemical technology, and of architecture and electro-technology. Conditions of entrance are the possession of the qualification for one year's military service, and, with the exception of the chemical technology department, one or two years previous practical course.

Similar municipal or private institutions which call themselves "Technicum," with only a two years course are found in several other federal States to the number of thirteen altogether.

In Bavaria the "industrial schools" of Munich, Nuremberg, Augsburg and Kaiserslautern form a special type of higher technical institutions. They form a continuation of three years to the Realschulen, with its six classes from 10 to 16. At the close of the second year of the continuation course, the pupils from them may proceed to a Technical High School. Those who do not proceed to the High School can take in the third year a mechanical-technical, chemical-technical, architectural, or commercial course. These schools are government institutions.

Middle Technical School, Limberger Street, Berlin.

The following are notes of a visit to a Middle Technical School in Berlin:

Pupils spend two years here. They must have been three years in a factory. Only day instruction.

Place is divided into: 1st, machine construction; 2nd, operation of machines. Manual skill is not taught here. Age over twenty. This is a finishing school for the highly skilled mechanic. It is not preparatory for the Technical High School.

Scholarships: For a number of students. For others the fee is $20 per half year.

Most of the students have not much means except what they have managed to save. Some get help from home but most of them scrape enough together for themselves.

What Students do: Young men have gone to Elementary School, then to Continuation Classes while working at trade, have spent three years in practical work and then come here. About half of those have passed the examination for one year's service in the army.

A good deal of experimental work is carried on with tools on different kinds of material and also with different materials in the tools. They learn all the qualities of the various forms of steel for tools and for parts of machines.

Some students have been as long as fourteen years in practical work before attending this school. Teachers prefer those who have had a good deal of experience, saying the longer the experience the better they follow the course. Chemistry and physics are directly connected with the machine work following up an analysis of the different substances, including those for lubrication and those for keeping the point of the tool cool while cutting.

Students go from this school as officials of traffic or as foremen in construction establishments.

They enter into competition with the least capable and intelligent of those who graduate from the Technical High Schools. This school has been going one and a half years. Attendance 290 students—expect to have 300 or 400.

Teachers: Instructors in this school have been graduated or have been taught at the Technical High School. Some are University men. A few have not had that training and depend on their prestige from proven ability. Teachers have not only been educated academically but have generally been from two to six years in industrial practice.

Courses for Trade Masters.

In Prussia Master Courses are intended to raise small shop industries to a higher level of efficiency by the instruction of shop owners and factory superintendents in practical and theoretical branches. The main object is to offer opportunities to the students to acquaint themselves with novelties and new technical processes and methods within the limits of their own trades, to teach them model methods, for a business of medium extent, and improved technical and commercial organization.

For this purpose the Independent Master Courses are equipped with workshops for a number of trades, in which the latest and best tools are in working order. The instruction is divided into full courses of six to eight weeks, and partial or brief courses of two weeks, which may be arranged at intervals several times a year. The beginning of the course is advertised in the press. The number of participants in each course is usually limited to ten, so as to afford opportunity for individual instruction.

Conditions of Admission: Admission to the Master Courses is, as a rule, restricted to applicants not under 24 and not over 45 years of age who have served in the army. In selecting the participants, independent masters are preferred; of journeymen, those are preferred who intend to open shops of their own.

Release from Tuition Fees and Grant of Financial Aid: If a participant can prove that he is indigent, the Minister, upon application, may release him from paying the tuition fees and grant him, besides, means to defray his expenses. These grants differ for masters and journeymen, for natives and foreigners. If an indigent person has been admitted he may receive railroad fare, if he lives at a considerable distance from the locality where the courses are conducted.

Other Advantages: All utensils, tools and raw materials needed are furnished to the participants free of cost, except small drawing materials and stationery. A diploma of attendance is given to those who have completed the course; it contains a statement as to the result of attendance. An examination does not take place.

SECTION 4: THE TECHNICAL HIGH SCHOOLS.

At the head of the institutions for technical education in Germany are the Technical High Schools. These have in most respects an educational status equivalent to that of the Universities. In the Empire there are altogether eleven of these institutions and a number of other High Schools for special subjects with similar recognition of their place in the educational scale. As examples of these might be mentioned the three Royal Mining Academies, one at Berlin, one at Claustaul (Prussia), and one at Freiberg (Saxony). There are also Forestry Academies, Agricultural High Schools, Veterinary High Schools, Commercial High Schools and High Schools of Art. In addition to these there are five High Schools of the German Army and Navy administration.

The name Technical High School is given to the institutions which are known in other countries as Technical Colleges or Technical Universities. They are somewhat similar to the faculties of applied science in Canadian and American Universities. They came into active service in Germany about 30 or 40 years ago. Some of them were founded on former technical and art institutions which had existed in some cases for almost a century. In Prussia, the Technical High School at Charlottenburg celebrated its hundredth anniversary in 1899, though the present building with its equipment was opened in 1884. It was on the occasion in 1899 that the right was granted to all Technical High Schools in Prussia to confer the degree of Dipl. Ing., and Dr. Ing. The object was to place the Technical High Schools on a level with the Universities and to give the graduates a recognised social status in accordance therewith. Some authorities regard the degrees as being of doubtful usefulness except in so far as they may enhance the reputation of a profession and thereby induce or incline able men to go into it. Social ideals and social standings exercise considerable influence at the time when the choice is made of a course of training for a life work.

Social and State Recognitions.

Engineering demands the best men and that fact was not lost sight of in the attempt to enhance the social position of the academical engineer. To strengthen further the position of the Technical High Schools, His Majesty the Emperor, in his capacity as King of Prussia, appointed professors of Prussian Technical High Schools as life members of the Herrenhaus (House of Lords). Every University, as an independent institution, had the right to send a member to the Herrenhaus. The King by taking this step placed the Technical High Schools, politically, on a level with the Universities. The example of Prussia, in conferring the right on Technical High Schools to grant degrees of Dipl. Ing., and Dr. Ing., has been followed by all the other German States.

In this connection we may quote what was said by Emperor William in 1899, on the occasion of the hundredth anniversary of the founding of the institution which is now the Berlin Technical High School, at Charlottenburg. Insight, farsight and power of interpretation are not absent from the qualities, utterances and actions of this distinguished monarch. In the following manner he indicates the connection between and the aims and tasks which lie before the Universities on one hand and the Technical High Schools on the other:

"In the relation of the Technical High Schools to the other higher educational establishments there is no opposition of interests and no other competition than this, that each of them and every member of them for his own part should do full justice to the claims of life and science, mindful of the words of Goethe:

'Neither be like to the other; but each be like to the higher.'

"How is this to be done? Let each be complete in himself! If the Technical High Schools that have attained to so flourishing a condition in the century now nearly past remain faithful to this admonition, the coming age will find them well equipped also to do full justice to the problems of which the progressive development of the world's civilization expects in an increasing measure the solution from technical science."

The Place of Tools and Workshop Practice.

As has already been indicated, it is now accepted that the instruction in the Continuation Classes is most advantageous when grouped around the calling or occupation of the pupils. In those cities where the Continuation Schools are not provided with workshops, tools or machinery, there is less close connection with the trades and industries by means of expert advisers or committees, and there are fewer of the teachers who have had practical experience in the workshops and factories.

In the Continuation Schools and in the Lower Technical Schools the object of using materials, tools and machines is to prevent the pupils from becoming mechanical in doing their work. The practice and experience in school with tools and machines gives them an all round training so that they may know something of each of the processes relating to their trade and be ready to become experts in any one of these by long or short practice.

In the Middle Technical and Technical High Schools the work is chiefly of an intellectual character intended to fit men for positions of leadership. In but few cases does manual work in them occupy any considerable portion of the time. In the Technical High Schools the workshop practice is not intended to teach the students a trade or to make them expert machinists or experts in any handicraft or tool or machine operation. The purpose is to give the students an adequate knowledge of materials, tools, machines, working methods and to make them acquainted with the workmen, their point of view and the conditions under which they work. All this is for the purpose of giving them clear ideas as to the conditions, means and limitations of manufacturing and workmanship, of the workmen's attitude and capacity and of the management of a factory.

To Train Leaders for Industry.

The Technical High Schools are schools of technology and not schools of technique for manual work with machines or for handicrafts. They are the institutions of the highest grade and their aim is to train the students to independent thought and ability in their technical affairs. The students are taught and trained constantly to take a wide view in all their considerations and in all their doings. It is recognised that a failure in any undertaking shows that something had been overlooked or neglected. On the other hand if all the conditions have been taken into consideration according to their importance, successful plan and satisfactory accomplishment may be expected.

Dr. Kerschensteiner says:—

The group of technical officers is almost exclusively recruited from the German Technical Colleges. These institutions are open only to students who have passed through the nine classes of the secondary school. They educate the technical leaders of industry and also the state and municipal officials who are entrusted with the execution of technical problems. They receive their pupils after a school course of twelve or thirteen years, including a primary and secondary school, running from the pupil's sixth to his nineteenth year. Frequently a year of practical work is thrown in between the secondary school and the technical college. These technical colleges supply us for the most part with the higher technical heads of factories, whose duty it is to strike out new paths and discover new tasks and methods.

Summary of their Evolution.

The present Technical High Schools are a gradual growth and outgrowth of the effort to provide schools which should embrace technical studies and industrial education, taking definite form in several states between 1820 and 1840, as for example: Munich, 1823; Dresden, 1828; Stuttgart, 1829–32; Karlsruhe, 1825; Darmstadt, 1826–36. Berlin Technical High School, at Charlottenburg, opened in 1884, is a continuation and extension of an institution which celebrated its hundredth anniversary in 1899. At different periods there was reorganization of most of the institutions. The mutual connection between the technical and the natural sciences naturally required a continued development of the schools, of their curriculum and methods. Progress in the discoveries of science and in the application of science to industrial accomplishment called for men with training to meet the needs of the altered conditions.

Before the Technical High Schools could be properly developed, institutions which furnished the necessary preparatory education had to be created and extended. The Secondary School, known as "Realschule," was in the first place organised to serve the spread of "generally useful knowledge." That was followed by the establishment of schools for the distinct and special branches of science.

Differentiation from Tenth Year of Age.

While the technical institutions at first included the training of craftsmen, mechanics and of professional engineers, experience revealed the fact that these classes of workers could not be advantageously trained in the same way. Further those who studied the question saw that the preparatory schooling necessary for those who were to become craftsmen and mechanics was different from that required for those who were to become professional engineers. The education of the latter was required to be more comprehensive and thorough.

The existing organization of education in the various German States attempts to provide suitable training for different classes of workers. As between those who are to follow manual occupations and those who are to prepare for the higher professional positions it becomes necessary for the pupil to decide the direction of his education in the main, in his tenth year. Practically the first three (or four) years of all schools in Germany offer similar courses of instruction and training. Some hold that the practical or manipulative work in the form of manual training, and a general idea of natural science, now provided under the general term of nature study, are beneficial and necessary for the best all around development of all pupils whether they are to follow education through Secondary School and College or are to leave the Elementary School for work at the age of fourteen.

Advancement in Reputation and Progress in Co-Operation.

The Technical High Schools fill a place of their own. For a time a movement was pushed in the direction of the German Universities providing a scientific and technical training. Owing to the apathy and opposition of the classical interests little progress was made in that direction and in consequence Technical High Schools were developed to meet the situation. Since 1901 they have been given substantially the same recognition and rank as the Universities. The quotation from the words which the Emperor William used on the occasion of the celebration of the hundredth anniversary of the Technical High School at Charlottenburg indicates the aims and tasks that lie before the two kinds of institutions.

About 1890 there came about a closer connection of the eleven Technical High Schools among themselves. This connection resulted in permitting students wider liberty in selecting the particular school which they would attend, by giving them credit in one institution for the time of study passed in another, and by mutual validity of the examinations in each school. Appointments of teachers from one school to another promoted a closer bond of similar aims and labors, while the joint interests are materially furthered by meetings of representatives of the various Technical High Schools at which questions of importance to all are fully discussed.

Organization of Courses.

In the general organization of the Technical High Schools there are first of all four technical departments of training: for architects, for engineers, mechanical engineers and technical chemists. Two of the Technical High Schools have special departments for Electro-Technology. Berlin has a special department for Shipbuilding and Marine Engine Construction. Karlsruhe has a department for Forestry, Munich one for Agriculture and Brunswick for

Pharmacy. In all the High Schools the mathematical and physical subjects and those of general education have been combined into a general department.

The time of the student is divided between lectures and exercises. The number of weekly hours on the average for the Technical High Schools varies from 37 for civil engineers to 43 for architects. Mechanical engineers and electrical engineers each give 38. Architects give 17 hours weekly to lectures and 26 to exercises; civil engineers, 20 to lectures and 17 to exercises; mechanical engineers, 20 to lectures and 18 to exercises; electrical engineers give 19 to each.

Science, Practical Training, Political Economy.

Separate branches of instruction on separate subjects act and react upon one another and necessitate the systematic building up of the course of instruction as a whole. The various departments of mathematical sciences form the foundation of the whole system. From the beginning physics and chemistry have been in closest connection with technical teaching. In more recent years electro-technology has stood in the most intimate relation to physical research. Chemical research has also stood in the closest relation to practical purposes.

It is necessary that the High School should keep pace with the practical achievements of technical science. These for profit-making reasons are mostly kept from publicity. In order to provide that the research work and direct practical activity shall be harmoniously combined, in many cases the teacher or professor is also, or has been, engaged in practical business or in his profession apart from the educational institution.

Technical High Schools have taken a great part in the evolution of teaching by means of the laboratory. In the founding of mechanical technical laboratories the first aim was pure research. However it was soon found useful to make these laboratories accessible to students as for presenting single experiments or demonstrations and then also for independent work. Technical High Schools thus, by extending laboratories, have been able to keep a close connection between the constructive and theoretical departments of engineering.

In the next place increasing attention has been given to the problems of political economy. Because of the increasing importance of technical science to modern life with the great material value attached to it, it becomes necessary that leaders should be trained by exhaustive study not only to material problems but to social and judicial problems of political economy.

A point of importance is that students should receive practical training as well as theoretical and scientific training for a technical profession. It is now generally held that students should have at least one year of practical experience under shop or working conditions before taking a professional course at the High School. Where this requirement is not in force it is exacted as a condition from the candidate for the title of certificated engineer.

SECTION 5: OTHER HIGH SCHOOLS.

Besides the Technical High Schools there are High Schools for special subjects dealing exclusively with the scientific teaching of separate technical subjects. Some of these subjects such as Mining, Engineering, Forestry, Science of Agriculture, are also represented in the Technical High Schools. Agriculture is also taught in several, and Forestry in a few, of the Universities. The special subject of Veterinary Science on the other hand is in the great majority of cases assigned to the Veterinary High Schools. There are also Commercial High Schools as independent establishments. One in Aix-la-Chapelle exists as a department of the Technical High School. The seven types of institutions which come under this qualification are (1) Mining Academies; (2) Forestry Academies; (3) Agricultural High Schools; (4) Veterinary High Schools; (5) Commercial High Schools; (6) High Schools of Art; (7) High Schools of the German Army and Navy Administration.

The institutions in this class are not reported upon with the exception of the brief statement *re* Forestry Academies which follows.

Forestry Academies.

The German Empire has an extent of forest ground covering about thirty-four and a quarter million acres of which about half are Government and Communal forests. For the intelligent management of these forests a considerable number of higher officials are required. These receive their training partly at the Universities and partly at special Forestry Academies. The conditions of admission to the Forestry Academies are practically the same as those to the Universities or Technical High Schools. The course for the Royal Forestry Academy at Eberswalde, Prussia, requires the leaving certificate of a school or schools with a twelve years' course. The candidate for the higher forestry service must then first pass through one year's practical preparation, then attend the Forestry Academy for at least two years successively, pass a first examination and then, as Forestry Referendar, follow a one year's course in law and political ecomony at a German University. After two more years of free practical preparation, the Forestry Referendar can present himself for the second examination and if successful obtain the title of Forestry Assessor and receive an appointment.

CHAPTER XLIV: TRAINING OF TEACHERS OF INDUSTRIAL AND TECHNICAL SCHOOLS.

SECTION 1: INTRODUCTORY.

It was recognized throughout Germany that one of the most important, and at the same time most difficult, tasks in the development of State systems of Vocational Industrial Instruction was to procure suitable teachers. It was evident that means must first be provided to induce to accept teachers' positions, persons who were not only theoretically schooled, but were also familiar with the practical side of industrial life.

In Prussia, where official title and rank count for a great deal, the position of teachers in that respect is duly accorded. The Report says:—

It is important for the standing of teachers of vocational schools and for the uplift of the teaching profession that, in consequence of a Royal order of January 27, 1898, the relations of title and rank have been regulated like those of similar officers of the State; naturally the order dealt first with the principals and teachers of State institutions. The principals of such schools received the official title of "Director" with the rank of councillors of the fifth class and the prospect of promotion to the fourth class on the motion of the Minister. Teachers with full university preparation received the title "Head-teacher" (Oberlehrer) with the rank of councillors of the fifth class. This order also provided that one-third of the total number of such teachers may receive the title of "Professor." After twelve years of service they may be proposed for the fourth class of councillors.

By a Royal order of January 27, 1906, the titles and rank of the principals and teachers of trade schools and industrial art schools subsidized by the State, and those of the higher technical schools for the textile branches, were similarly regulated. According to that order the title of "Professor" may be conferred on such teachers without the pre-supposition of full university preparation. It was further decreed that henceforth one-half of the number of head teachers of the schools for the building and machine building trades may be promoted to the rank of Professor.

Courses in Industrial Art.

In Schools of Industrial Art and in Trade Schools the need of further education for the teachers has been most strongly felt. Here the teachers to be successful must preserve an aptitude for new accomplishments and keep in touch with artistic life. For that, however, opportunities are often lacking in small cities. Such teachers need to become familiar with new fields of activity in industrial art and design for which their work in school does not give them the required time. In order to meet this need a number of courses of instruction for teachers in different fields of industrial art were arranged during the last few years; thus, for instance, by Architect Riemerschmidt, in Munich, who dealt with designs of furniture and interior architecture; in flat ornamentation at the industrial art and trade school in Magdeburg; in lettering at the school of design in Dusseldorf under Professor Behrens; in mural painting and decorating for teachers of technical classes under direction of Professor Mohrbutter in Charlottenburg; and finally a course in mural decoration under Professor Hammel in Hanover.

This improvement of teachers was promoted further by stipends, granted by State and communities to schools of that kind, for teachers' journeys of study. Similar journeys were encouraged by stipends for the improvement of teachers of the textile branches.

Need of Better Training Recognized.

In Schools for the Building Trades and for Machine Building and Mechanical Engineering Schools in Prussia, special arrangements for the preparation of the teaching staff had not been made until the end of 1912. For some years it has been required that any teacher to be appointed should possess a higher education obtained either in a University or in a Technical High School and more especially that they should have had adequate experience in industrial practice. Opportunities have existed for some time by means of grants to enable teachers to take study trips to other cities; by grants of absences from duty with salary paid for the same purpose; and by permission to engage in private occupations or practice. Short courses have also been given and special lectures provided.

The training of teachers for Continuation Schools because of their large number is perhaps more important than for schools of any other class. In the early years of Continuation Class work, the schools were generally taught by teachers of Elementary Schools who were seldom industrially or technically prepared to give the proper instruction. Gradually men with adequate preparation have been found for these schools, more particularly those who are able to teach Drawing, Technology and the various trades represented.

Special professional Drawing Courses were provided at Berlin, Dusseldorf and Hanover. The total number of teachers employed in the Continuation Schools of Prussia is over 12,000. The Government authorities recognize the necessity that such teachers for these schools hereafter should be more thoroughly trained in both pedagogical and technical matters and have their qualification completed by industrial experience.

The Baden and Wurttemberg Plan.

The organized provision for the training of teachers for the trade side of Technical Schools has been carried furthest in the City of Karlsruhe. The Government of the State of Wurttemberg has availed itself of the provision made by the Government of Baden, at Karlsruhe, to the extent that selected teachers-in-training went from Wurttemberg to Baden and took courses in the Department of Training Teachers in the Technical Institution at Karlsruhe. The Commission had the advantage of conversations with Dr. Hartmann of Stuttgart and Dr. Mier of Karlsruhe.

From Dr. Hartmann it was learned that, for the State of Wurttemberg until a sufficient supply of competent teachers was available, teachers of Elementary Schools and Higher Elementary Schools had been given scholarship allowances of 1,000 marks per annum to take 3½ years of training, usually at Karlsruhe. That was a temporary expedient to secure enough competent teachers. It was necessary for such teachers to follow practical work, in workshop or office for one year, usually at the end of the first year of training, in addition to two years of theoretical instruction and school experience at the institution at Karlsruhe.

Another plan which also was followed was to give students, who had shown ability at the Lower Technical Schools and the Industrial Art Schools, one year of special instruction in the principles and art of teaching.

Now that a sufficient number of teachers have been trained, and the positions are numerous enough and attractive enough to induce men to prepare for them, the scholarship allowance of 1,000 marks per annum has been discontinued. In most cases teachers for the Continuation Classes and for the Middle Technical Schools now come from the Technical High Schools.

Dr. Hartmann was of opinion that it was not desirable to employ as teachers those who were occupied in other work or business. He preferred a teacher who could take and did take with the pupils all the closely related subjects. He preferred that method to the one whereby a number of special teachers gave the pupil a few hours each.

Dr. Mier spoke of the difficulty of preventing the schools and the courses from becoming too theoretical. By keeping the instruction and experiences of the students in the schools more and more on practical lines the difficulty is being overcome. In his judgment the professors, on the staff of an institution which trained teachers for technical institutions, should have a qualification of at least ten years of practical experience of a business occupation. That had been the rule of the institution at Karlsruhe.

SECTION 2: THE TRAINING AT KARLSRUHE.

Since 1882 the Technical Institution in the City of Karlsruhe has had a department for the training of Industrial Teachers. The institution was visited and a brief statement of the main features of the Division for the Training of Industrial Teachers is submitted as published in the Annual Report of the Commissioner of Education for the United States (1911).

Division for the training of Industrial Teachers.—This division aims at preparing teachers to give the Industrial and Technical instruction prescribed by the laws of the country for the industrial schools, and is, of course, attended mainly by students who intend to devote themselves to the teaching profession. Candidates for positions as industrial teachers must attend the institution seven semesters, and then pass the regular State Teacher's examination.

Candidates who seek admission into the lower classes of the first four divisions of the Karlsruhe Building Trades School must have finished their sixteenth year. At the time of admission candidates must pass an examination in German, Arithmetic, and the Theory of Projection. Besides this, previous practical experience in the industries is demanded under all circumstances for admission into the lowest classes of any one of the four divisions. This practical experience must amount to at least two full years (24 months), in which service in an office is not to be counted. The experience must be obtained as follows: (1) for the Architectural Division, in actual building operations; (2) for the Road Building and Hydraulic Division, in actual work of this class; (3) for the Machine Engineer, in the machine shop; (4) for the Electrical Division, also in the machine shop in the following proportions: students with predominatingly Machine-Engineering training must take from the minimum requirements of two years' experience at least nine months in an electro-technical manufactory, in electro-technical business, or in fitting up electrical plants; students who attend this Division with predominatingly electro-technical experience must complete at least nine months' practice in general machine building trades.

Besides this two years' practice or apprenticeship the candidate for admission must produce proof that he has either attended an Industrial School or completed the fifth class of a Middle School. In exceptional cases only and on account of especially good work, students from an Industrial Continuation School may gain admission. It is important that pupils who possess the certificate for one year's military service or who have finished the classes of a Middle School, mentioned above, should receive instruction in an Industrial School in addition to their practical work before their entrance into the Building-Trades School.

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The division for the training of industrial teachers is open only to those who bring proof of having been accepted as Elementary School candidates or of having finished seven classes of a Middle School. The completion of the seventeenth year marks the earliest period for admission into this Division. Besides this, it is required that one entering this Division shall have finished at least three months' practical activity in some large building business, and that before attending the fourth class Elementary Schoolteachers shall undertake at least a year of further practice, while those coming from the seventh class of a Middle School must complete two years in practical work. It is recommended that students of the Middle School finish one year of this practice before they enter, instead of the minimum three months' practice.

During their vacations, or during the period of their absence from school, in order that they may advance in their education and increase their understanding of national methods of building, students of the Architectural Division are directed to prepare photographs and drawings of fine old buildings and their parts. This serves as a preparation for subjects of instruction which form the substance of the course in the next higher class. The examples chosen are sketched under the direction of the teacher.

The students of the Industrial Teachers' Division are required to make use of the autumn vacation for learning some of the industrial handwork mentioned above. The Easter holidays, on the other hand, are used for the taking of photographs of buildings and artistic objects of all kinds. State assistance is at the disposal of both Divisions to defray the expenses of visits to manufactories and the like, as well as to pay for well-prepared photographs.

Candidates in this division pay a matriculation fee of five marks ($1.19). The tuition fee is 40 marks ($9.52) for citizens of the Empire and 80 marks ($19.04) for foreigners.

At the opening of every semester, instruction in hygiene is given to the new students by the conductor of the so-called Samaritan course. This course covers the principal points a student should know in order to preserve health of body and mind.

Course of Study.

The course of study is arranged in six Semesters each lasting half a year.

First Class.

	Hrs. per week.
Mathematics	4
Physics	3
Mechanics	2
Geometrical Drawing	2
Descriptive Geometry	7
Grammar of form, with Sketches	2
Free-hand Drawing and Painting	22

Second Class.

Mathematics	3
Physics	4
Chemistry	3
Mechanics	2
Descriptive Geometry	6
Theory of Building Construction	11
Grammar of form and Mechanical Drawing	4
Free-hand Drawing and Painting	9

Third Class.

Mathematics	2
Chemistry	4
Theoretical Mechanics	2
Descriptive Geometry	2
Theory of Building Construction	9
Building Models	7
Elementary Mechanics	1
Grammar of form and Mechanical Drawing	4
Free-hand Drawing and Painting	9

Fourth and Fifth Classes.

Mechanics	1
Technology	2
Theory of Building Construction	7–9
Industrial Technical Models (building forms of wood and stone)	2
Industrial Technical Drawings (parts of buildings and furniture)	5
Practical Geometry	2
Knowledge of Machinery	1
Elementary Machines	2
Machine Drawing	3
Applied Free-hand Drawing and Painting	8
Bookkeeping	4
Political Economy	3
Introduction to Industrial Practice (visits to workshops, etc.)	Time not fixed.
Introduction to Industrial School Practice	1

Sixth and Seventh Classes.

Technology	1
Theory of the Consumption of Fuel	1
Theory of Building Construction (with working drawing)	9
Theory of Construction in Iron	2
Industrial Technical Models of Metal, Clay, Glass and Textiles	3
Industrial Technical Sketches	9
Drawings of Machinery	3
Electro-technology	2
Applied Freehand Drawing and Painting	8–9
Knowledge of Baden (considering artistic buildings and monuments and their preservation)	1

Building Regulations of Baden, with consideration of its relation to Wurttemberg	1
Theory of Exchange	1
Legal Knowledge	1
Political Economy	3
Introduction to Industrial Practice	Time not fixed.
Introduction to Industrial School Practice	1

Courses in Industries.

In addition to the theoretical and intellectual instruction pursued at Karlsruhe, each of the teachers-in training must have courses of work in the industry itself, as for example those who have been accepted as candidates from Elementary Schools must take the following:—

	Months.
Masonry	2
Carpentry	1
Building and artistic iron work	1
Joinery and furniture making	1½
Tinsmithing	1½
Whitewashing and decorating	1½
Mechanical engineering	1½
Optional work	2
Total	12

For those who enter from the seventh class of a Middle School the work is as follows:—

	Months.
Masonry	4
Carpentry	2
Building and artistic iron work	2
Joinery and cabinet making	3
Tinsmithing	2
Whitewashing and decorating	2
Mechanical engineering	2½
Work in the graphic industries	1½
Optional work	5
Total	24

It is recommended that voluntary work be done in one ofthe following trades: stonecutting, glazing, plumbing, paper hanging, electro-work, lithographing, bookbinding. It is not expected that candidates will acquire great mechanical dexterity by means of this practical activity in industrial life, but it is hoped that a clear and comprehensive survey of the whole industrial field can be made, and attention be paid to the different processes of work. During the time of practical work in the industry, which is included in the preparation for the profession of industrial teacher, it is especially important that the candidates comply exactly with the same methods of business and times of work as the ordinary worker in the industry.

Expense Justified by Efficency.

The character and extent of this course of training and experience seem to be exacting and expensive. Those who know the history in these two States say that at first they experienced the weakness and unsatisfactory results from having classes taught, on the one hand, by mechanics who were not qualified as teachers, and on the other hand, by good teachers who had no technical or industrial experience for that part of the work. Now the leaders have come to the conclusion that the professional teachers must be trained technically and have industrial experience and that the mechanics must be given opportunities of learning the principles and of acquiring experience in the art of teaching.

They further encourage the teachers after their training is completed and they are in charge of classes, to keep in touch with actual business progress by frequent visits to industrial plants and in some cases by permitting and even encouraging them to carry on industrial and business occupations in addition to their teaching work. This practice was encouraged also in other places visited, more particularly in connection with the Art Schools. The high state of efficiency of the Vocational Schools in Wurttemberg and Baden are justification for all that has been attempted and done in the way of training those who have charge of the classes in the Continuation, Lower, and Middle Technical Schools.

SECTION 3: THE LATEST PROVISIONS IN PRUSSIA.

Since the visit of the Commission to Germany a circular has been issued, by the Ministry in the Kingdom of Prussia to the Presidents of all the Provinces, setting forth that it was intended to institute a course of training for teachers in Industrial Continuation Schools, beginning in 1913. The course is to be held in Berlin, will last one year and will be terminated with an examination.

The subjects taught will include pedagogy, with special reference to the organization and methods of instruction in Continuation Schools, knowledge of business methods, citizenship, and the elements of technical drawing. Admission to the course will be limited to:—

(1) Engineers and artisans who have received a good general education and have done at least three years' practical work. Preference will be given to those who have already taught in a Continuation School. A knowledge of foreign languages will not be required, but credit will be given for a thorough mastery of the German language, literature, and history, as well as some acqaintance with the economic and artistic questions of the day.

(2) Teachers who have already passed the second professional examination and who have studied some industrial or technical subject, and have had some experience in a Continuation School. This latter condition may be waived in special cases. Preference will be given to candidates who have had practical experience in some branch of industry.

(3) Other persons of a good general education who have already taught in a Continuation School and have done practical work.

Candidates for admission to the course must be not less than 24 nor more than 35 years of age. The fee for the course is 60 marks; this may be remitted in necessitous cases, or a scholarship may be granted where this has not already been done by the locality from which the candidate comes.

As the number of places for the course of training is limited, the passing of the entrance examination will not necessarily admit to the course, but candidates will be chosen according to the place taken by them and according to the date of application. Those who pass, but for whom there is not room, will be allowed to enter later without again taking the entrance examination.

SECTION 4: THE MODERN SYSTEM OF APPRENTICESHIP IN GERMANY.

The Commission had the advantage of being accompanied during part of its enquiries in Europe by Professor Frederic H. Sexton, Director of Technical Education and Principal of the Technical College of Nova Scotia. He has kindly placed at the disposal of the Commission a Memorandum which he prepared on the Modern System of Apprenticeship in Germany.

It is as follows:—

The extensive system of apprenticeship in Germany is one of the most characteristic and impressive features of industrial life in that country. The system runs hand in hand with the Continuation Schools all over the Empire. If one wishes to acquire an adequate comprehension of the latter, he must inform himself at the same time concerning the former. The industrial Continuation School would be shorn of a large part of its great efficiency if the custom of indenturing youths to a master for a term of years had not been persistently preserved and adapted to the evolution of industry. It is true that the system has been radically modified to meet modern industrial conditions, but it still retains a great many of the paternal features which characterized the older forms of indenture.

All contracts of apprenticeship call for the attendance of the apprentice at a Continuation School especially adapted to his vocation. In the workshop, the boy learns the practical methods of construction of the products in his line of work and gradually acquires manual dexterity and craft skill. In the school he is given mathematics, bookkeeping, languages, hygiene, civics, drawing and science, all applied to his special vocation in addition to the workshop practice necessary to make him a competent, skilled journeyman and intelligent citizen. He is also taught the finer and more delicate parts of his trade in the school workshop, if these refinements do not constitute a portion of his instruction in every-day work. In some cases the special tasks involving particular skill are set out in the school to be carried out in the master's shop or factory and brought back to the school for inspection. In such a manner the work of the school and the shop supplement each other.

In Germany, however, the trade school that is so common in France and Switzerland is very rarely met with. By trade school in this sense is meant a school which acts as a substitute for industrial apprenticeship, which receives the boy at an early age (14-17), which occupies his whole time in lessons and shop work for practically the same number of years as the regular period of indenture in industrial establishments, and which turns him out as a competent journeyman. The German school authorities try to assist the parents in determining the vocation of the pupil while he is in the common schools and then co-operate with the municipal labour bureaus in placing him under a suitable employer when he leaves school.

Germany did not feel the effects of the factory system to a very great extent until after the consolidation of the separate States into the Empire and the industrial expansion after the war with France. Previous to 1871, most of the manufacturing in Germany had been on a handicraft basis, although the laws surrounding the old systems of guilds with their compulsory membership and strict regulations concerning apprenticeship had been very much loosened and had fallen into partial disuse prior to this date. In Germany there has been a persistent belief and continuous legislation to preserve the ancient handicraft guilds in as many particulars as could be adapted to modern industrial conditions. The principal motive for such action was the preservation of an effective apprenticeship system. There has been, therefore, a succession of enactments since the formation of the Empire which concern themselves with the maintenance of the prestige of the handicrafts and the granting to the guilds of continually widening powers. No other country except Austria has gone so far to provide adequate training and education for the apprentice and to strive to maintain the handicrafts in the face of the encroachments of the factory system. In 1897 all of the legislative enactments in Germany were gathered together, improved, added to and consolidated in the Industrial Code (Gewerbeordnung). This has been changed in some respects since then, but is essentially the same now as when passed. The radical advocates for the guild wished to make it compulsory for all men engaged in a trade to become members of it, but the government only went so far as to authorize the establishment of a guild in any district where the majority of persons interested are in favour of it. When established, the membership is compulsory upon all persons who, on their own account, carry on the trade to which the guild relates, except such employers as are at the head of large industrial establishments or those who do not employ either journeymen or apprentices. Such persons may become members if they wish to do so. Besides the two classes of people engaged in a trade which have just been mentioned, the guild membership is confined to those who are engaged in the trade on their own account, those who have ceased to work in the trade and have not taken up any other trade, and handicraftsmen working for wages in agricultural and industrial pursuits.

All applicants for membership have to pass such an examination as will properly test their ability to carry on their trades.

The guilds exist to regulate the trades and conditions of apprenticeship. They are the agents of the government in most matters that concern the handicrafts and all lines of industry in which skilled artisans are employed. The object of the guilds is sixfold, viz: (1) the detailed regulation of the conditions of indenture in all its phases, even to the echnical and moral education of the apprentice; (2) the cultivation of an *esprit de corps* and professional pride and coherence among members of a trade; (3) the maintenance of good will between employers and employees; (4) the arbitration or the adjustment in other ways of disputes between master workmen and apprentices; (5) the creation of means to aid guild members and their families, journeymen, apprentices, and helpers in cases of sickness, invalidity, death, unemployment, etc.; (6) the formation of a general business organization for advancing the trades for which the guilds were created.

The main duty of a guild is to look after the welfare and education of apprentices. Germany firmly believes that the education of apprentices is too important a matter to be left to the hazard of a purely private contract. The Government did not wish to introduce a direct system of examination and regulation of apprentices, but delegates these powers and duties to the guilds.

The contract between a new apprentice and a master workman has to be carefully drawn up in due form and a copy must be submitted to the local guild within 15 days from the time it is signed. The contract provides that the apprentice shall be courteous, diligent, and loyal to his master, but also protects the former from exploitation, which latter condition is most to be guarded against. The employer is required to instruct the apprentice in all matters relating to the trade; to compel him to attend an industrial or trade Continuation School; to guard him against bad habits; and to protect him from bad treatment on the part of members of the household or companions. The employer must teach the apprentice himself or put him under the tutelage of a competent person who is directly responsible for his instruction. The apprentice must not be required to work beyond his strength and must be allowed time out of working hours to attend a Continuation School. He must also be allowed time to attend divine worship. Apprentices not living in the homes of their masters cannot be required to perform any household duties.

The conditions under which the indentured youth lives and works are carefully safeguarded. The officers of the guild visit the shops at least once a year and satisfy themselves that all of the provisions of the contract are being carried out, especially in regard to the instruction of the youth in all parts of the trade.

The guilds established a great many industrial Continuation Schools closely allied to the trade, at the same time including such general branches as civics, personal hygiene, etc. which are necessary for the making of an intelligent independent citizen. The teachers are usually members of the guild who are thoroughly conversant with the practical side of the trade and who are public-spirited enough to devote some of their time to the good of the apprentices. The communities usually furnish schoolrooms for these classes. The present tendency is, to eliminate the guild schools and for the community to supply the industrial instruction itself under close co-operation with the guild. The apprentice usually is required to attend these schools during the working hours in the daytime and the general attitude of employers is most favourable to this arrangement. It is a very general thing also for the guild to contribute toward the maintenance of the school either in apparatus or by an annual subscription or both.

The usual duration of the term of apprenticeship is three years, although it may be extended to four years. Upon the completion of the term of service, the apprentice is required to pass his examination as journeyman. He must submit a specimen of his own handiwork and pass certain theoretical examinations in drawing, science, book-keeping, etc. The examining boards consist of a president, appointed by the chamber of trades, and at least two other members, half of them elected by the guilds and half by the journeymen's commission.

When the journeyman has practised his trade as such for two years he may take another examination and if successful can receive the title of assistant or helper. As such he is employed as an artisan with proven skill and often is employed as foreman in minor capacities.

When the journeyman has practised his trade as such for three years, he is eligible for the examination of master workman. This examination is given by commission which consists of a president and four other members chosen by the superior administrative authority. The candidate for the title of master workman must show that he is able to value and execute the ordinary work of his trade and especially that he possesses full ability to keep books and accurate accounts, so that he may have ample capacity to carry on the trade in his own establishment. Master workmen are allowed to employ apprentices only after they have attained the age of 24 years and have completed the term of apprenticeship as prescribed by the chamber of trades, or after they have exercised their respective trades without interruption for five years, either on their own account or as foremen in an industrial establishment.

The number of apprentices which any employer has in his establishment may be limited by the lower administrative authorities, if it can be shown that there are more than the business warrants so that the instruction of the youths under indenture might be jeopardized.

It must not be supposed that all of the youths engaged in industry are regular apprentices under the conditions mentioned above. A great many are employed as factory hands who are learning to become skilled machine operators and who earn a much higher wage than the apprentices, but who do not receive nearly as thorough a training. The following scale of wages for apprentices in the firm of A. Borsig, a very large enterprise engaged in building locomotives and machine-construction near Berlin, will be illustrative.

During the 1st year, per hour........................	$1\frac{3}{4}$ cents.
" " 2nd " " "	$2\frac{1}{2}$ "
" " 3rd " " "	$3\frac{1}{4}$ "
" " 4th " " "	4 "

Twelve and a half cents is retained out of every week's wages by the firm, to be given as a bonus at the end of the apprenticeship.

The handicraft trades and regular indentured apprenticeship are more prevalent in Southern Germany, as in Bavaria, Wurttemberg, Baden, etc., than in the northern portion of the Empire.

In Prussia, however, the system exists to a very great extent, as is shown by the statistics for the year 1909, which are as follows;—

Number of apprentices	31,209
" who board and lodge with master	9,484
" apprenticed to their own fathers	1,730

Germany has provided for a perpetuation of the old guild and apprenticeship system because she believes that there was much of good in the old relation of master and apprentice. Along other lines the Germans have put forth strenuous efforts to maintain the place of the handicrafts in the industrial system and raise the workmen in the small establishments. In a great many manufacturing centres there is a provision at the schools for short courses especially adapted to the needs of master workmen. These courses are of one, two, or three months' duration. The master workmen come in from the surrounding districts and from the community itself and are taught the special refinements of their trades and also any new developments that apply to their respective vocations. Thus we find at the School of Machine Construction in Cologne, courses for master workmen engaged in installations of gas, water or electrical apparatus, also fo those engaged in gas works, electrical power stations, autogenous welding plants, etc. The Rhenish Association for the Advancement of Industry also offers short courses in Cologne for master workmen in the vocations of ironsmith, tailor, cabinet maker, and shoemaker. These courses are of immense advantage in keeping the skilled workers in the handicrafts abreast of the times and also in assisting the handicrafts industries in their otherwise unequal struggles with the factory system of production.

One of the most patent advantages of developing and assisting the all-round training of craftsmen, through a careful system of recognized apprenticeship, is the standardization of the capacity of the mechanic to do the work that is expected of him. In America, where the apprenticeship system has been allowed to fall naturally into a decadent stage, the employer is compelled to take the word of the applicant for a position that he is a capable journeyman. Very often the employer only knows the misrepresentations of a new employee after some valuable work has been spoiled or an expensive machine damaged. In Germany a prospective employee has to produce his certificate of apprenticeship and his papers which describe him as a journeyman, assistant, or master workman, and then the employer may be sure of his capacity as a competent workman within the limits described on the respective certificates. One of the greatest drawbacks in industry on this continent to day would be removed if there were general provisions for the indenturing of youths under such safeguards as to welfare and thorough instruction as are provided for in the modernized system of apprenticeship which is in force in the German Empire at the present time. Too many of the young men in America are wasting valuable years of their own life in acquiring a thorough all-round knowledge of a trade by "stealing" it at a great expense to their employers. It is only the very largest American firms who seem to be able to carry out any effective system of apprenticeship adapted to modern conditions.

The apprenticeship system as carried out in Germany seems to be effective and also seems to meet with the general approbation of all parties concerned. The Government, through the guilds, does everything within its power to prevent the exploitation of youth in industry and also to secure a high class of skilled workmen for the manufacturing industries. The following quotation is from an official report of an expert from Belgium, Mr. Buyse, on the German apprenticeship system, "Thanks to the guilds, the apprentice is not exposed to the hazards of life and left to his own weakness. He is surrounded with safeguards, and his education is obtained under the most favourable conditions. From his entrance to industry the guild looks after him. It supervises the punctual execution of the work in which his employer instructs him, takes account at least once a year of the progress realized, and as a test of his studies makes him give a proof of his ability, and gives to him a certificate of apprenticeship. This certificate is a reliable document of influence throughout the Empire. The young journeymen finds a cordial reception among the federated guilds in all German cities. The master who employs him can judge of his ability and assign him work in accordance: because the declarations of the guilds are sincere and generally furnish a perfect guarantee that he has the necessary theoretical and practical knowledge."

CHAPTER XLV : ORGANISATION OF TECHNICAL EDUCATION IN TWO TYPICAL GERMAN CITIES.

SECTION 1 : BREMEN.

This is one of the cities of the old Hanseatic League, the second largest commercial centre in Germany, and a busy seaport, being the headquarters of the North German Lloyd Steamship Company. It has a population of 250,000, principally engaged in shipping, shipbuilding, marine-engineering, machine-construction, building and commerce.

THE VOCATIONAL CONTINUATION SCHOOL SYSTEM.

This provides the first step in Technical Education for those who have left the public Elementary Schools. It is maintained by the city, and controlled by the "School Chancellor" and the Education Committee of the City Senate. The fees charged cover only about one-fifth of the expense of maintenance, the city contributing the difference,. In 1909-10 the expenses amounted to 144,600 marks,of which 30,000 marks represented fees, while the remaining 114,600 marks was furnished by the city. Public School buildings are largely made use of for this work, but a new building, to include workshops, was being erected at the time of the Commission's visit. The equipment seen was very modest, except as regards drawing models, and there were no workshops.

The attendance at the winter Session of 1909-10 was as follows:—

Voluntary:—	
Vocational Continuation School	311
Industrial Drawing School	1211
Boys' Drawing School	173
	1695
Compulsory Continuation Students	782
	2477

The majority of the 83 teachers employed are technical or practical men, who have had some training in the art of teaching. The Director, Professor Dr. Koop, stated that he had found this class of man to be the most satisfactory teacher for Vocational Continuation Schools.

Information obtained in "Conversation" with PROFESSOR DR. KOOP, *Director of the Vocational Continuation Schools.*

Professor Koop considers that in vocational Continuation Classes the boys should be divided according to vocations and not according to years. The instruction is mainly individual.

He ascribes the general excellence of the German school system and the generosity towards education to the general belief in the efficacy of education. There is a general knowledge abroad in Germany that it is a poor country, and that they must educate every man for his job, in order that they may all work with great skill and efficiency.

He recommends strongly that Canada should make Continuation Schools compulsory from the start if possible; and if he had it in his power, he would start them as compulsory schools and then the people would recognize the good of them very shortly.

In Bremen a number of the Guilds have come to Professor Koop and asked him to take their classes over, when they would give up their classes and co-operate with the city Continuation Schools.

He thinks it is better for a boy to learn his trade in a regular shop, or industrial establishment as an apprentice, and get his theoretical and scientific training in a Continuation School, than to get both in a trade school, because he then works in a true industrial atmosphere, which no trade school can duplicate.

He thinks emphatically that the best kind of teacher for vocational Continuation Schools would be one who is a skilled master workman and has taken 6 months' or a year's training in pedagogy. He would compare favourably with the regular teacher who is given a somewhat extended training in practical work.

He says there have been too many technical men trained in Germany for the real demand, but this will correct itself and that the man from the Technikum, or school for foremen, is in more demand than the graduate from the Hochschule and can more easily find a position that suits him.

THE TECHNIKUM.

This institution is a splendid example of what a single city can do in the way of stimulating its principal industries by technical education. It consists of a large main building with a central court for administration, recitation rooms, lecture rooms, collections of models and drawing rooms, and a fine, large, separate engineering laboratory. It is not as elaborately equipped as some of the other schools visited, but the money appears to have been very carefully allocated among the various departments, in procuring the apparatus which was most necessary for instruction. The departments provided are those especially needed for the industries of Bremen, e.g., shipbuilding, marine engineering, courses for mechanics on board ship, and for electric, gas and water installators. It seems to be a carefully developed and well-rounded institution for Bremen, maintained by the city, to which the Director, Dr. Lange, is responsible. Fees cover less than half of the expenditure, so that the city provides the greater part of the funds, the proportions in 1910–11 being: fees, 97,000 marks., city, 192,000 marks; total 289,000 marks. No extra fees are charged to non-residents or foreigners. In every department, practical experience in the trade is a necessary qualification for entrance. The departments are as follows:—

A. Building Trades (above-ground and underground section).
B. Higher Machine Construction School.
C. Higher Shipbuilding School.
D. Ship-Machine construction and Marine Engineering.
E. Gasmasters' Course.

The teachers are Technical High School graduates with practical experience of the trades.

A. Building Trades School.

Students must have completed the Elementary School work and have had not less than two seasons' practical building experience. For the underground section, 4 years' training in the railway shops, or as assistant in railway construction, water or drainage works; or 4 years as locksmiths or mechanics, etc. There are 5 terms of 20 weeks each, the fees being 200 marks yearly, plus a small contribution for accident insurance. The following subjects are taken:—

German, Arithmetic, Planimetry, Stereometry and Trignometry, Physics and Chemistry, Freehand Drawing, Descriptive Geometry, Building Construction, Building Materials, Estimates of Construction, Surveying, Estimating, Industrial Law, Building Laws, Book-keeping, Planning and Projecting.

In the *Underground Building* Department, additional subjects are: Bridges, Roads, Railways, Grading, Surveying, Water Systems, Hydraulics, Machinery, City Systems, Electro-technics.

43 hours weekly are taken in first 2 terms, 42 and 41 in 3rd term, 39 in 4th term, and 37 and 38 in 5th term.

B. Higher Machine Construction School.

This Department trains mechanics, general and marine machine-builders, electro-technicians, etc., qualifying them to take independent positions or enter the Government service. Candidates must possess the one year's military service certificate, and have had at least one year's practical experience, a longer period being preferred. The fees are 200 marks yearly, and the course covers 5 terms of 20 weeks each, 37 to 42 hours weekly. The following subjects are taken up:—

German, Arithmetic, Caligraphy, Commercial Geography, German History, English, Book-keeping, Political Economy, Arithmetic, Planimetry, Stereotomy, Trigonometry, Analytical Geometry, Mechanics, Statics, Hydraulics, Chemistry, Physics, Geometrical Drawing, Freehand Drawing, Drafting, Machine-parts, Machine-construction, Technology, Levers, Pumps, Boilers and

Steam Fittings, Steering Gear, Hydraulic Motors, Combustion Engines, Railway Machinery, Building Construction, Iron Construction, Electro-technics, Electric Signalling, Electric Measuring, Electric Lighting, Calculating Electric Instruments, Power Transmission, Electro-chemistry, Marine Engines, Classification, Harbour Works.

C. Higher Shipbuilding School.

The aim of this department is to train technical students of shipbuilding to acquire the theory which will enable them to manage a business or work in a shipbuilding office, also to qualify for positions in the Imperial Navy. Candidates are required to possess the one year's service certificate. The course covers 4 terms of 20 weeks each, and the fee is 200 marks, plus accident insurance. The subjects are the same as under A. and B. with the addition of Shipbuilding Science and Drafting.

D. Ship-Machine Construction and Marine Engineering.

Students in this section are prepared for the examinations for Marine Engineers and Naval Mechanics. They must possess the one year's service certificate, or be able to pass an equivalent entrance examination, failing both of which, they may enter the Preparatory Class. To qualify for the lowest grade of Naval Mechanic (4th class) 5 years' practical experience at sea is required; for Marine Engineers, 5½year at sea and on shore; and for the higher grades, a proportionately longer term of service.

Courses for Engineers and 1st and 2nd Class Mechanics cover 1 year; for 3rd and 4th Class Mechanics, 16 weeks of evening classes. The fees are as follows:— Engineers, 300 marks yearly; Lower Engineers, 250 marks; 1st and 2nd Class Mechanics, 200 marks, 3rd Class Mechanics, 60 marks, 4th Class Mechanics, 50 marks. The subjects comprise:—

German, Arithmetic, Machinery and Electro-technics, Machine Sketching, English, Arithmetic, Planimetry, Stereometry, Trigonometry, Physics, Mechanics and Statics, Technology, Ship-building, Descriptive Geometry, Marine Engines, Chemistry.

E. Gasmasters' Course.

The aim of this course is to qualify students to conduct small businesses connected with the installation of water, gas and electricity in cities and private houses.

THE REALSCHULE : BREMEN.

THE TECHNIKUM : BREMEN.

Information obtained in "Conversation" with DR. WALTHER LANGE, *Director of the Bremen Technikum.*

Dr. Lange was at the head of the Vocational School in Lubeck when he was called to Bremen 17 years ago to take charge of the planning, organization and upbuilding of the new Technikum there. He had been working at the problems of technical education for 16 years previously, and has been in the movement for 33 years.

Dr. Lange is an author of wide reputation on Technical Schools in Germany, France and Austria, and is an authority on this subject.

He said that there was no distinct public sentiment in favor of technical or scientific education as against classical or general education. There was a strong general sentiment in favor of education itself, and the people felt that all branches must be generously supported. He had not had much difficulty in getting what money was needed for the development of his schemes in the Technikum. It was a little harder to get money now than in the early stages of the development of the Technikum.

The industrial firms in Bremen had done very little to help the Technikum, either in personal support or financially by gifts. The North German Lloyd SS. Co. had paid a small amount towards the support of the higher classes in shipbuilding, engineering, etc., for 10 years, but do nothing of this sort now.

Lately there had appeared some little opposition to the Technikum, from some economists who said that Bremen should not support such an expensive institution as the Technikum, but should give grants towards students who wanted such a course and send them to similar institutions in Prussia or elsewhere. This sentiment was not general or dangerous.

There was an instance of close co-operation between the school and a large industry in the case of the establishment of the Gasmasters' Course. A very large firm, Karl Fraenke, who manufacture apparatus for gas plants, waterworks, etc., wanted men who could superintend the installation of such works and operate them. The firm came to the Technikum and asked that it train such men. The school consented and the firm gave apparatus, drawings, etc. and agreed to make up the deficit of such a course beyond the income from fees. There has been a very small deficit, so the firm have not been called on to any great extent. There has been a great demand for such men and now they come from all over Germany and get employment as soon as they leave the course. Other schools (such as Cologne) have established courses like it.

Dr. Lange said that there had been an excess of technical men trained for the opportunities in Germany, but not any more, (if as many in proportion to the demand), than for the professions of doctor, lawyer, etc. Now, a number of technical men went abroad, chiefly to the German colonies and to other places where German capital was interested, viz. Brazil and China. It was a most excellent thing for Germany that there were so many well-trained men for responsible positions even if it were a little hard on the individual.

He advised Canada, as a new country, to first establish Continuation Schools in every place, even down to the small village, to make them as nearly compulsory for all boys and girls from 14 to 17 years of age as possible, and then with the demand to establish special schools like the Building and Machinery Schools etc., in principal centres. These schools were much more important to the country and the national industries than Colleges for Engineers. The most necessary thing to do was to permeate and uplift the masses, and thus every apprentice should be trained, and men should have the opportunity to train themselves specially to be foremen. He was most emphatic on these points, and also on the point that Continuation Schools should be compulsory if possible, and that instruction should be given in the day time.

He also laid a good deal of stress on the fact that part of the instruction in the Continuation School should be devoted to general subjects, such as languages, civics and industrial history.

SECTION 2: CHEMNITZ.

This city of 290,000 inhabitants is situated in the Kingdom of Saxony, and is one of the most important manufacturing centres in the German Empire. Its principal industries are, the manufacture of locomotives and agricultural implements, cotton-spinning, glove-making and linen-weaving. It has an admirable organization of technical education, and may serve as a model for any city of similar size elsewhere. It has altogether 29 Technical Schools.

The general organization of technical education in Chemnitz is as follows:—

I Municipal Vocational and Continuation Schools supported by the City with grants from the State.

II. A Technical Institute with 5 Departments, provided and maintained by the Kingdom of Saxony.

III. A Higher Weaving School, with 7 Departments, a privately-managed institution, receiving a grant from the Kingdom of Saxony.

I. MUNICIPAL VOCATIONAL AND CONTINUATION SCHOOLS.

Since 1873, when it was made compulsory for all boys to attend Continuation School for not less than 2 hours a week from the age of 14 to 17, Chemnitz has required 4 hours a week, and 5 hours in some trades, the latter to be shortly extended to include all. Public opinion is now so strong on the subject that it is estimated that if the compulsory law were abrogated, attendance would remain at the same level.

Apprentices receive all their instruction in the day time, neither evening nor Sunday lessons being given, and the session is continuous, for 4 or 5 hours, instead of, as formerly, in two periods of 2 hours each per week. Boys usually come in the morning before going to work.

The Secretary expressed the opinion that the compulsory attendance at Continuation Schools since 1873 has increased public support of all education, through the contact of the workers with Continuation Schools. He cited an instance of some moulders who were on strike, spending their spare time in visiting an exhibition of work from the school, which convinced them of its value.

Voluntary evening classes are offered to journeymen.

The extension of the compulsory attendance limit is being considered, and employers, who were formerly hostile to the schools, are now strongly in favour of the idea. Owing to increased attendance it has been necessary to construct a new building, making three in all for Continuation Schools. These schools are supported by the city, but share in the general education grant made to the city as a w ole by the Kingdom of Saxony. The attendance at the time of the Commission's visit was 14,000 out of a population of 290,000; 4,000 pupils were accommodated in the building visited, their ages ranging from 14 to 17.

The aim of the Continuation Schools is:—

(1) To increase the knowledge and efficiency of the student as producer;

(2) To make him a better citizen.

This is done by means of supplementary education, without workshop practice, though the authorities would be glad of workshops if they could afford them.

All the staff have been elementary school teachers, with a year or more of practical experience in industry, and have the same status and privileges as elementary school teachers. They are required to give a minimum of 24 hours per week. It is proposed to establish a special course for vocational teachers, giving them a year after their elementary school normal training.

General Observations.

A class of Bakers' Apprentices in their white uniform presented a very neat and businesslike appearance. They were going straight from the class to night work.

In the new school there will be workshops for demonstration purposes, as in Frankfurt or Wurttemberg, but the authorities consider the Munich system the best to adopt, if possible.

The following courses are offered:—

Commercial—(6 hrs. weekly): German, Book-keeping, Arithmetic, Trade Instruction, Stenography, (compulsory), English, French, 2 hrs. weekly, (optional).

Clerks' Class—(6 hrs. weekly): for clerks in law and public offices:—German, Arithmetic, Business Stenography, Book-keeping (compulsory), English and or French, 2 hrs, (optional).

Bakers' Class—(160 hrs. a term): German and Book-keeping, Arithmetic and Industrial History.

Confectioners' Class—(200 hrs. a term): German, Bookkeepin , Arithemtic, Business, Drawing, Practical Work.

Builders' workers—(200 hrs. a term): German, Arithmetic, Business, Drawing.

Pattern-Drawing—(160 hrs. a term): German, Arithmetic, Business, Drawing, especially for textile industry, Drawing given in the Higher Weaving School.

Metal workers—(200 hrs. a term): Same subjects, with Drawing as required.

Freehand Drawing.—(200 hrs. a term).

Unskilled Workers—Classes for unskilled workers, 4 hrs. weekly, comprising German, Arithmetic and Civics.

Information obtained in "Conversation" with PROFESSOR GOEPFERT, *Director of Continuation Schools, Chemnitz.*

Prof. Goepfert stated that Continuation Classes have resulted as much to the advantage of the social spirit as to the industries themselves. Graduates are encouraged to form social clubs, with the school as a meeting place.

Owing to the advance of specialization in factories, school workshops are becoming more necessary, and these will be included in the new building. The Guild Continuation Schools will also be taken over as part of the general scheme as soon as the new building is ready, and no contributions are expected from the Guilds for this purpose.

There is no special organization for securing employment for graduates from the elementary schools, beyond the personal interest of the teacher.

The Director prefers teachers, who have had practical experience and possess some pedagogical ability, to academic teachers with little or no practical training.

The trend in public schools nowadays is to include 'dexterity' work.

Continuation pupils usually have about 2 hours of homework.

It is expected the compulsory Continuation Schools for girls will soon be introduced throughout Saxony, and that they will include Domestic Science.

II. TECHNICAL INSTITUTE.

This is organized in 5 Departments, as follows:—

1. Industrial Academy,
2. Building Trades School.
3. Machine-construction School.
4. Dyeing School.
5. Industrial Drawing School (Evening Classes).

Under (3) is included an electro-technical Department for training men in management of weaving machinery.

It is a finishing school, but at the same time, 2 to 5 per cent in (1) go on to a Technical High School, of whom about half proceed to a diploma course. Graduates take positions as draughtsmen rather than as foremen.

The attendance in 1910 was 1253.

The equipment is modern and complete, but intended entirely for demonstration purposes. New buildings and equipment for electrical and steam engineering and for dyeing had been erected about 2 years before the Commission's visit at a cost of 1,250,000 marks. 3,000 marks annually is expended for magazines, ,000 marks for books and 1,000 marks for repairs. The library is open every school day and one evening a week to the general public.

(1) The Industrial Academy.

It began as an industrial school about 1830 for the training of factory workers and foremen, and does not profess to give higher scientific training. The highest class leads to the point where Dresden begins. There is a preparatory class for students needing it.

Divisions:

A. Machine-engineers, manufacturers, managers of machinery, weaving and spinning factories.

B. Chemical technical engineers, manufacturers and managers of chemical and allied trades.

C. Architects.

D. Electrical engineers, for manufacturers, etc. of electrical apparatus.

Courses. 7 terms in all departments. In C 6 months' practical work between first and second terms.

The entrance requirements are as follows:—

For A and D, 1 year military service certificate and one or two years' practical work in a machine factory or electro-technic works.

For C, at least 5 months practical building experience.

Entrance examination or equivalent test.

Leaving certificate entitles to entrance without examination at Dresden and Freiberg to study for degree of Doctor of Engineering and Diploma of Engineering. In B it entitles to course of "Foodstuff Chemist."

The fees are:—120 marks for Saxons, 180 marks for other Germans, and 300 marks for foreigners, plus laboratory fees and deposit for breakages, etc. Books and supplies amount to about 70 to 100 marks per annum.

Svbjects: German and literature, English, technical freehand drawing, physics, chemistry, mathematics, building construction, drawing, measurement, chemical and mechanical technology, metallurgy, electro-technics (practical work), machine drawing and construction, lifting, pumps, steam machinery, boilers, water machinery (practical work). All the foregoing are compulsory.

The optional subjects are:—English, French, stenography, business arithmetic, book-keeping, fire-extinguishing, spinning, weaving and finishing, iron construction, first aid, water installations, patents, prevention of accidents and hygiene.

(2) Building Trades School.

The aim of this Department is to train men for the building trades, as middle-grade technical officials, and to prepare for the certificate of Head Builder.

The entrance requirements demand elementary education not below the 4th class of an elementary school, plus 3 summers' practical work as a mason or carpenter apprentice, and evidence of physical fitness. An entrance examination, including drawing, is held. The journeyman's certificate must be obtained before the second term. Practical work may be put in during the summer to make up the required time.

Fees are 50 marks for Saxons, 100 marks for other Germans, and 200 marks for foreigners, plus books and supplies, 50 marks.

The following subjects are taken:—

German, book-keeping, writing, mathematics, natural science (including chemistry), building mechanics, projections and shading, perspective; building science, including underground work, building materials, building regulations; planning and execution of buildings; heat and light installations; measuring; stone, wood, iron, mixed buildings; pipes, roofs, gutters, plans, freehand and architectural drawing; history of architecture; designing buildings, fire extinguishing.

The course covers 5 terms of 6 months each.

(3) Royal Machine Construction School.

This school has two Divisions, viz:

Machine-technical (tool and power machines).

Electro-technical.

The Aims: To train practical workers as foremen, etc.

The Course: 3 terms of 6 months each (Electro-technical, 4 terms).

The Entrance Requirements: Age 17, sufficient education, and not less than 3 years' practical experience. Only workshop practice is accepted, and the experience should preferably have been in a machine factory (with foundry), or electro-technical work in a mechanical workshop, telegraph supplies shop, etc. Installation of machinery or electric fittings is counted, but not drawing work. An entrance examination is held in general subjects.

The Fees: Saxons, 50 marks; other Germans, 100 marks; foreigners, 200 marks, plus books and supplies amounting to about 60 marks annually.

The Subjects include: German, book-keeping, political economy, drawing, projections, mathematics, physics, writing; technical subjects of selected course. Optional subjects are stenography, spinning, weaving, finishing, paper-making, water fittings, patents, workshop machinery, hygiene.

(4) Royal Dyeing School.

This Department of the Technical Institute gives theoretical and practical instruction to dyers and others interested to enable them to become dyeing experts. Practical laboratory work is given. Short-time students are accepted.

The course covers 3 terms of 6 months each, but those having the necessary training can shorten this, or take the time for special work.

The Entrance Requirements: Age 15, sufficient education, and (3) not less than 1½ yrs. practical work.

Certificates of school and industrial experience must be furnished on entrance and candidates must be able to read and write and know the first four rules of arithmetic, and an examination is held to test their knowledge. Students who have already worked one term in a laboratory may enter one term later.

The Fees: (a) Saxons, 50 marks; (b) other Germans, 100 marks; (c) foreigners, 500 marks, with remissions in deserving cases.

Courses are offered as follows:—

Experimental chemistry and laboratory work in dyeing laboratory; arithmetic, geometry, German, sketching and machine drawing; chemical technology; experimental dyeing and finishing; machinery, dyeing, bleaching, printing, finishing and chemical washing; business book-keeping, civics.

Optional:—Spinning and weaving, electrical and water installations, fire extinguishing and patents.

(5) Industrial Drawing School.

This is an Evening School, which aims to train young people of the industrial classes in drawing and modeling, giving them a sure hand and eye and cultivating their taste. About 300 students attend, most of them being journeymen. Courses are arranged as required in freehand drawing, modeling, geometrical drawing, projection drawing, machine drawing, and the fee is 5 marks per half year.

III. HIGHER WEAVING SCHOOL.

This school has 7 sections, as follows:—

1. Day school—1 yr.
2. Pattern drawing day-school—3 yrs.
3. Day preparatory department—as required.
4. Weaving school (evening and Sunday)—2 yrs.
5. Commercial (evening)—1 yr.
6. Pattern drawing (evening and Sunday)—as required.
7. Apprentice department (day school and 3 yrs. apprenticeship in weaving room).

Special Courses.

Teachers of Needlework and Evening School Teachers.
Plush Weaving.
Accounts in Weaving Business.

The attendance in 1910–11 was 510.

Special Features.

There is an employment bureau in connection with the school, the demand for graduates exceeding the supply.

A Botanical Garden is attached to the school for the use of pattern designers and drawing classes.

Models are borrowed for lectures on style, etc.

Students make trips to industrial centres and write reports.

A weaving collection with 2,047 varieties of textiles is on view for the use of students, and the Reading Room is well supplied with technical magazines. Exhibitions of work are held.

CHAPTER XLVI: CONTINUATION SCHOOLS.

SECTION 1: CONTINUATION CLASSES IN PRUSSIA.

Courses of Study.

The rules and regulations formulated in 1897 for guidance in laying out local courses of study and prescribing the method of teaching dealt particularly with German and arithmetic. It was required that the subject matter should preferably be chosen from practical pursuits and everyday life; and that it should take into consideration the local industrial conditions and promote religious feeling and love of country. Such courses of study could be applied to all grades of schools.

The general Continuation School, which was not directly technical or vocational, had four grades, 2 for German, 2 for arithmetic, geometry, book-keeping and 2 for drawing.

In the carrying on of the classes much was left to voluntary initiative; and chiefly by that means development took the direction of making the courses of study centre more and more upon the interests arising from the occupations and daily lives of the pupils.

In the larger cities the number of students made it practicable to group them in classes according to occupations. This has made it necessary to appoint expert supervisors, principals and teachers, and to provide separate school buildings. The official report says that the former courses of study had become antiquated through this development and in consequence new courses were prepared and officially ordered for adoption in 1910.

In accordance with these, instruction in the mother tongue takes the form of compositions on vocations and lessons in civics, teaching intimately the actual relations of trades and occupations. In schools of smaller communities, in which for reasons of cost students cannot be grouped according to occupations, the subject matter is arranged to pay attention to local conditions and the special needs of the prominent trades of the towns.

Commercial Continuation Schools have also developed into Technical Schools which place in the centre of instruction Business Correspondence, Commercial Arithmetic and Geography, as well as Business Practice.

Drawing.

As a result of careful consideration, new principles for the subject of Drawing were approved by an order of January 28, 1907. These principles aim at a purely vocational evolution of that important branch. Drawing in the Continuation School has during the last decade dropped the former customary æsthetic object and has become sketching and drafting as a practical aid to the various vocations. While formerly drawing of geometrical bodies and mathematical measuring were the centres of that branch of study, and, later, drawing of ornaments received more attention and time, and vocational Drawing (so-called working drawings) did not come in before the second half of the course, now, according to the new principles adopted, working drawings and sketches are the basis of the whole instruction in Drawing.

FOR BOYS IN UNSKILLED OCCUPATIONS.

New problems arise from the fact that unskilled labourers are brought into the sphere of school influence and attend the classes. The subjects of study for such persons are chosen chiefly from labor and transportation conditions of their locality and home province. There are lessons in hygiene and decorous deportment as well as information concerning civic duties and economic welfare.

Before dealing with the Continuation Classes for those employed in learning what are called skilled trades, a syllabus of a Berlin school for boys not in skilled occupations is presented. It will be observed that it also keeps close to the personal, local and daily interests of the pupils.

First Year.

The young workman and his personal circumstances.

A.—Knowledge relating to the calling and civics.

1. Entry into the industrial world.

(*a*) Choice of calling. Skilled and unskilled labor. Obtaining a situation. Meaning of labor.

(*b*) The Continuation School.

2. Place in the new community.

(*a*) Work-book and wages-book. Regulation of the work.

(*b*) Moral behaviour. Duties towards the employer. Attitude towards one's fellow-workers. Relation with others.

3. Hygiene.

(*a*) Personal Hygiene. Nutrition (temperance, alcohol). Clothing (care of the skin).

(*b*) Hygiene in the home and workshop. Ventilation, heating, lighting.

(*c*) First aid.

(*d*) Employment of leisure time for gymnastics, walking and games; for culture, instruction and conversation.

4. Insurance, measures to be taken in case of sickness, accident, etc.

(*a*) Insurance and sanitary measures in case of sickness.

(*b*) Insurance and sanitary measures in case of accident.

(*c*) Insurance and sanitary measures in case of disablement and old age.

B.—Written Work.

1. (*a*) Letters of application and replies. Notification to Police of change of situation.

(*b*) Correspondence and forms used in connection with Continuation School.

2. (*a*) Work-book and forms connected therewith. Correspondence with the employer. (Sickness, inability to attend to one's work, etc.)

(*b*) Letters to relatives, friends, and acquaintances.

3. Notes on hygiene.

4. Papers and forms in connection with the laws of insurance.

C.—Arithmetic.

The four fundamental rules and whole numbers and fractions. Calculations of percentage. (Money, weights and measures system in connection with decimal fractions.)

1. Exercise on entry into the industrial world, fees, advertisements, application for a situation.

2. Exercises on personal needs and on wages.

3. Exercises in connection with hygiene.

4. Exercises in connection with insurance laws, etc.

Second Year.

The young workmen in his employment.

A.—Knowledge relating to the calling and civics.

1. His activity in business (messenger).

(*a*) Transactions in the city.

(*b*) Transactions in connection with the railways.

(*c*) Transactions in connection with the post office.

(*d*) Transactions in connection with money matters.

2. His activity in the workshop (work boy).

(*a*) Important products of handwork and industry of Greater Berlin (so far as they have meaning for the young workman of the classes concerned).

(*b*) Regulations for the control of the workshop.

(*c*) Examples of work for independent and for joint performance.

General View of a Handworkers' School : Berlin.

3. His wages.
   (*a*) Meaning and kind of wages. Protection of wages.
   (*b*) Reasonable use of wages.

4. His legal position.
   (*a*) Examples of contracts for employment.
   (*b*) Orders; commissions, and their fulfilment.

5. The meaning of work.

   (*a*) The value of work for the individual. Possibilities of advancement.
   (*b*) The value of work for State and society. Work formerly and to-day.

B.—Written Work.

In addition to the filling in of forms, letters, notes, etc., are regularly prepared.

1. Papers used in business.
   (*a*) Papers employed in the transactions of the city. Order forms, delivery and receipt forms, accompanying voucher.
   (*b*) Papers in connection with the railway. Consignment entry forms, addressing goods, etc.
   (*c*) Papers in connection with the post office. Addressing packages, telegrams.
   (*d*) Papers in connection with money matters. Invoice and receipt, draft, money order, cheque, postdated cheque.

2. Papers in the workshop. Delivery orders and messages.
3. Papers in connection with the calculation of wages.
4. Papers in connection with contracts for employment, with orders and commissions.
5. Notes, applications, letters.

C.—Arithmetic.

In addition to the application of the fundamental rules, the reckoning of percentage in all forms and applications to be considered.

1. Exercises from business
   (*a*) The city.
   (*b*) The railway.
   (*c*) The post office.
   (*d*) Money matters.

2. (*a*) Exercises on raw products and manufactured articles.
   (*b*) Calculation of space.
3. Exercises on wages and their distribution. Saving and spending of wages.
4. Exercises in connection with buying and selling.
5. Exercises for further application of the materials.

Third Year.

The workman in the community.

A.—Knowledge in respect to the social and civic relationships.

1. The workman in the family.

(*a*) The family as basis for morality and well-being.

(*b*) The care of the parents for a livelihood and dwelling. Thrifty management and insurances.

(*c*) The most important facts in connection with the parental authority and the necessity to provide for maintenance. Inheritance and will. Guardianship and education provided by a trustee. Duties of Children.

2. The workman as member of clubs and unions.

(*a*) Associations—*e.g.*, rent and building society, savings and lending banks.

(*b*) Trade associations.

(*c*) Educational and social clubs.

3. The workman as member of the municipality.

(*a*) Provisions of the municipality for the well-being of the citizens. Public hygiene. Care of the poor and the orphans; provisions for education; taxes.

(*b*) The most important facts in connection with the administration.

(*c*) The most important facts *re* obtaining residence in case of relief.

4. The workman as a citizen of the State.

(*a*) Concerning Imperial arrangements and Imperial authorities: The Emperor; the Federal Council; the Reichstag; Imperial revenues; Army and Fleet.

(*b*) Concerning State arrangements and State authortities:—The King and the Parliament; State revenue and Justice.

B.—Written Work.

1. Papers and letters which concern the family. Rent, notice, loan, etc.
2. Invitations. Exercises. Composition of a simple report.
3. Applications in matters concerning the poor and orphans.
4. Applications to the authorities, particularly to the court.

C.—Arithmetic.

1. Exercises from domestic affairs. The savings bank, life and fire insurance, notes, bonds, etc.
2. Domestic book-keeping.
3. (*a*) Municipal taxes. Exercises in connection with the organization of the city.
   (*b*) Book-keeping of a small business.
4. Taxes and customs.

FOR BOYS AND MEN IN SKILLED OCCUPATIONS.

The courses of study and time-tables for those differ from that which has been given for boys in unskilled occupations. Information on the courses of study for skilled workers and those learning skilled trades is given with great fulness under the headings Machine and Metal Trades Schools, Building Trades Schools, Textile Schools, Commercial Schools, Industrial Schools for Women, and Industrial Art Schools.

Schools for Apprentices.

In all the schools the Commission was impressed by the very high quality of the Drawing. In the Elementary Drawing, study and practice in form are taken first, then study in colors. As an example of how a design is built up by a pupil, the following was noted. The unit of a butterfly was first drawn; then the pupil made conventional designs from that unit, and afterwards combined those into a scheme for a decorative border.

For those in the Building Department, in the latter years of the course, drawings with complete specifications are required. If the project be the installation of a lighting plant in a house, the drawings and specifications must be such as a contractor and workmen could work from.

Practice in calculations was made a good deal of. These were introduced and extended to include the cost of materials, suitability of the project for the conditions into which it was to be fitted, and the purpose for which it was to bs used; all this considered in the light of local and existing market condition.e Students were trained in such calculations at least eight times a year. Book-keeping for each trade is taught carefully, including a system of cost accounting, etc.

As examples of the completeness and thoroughness of the provision made and the work done, the following are cited as typical of others. In the Upholstering Department one room was fitted with movable fixtures for experimenting in draping in materials of different kinds for various purposes.

For the shoe making trade there were specimens of leather showing the stages in all the processes of leathermaking. Hides were marked to show the method of cutting without waste of material. Students practised first in cutting cardboard and paper until they had some proficiency.

In the class in saddlery, Drawing was taught as carefully as in other departments. That was carried out to a much more advanced stage than would be considered necessary in Canada. This is mentioned as illustrative of the thoroughness of the work in the Continuation Schools.

In one school for the course in saddlery, 2 hours out of 6 every week for 3 years was devoted to Drawing.

In the Gold-and Silversmiths' Department there was full equipment for the making of fine jewelry and art objects.

In all departments care was taken to acquaint the pupils with all the different materials used in the trade, the processes of their manufacture, their relative values and their geographical origin. The impression was received that the teachers treated every subject allied with the one in hand in great detail, and that beyond the point that would seem practicable or necessary in Canada.

All classes receive some instruction in Hygiene, Public Health and Civics.

At this point a few of the notes are introduced from those taken while visiting a school (Gewerbesaal, Strassmannstrasse) for workmen past apprenticeship at Berlin.

School for Workmen Past Apprenticeship.

This School has Evening Classes for workmen in iron and wood who are past the apprenticeship stage. It is also attended by some apprentices who take Continuation Classes. Workmen take courses to make their 'master-pieces' and obtain their Master's Certificate.

The staff is appointed by a committee of the city authority and is paid by the hour. The head teachers give their whole time to the school. Some of the men of the highest attainments and reputation in manufacturing establishments are among the instructors. The staff is not represented on the examining committee for Masters' Certificates, which are awarded by the Guilds. There are both State and municipal inspection, although all the financial support comes from the city. The courses are ten weeks each. The workshop courses are arranged for 14 men in a class. The models are usually made by the instructor, and from them the 'master-pieces' are executed in iron or wood by the pupils.

The newest forms of iron and wood-working machines for particular trades are provided and used to give the students a knowledge of them which they cannot obtain in the workshop.

The pupils were making some fine instruments of precision for use in the school. Individual parts of instruments of precision were mounted so that each could be seen complete.

All work was fine in quality, revealing skill of a very high order. The Drawing was particularly good. The school is reported to exercise a leavening influence on standards of workmanship.

The attendance was 80 in Day Classes and 400 in Evening Classes. There are seven divisions and altogether 98 Evening and Sunday Classes.

SECTION 2: THE MUNICH SYSTEM.

Information obtained in "Conversation" with DR. GEORG KERSCHENSTEINER, *Superintendent of the Munich Schools.*

GENERAL PRINCIPLES OF ORGANIZATION.

1. The aim of the public schools, which are supported from public funds, is the education of useful citizens, *e.g.*, such as will contribute directly or indirectly by their work to the development of the State as a civilised and cultured community. Thus the first object of the schools is to promote as far as possible the working capacity and at the same time the joy in work of the pupil. The second is, to accustom the pupils early in life to use this capacity and joy in work for the service of their companions and fellow-creatures. The third is, to combine this readiness for service, consideration and propriety, with an appreciation of the aims of the community of the State, as far as the pupils mind is sufficiently matured to appreciate it. Our present schools do not quite come up to this ideal, but where they are well organized, they at least aim at the solution of the first problem, training for personal capacity. They are not, however, schools of social service.

2. The schools for the great mass of our fellow-citizens, *i.e.*, the public schools, are not even sufficient to satisfactorily deal with the first point, and thus they can in no wise promote industrial efficiency and industrial satisfaction in work. On the other hand the conditions of industry for the apprentice of 14-18 either in industrial or handwork pursuits, commerce or agriculture, leave so much to be desired that the majority of our fellow-citizens during their introduction to a definite trade attain neither a right understanding of work nor industrial efficiency, let alone a productive joy in work. Further, all moral education is absent. It is therefore essential to extend the public school system in such a way as to bear directly on the industrial life of the boy, handle its problems as thoroughly as possible, deepen, widen and ennoble it, and thus produce in boys and girls efficiency and delight in work. For the education of the masses the present continuation school is the best agent; it accompanies the boys and girls during their industrial learning time, and at the same time it can handle the other problems mentioned, the training in consideration for others and devotion to common causes, as well as for social service in the community.

3. In order to fulfil the first aim, the training for efficiency and joy in work, the course of the continuation school must make the pupil's practical work the central point of its activity, and combine all teaching of a commercial, agricultural, scientific, moral or aesthetic kind closely with the practical work. Where possible, *e.g.* in all larger cities and all purely agricultural communities, pupils of both sexes are to be gathered according to pursuits, and to be led *through the trade instruction* to higher intellectual, moral and social education. This trade continuation school must be compulsory for all boys and girls to their 17th or 18th year, just like the public school. The hours per week should

not be less than 6, and should not be at night, but during the actual daily work of the boy or girl. Wherever possible, special teachers should be appointed, for only thus can they be expected to give their whole energies to this work. These schools should be free, like the public schools, and supported equally by the community (city or village) and the State.

4. In order that these schools may fulfil the second and third condition also, the instruction is to be organized as far as possible from the point of view of *work in common*, for only thus are the most important civic virtues cultivated, viz., consideration for others and devotion to outside objects. Even outside of lessons, pupils should be encouraged to form societies for various purposes. Where possible, an employers' association should be connected with the school in such a way as to give it considerable interest in the same; this will promote combination in work and extend the scope of the training. The training will thus gradually tend to instruction in patriotism and civics, as far as the pupil can grasp the subject, and this instruction is not to be in formal lessons, but rather training in duty towards the Constitution and prompted by the ethical conception of the State, founded as far as possible on the personal experience, original investigation and observation of the pupil. Such training of the masses, if properly carried out, will enable the modern federal States to develop themselves above all as cultured States by further extension of their public life. That such training is possible is shown by the results in Munich, a city of 580,000 inhabitants, and also in various small country communities. The extension of these principles of organization to the higher school system, will then be the best means, in conjunction with the lower school system, to convince all of the inseparable character of their interests, and to put them in the way of an equitable adjustment of those interests.

The City School System.

Before proceeding to describe the Munich organization, a short sketch is given of the entire school system of the town. The primary school is compulsory for boys from 6 to 14, for girls from 6 to 13. The number of primary school pupils is 70,000 in a population of 580,000. All children from the day laborer's up to the prime minister's attend these schools. No fees are paid.

Kindergartens for children from the age of 3 to 6 are attached to most primary schools. Attendance is voluntary and not free of charge.

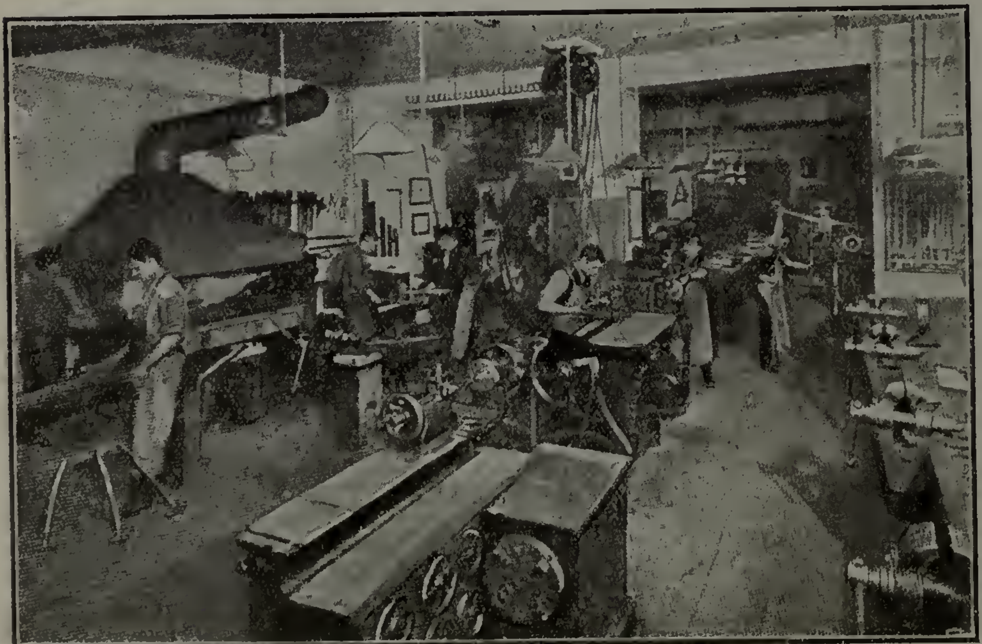
Girls and boys who pass up to higher schools to prepare for the professions of scholars, engineers, clergymen, higher state officials, etc., leave the primary school at the age of ten and attend a secondary school. There are 13 public and 14 private (secondary) schools for this purpose (Gymnasia, Realschulen, Oberrealschulen and Higher Girls' Schools). Attendance is not free of charge, but very cheap—about $1 a month.

The compulsory primary school is followed by the compulsory continuation school for all boys and girls who do not attend a higher school. Attendance is compulsory for boys during the whole of their apprenticeship, but not beyond their 18th year; it is compulsory for all girls for 3 years. Attendance is free of

Elementary and Continuation School for Coppersmiths, Machine Fitters, Mechanics, Locksmiths and Iron Workers, Tailors, Carpenters and Joiners.

For Carpenters and Cabinet Makers.

For Metal Casters, Belt Makers, Engravers.



For Iron Workers and Locksmiths.

For Smiths.

For Coppersmiths.

FOR JEWELERS, GOLD AND SILVERSMITHS.

FOR TURNERS.

For Wood Carvers.

For Saddlers and Leather Workers.

FOR BOOKBINDERS.

FOR CONFECTIONERS AND FANCY BAKERS.

charge. The compulsory continuation school for boys is again followed by an optional continuation school for persons over 18, which was attended last year by 2,600 pupils, and represented at least 12 hours' weekly instruction. Attendance is not free of charge, but also very cheap—50c. to $1 a month.

The compulsory continuation school for boys had 8 to 10 hours' instruction weekly. The compulsory continuation school for girls had only 3 hours' instruction weekly previous to 1912; now it has 6 hours. But side by side with this compulsory continuation school are a voluntary continuation school, with 6 to 12 hours' instruction weekly, and a voluntary 8th class in the primary school with 30 hours of instruction a week.

Extent of Attendance.

The compulsory continuation schools for boys contain in round numbers 9,400 pupils; the compulsory continuation schools for girls contain 7,500 pupils, the voluntary continuation schools for girls, including the 8th class, 3,700 pupils. All in all, therefore, there are about 20,000 pupils under 18 years of age in these continuation schools. In addition to these there are 10,000 pupils in the higher boys' and girls' schools of the town (7,000 boys and 3,000 girls).

Thus about 100,000 children, that is 18 per cent of the entire population and 93 per cent of all the boys and girls between 6 and 18 in Munich, attend the public schools of the town.

The 9,400 pupils of the compulsory continuation school for boys are distributed in 52 trade schools and 12 general schools. The trade schools are attended by all boys who are apprenticed to any trade, the general schools by unskilled workmen (about 1,100), day laborers, barrow men, errand boys, and servants. These general schools also receive the apprentices of trades that are too small to have special trade schools established for them.

The 7,500 girls in the girls' compulsory continuation school are distributed over 40 schools in the town. They receive without exception household teaching. 1,200 of the 3,700 pupils of the voluntary continuation school are in the voluntary 8th class, 1,300 in the household department of the continuation school for girls, 900 in the commercial, 300 in the trade department. The classes of the voluntary continuation school for girls are distributed in 21 schools.

External Organization.

A trade school (a continuation school) is established in Munich for every trade that has at least 25 apprentices. Trades with a great number of apprentices (such as machine-builders, mechanics, locksmiths, joiners, bakers, butchers, publicans) have at their disposal several trade schools in different parts of the town, in order to shorten the distance to school. The only exception is that the 1,200 commercial apprentices are housed in a single building in the centre of the town.

The apprentices' trade schools with their higher divisions for journeymen and masters, that is, with their voluntary continuation schools, are distributed in 7 schoolhouses throughout the city. One of these schoolhouses contains only the commerical apprentices, a second principally the different branches of painters, a third the various building and arts trades, a fourth the printing and reproducing trades, fine mechanics and machine locksmiths, a fifth the different kinds of wood-workers. The butchers' trade school is combined with the town slaughter-house. The gardeners' trade school has its own grounds. Six of the 52 trade schools are still in the buildings of the primary schools.

All trade schools are under the direct supervision of 9 headmasters or directors, with sub-directors for each school.

To most trade schools is attached an association of employers, who bear the expense of school material, take part in the discussions on the plan of instruction, have the right of nominating technical teachers, assist in the supervision of the practical subjects, co-operate in the examination of apprentices, and help to increase interest in the school and to further its development. This intimate connection of an employers' association with the aims and tasks of a trade continuation school established by public money has in many cases proved an exceedingly useful arrangement. The interest of the employers in the education of the apprentices is considerably increased. And when this is achieved, the association naturally does not content itself with furthering the education of the apprentices in the school alone, but seeks to raise the standard of their calling in their own workshops as well. This is of course a process that takes place very gradually.

Each continuation school also possesses its own school board, consisting of a headmaster of the trade school, a member of the municipality, and three employers of the trade. It is the business of this board to manage the affairs of the school and especially to keep watch on the regularity of attendance.

Every apprentice spends one whole day or two half days of his working week in a trade school. As a rule this involves a reduction in wages. Some employers' associations, however, pay wages on both school and work days.

The yearly expenditure for the compulsory apprentices' trade school and for the voluntary journeymen's trade schools amounted last year, aside from the annual building expenses, in round figures to 900,000 marks. The individual continuation school pupil therefore costs about 80 marks, whereas each primary school pupil costs 93 marks and each pupil in the higher schools 200 marks. The expenses of the primary school are borne principally by the city, the expenses of the higher schools are with few exceptions borne by the State, and the expenses of the continuation school are borne by State and city together.

The annual net expenditure for the compulsory and voluntary continuation schools for girls amounts to about 400,000 marks, and is borne by the city alone.

Internal Organization.

So much for the external organization. When we turn to the internal organization of the compulsory continuation school, we find, as already pointed out, practical instruction in workshop, laboratory, shop and garden in the centre of every apprentices' trade school. This instruction represents two to three hours a week.

Teaching in drawing and arithmetic is most intimately connected with this practical instruction. Nothing is drawn that has not been made in the workshop. And every process in work or construction is followed out in figures. By making out both preliminary estimates and bills the pupil learns the value not only of material and work, but also of the time that has been spent upon the work. It is particularly useful for the apprentice to recognize by these bills how much the time he has spent on the work—and this of course is very great with apprentices—increases the cost of production. Special care is taken in making out bills and estimates to let the pupil learn to calculate not only the cost of materials and time but also all other items of cost arising from the deterioration of machines and tools, the interest on capital, carriage and various other sources of expense.

Practical instruction is also intimately connected with the study of materials, tools and machines. The pupil makes acquaintance with these almost exclusively through his own practical work. He is especially familiarized with the mechanical laws under which machines and tools work.

Moreover, when the work in hand demands a knowledge of physics and chemistry to show the pupil the reasons for what he does, or teach him how to make new experiments with success, he receives instruction in special laboratories in the fundamental laws for well-considered work.

Civic instruction is generally planned as follows in the different trade schools: First, the historical development of the trade to which the pupil belongs is discussed. He is shown in the struggles of his fellow-workers the continually growing interdependence of interests among all citizens of a community. Concrete examples of devotion to a common cause are placed before him. Thus by degrees he recognizes how the problems arose which occupy city and nation today, and learns the duties and rights of the individual within the state.

This insight is strengthened into the will to consider others and to devote himself to common purposes by the association of pupils in working groups, especially in the last school year.

Hygienic training is given not only by special instruction in hygiene, but also by gymnastics and games on Sunday afternoons and during the school holidays. An association of young men of the cultivated classes, especially young army officers, places well-trained leaders at our disposal on Sundays, who take hundreds of apprentices for walks in the environs of the town.

The technical education of the apprentice is never planned with a view to letting him make masterpieces. On the contrary, the endeavor is to let him find pleasure in simple, careful, thorough, conscientious work in genuine materials, and also to encourage him to new attempts through the feeling of security in his own power.

Religious Differences not Recognized.

The pupils' moral insight is enlarged by German lessons. Good authors are read in class and a selection of good books from the school library placed at the pupils' disposal for reading at home. In addition to this the pupils have 1 lesson weekly in religion up to their 16th year.

Although the Primary Schools are separated for Catholics and Protestants, there is no such distinction in the Continuation or Technical Schools, there being but one organization of these schools for all.

Teachers from Different Sources.

In the 52 trade schools there are about 120 teachers entirely attached to the schools and about 300 who give lessons there in addition to other work. The teachers are recruited from all kinds of professions and vocations. Academic and normal school teachers co-operate with master workmen, journeymen, artisans and agriculturists, and they exert an excellent influence upon each other. The artisan, the master and the journeyman learn to respect the schoolmaster, and the schoolmaster learns to respect the workman, who is engaged with him on the same educational problem.

Compulsory Attendance Discussed.

The first fundamental principle of a rightly organized continuation school is that it must extend to the eighteenth year of every boy or girl who is not being educated in a higher school. It is of no advantage to a constitutional State to make its opportunities of culture accessible only to a small percentage. When all citizens of the State have the right to participate in its affairs and to exert influence on its executive through the suffrage, it is the business of the State to provide all with an education that will enable them to make a reasonable use of this right.

During several decades it was believed in Germany that it was sufficient to give opportunities for boys and girls to continue their education after quitting the primary school and to leave the use of such opportunities to their own free will. The United States, France, and especially England are still of this opinion. England points not without justifiable pride to the very large attendance at its night schools. The evening courses at the excellent School of Technology in Manchester were attended by twenty-five thousand pupils, while Munich, having four-fifths of the population of Manchester, had only about eighteen thousand pupils in its compulsory continuation schools in the same year. But it is not enough to count only the number of pupils. We must also ask, how many hours' instruction does each receive? And we then find that in Manchester the pupil received sixty-three hours a year, while in Munich he received three hundred and thirty hours in the year.

Attitude of Employers.

In Germany everybody is now convinced that the voluntary continuation school no longer suffices for the educational needs of modern States. As long as the continuation school remains optional, thousands of employers will prevent their youthful workmen from making use of its opportunities, except at the end of their day's work, when mind and body are fatigued. And even in cases in which some reasonable employers would be willing to grant their boys time for study they would probably do it only if the training in question were principally in the interest of their own trade. The number of employers who see farther and recognize that it is of the greatest importance, not only for business but also for the community at large, not to let the man disappear in the workman, but to take his moral and civic education in hand betimes, is too small to achieve any appreciable progress in the universal education of the people by means of purely voluntary continuation schools. We must remember that a voluntary continuation school will not reach those who need it most, that is to say, the innumerable boys and girls in our large towns who have a family only in name or no family at all. No one will voluntarily seek an opportunity of culture after the burden and heat of the day, unless he already possesses certain moral qualities that incite him to attend to his own education at the cost of trouble and inconvenience to himself.

There was great opposition to the compulsory requirement, in the early days, especially from the employers, but now they have learnt from experience that the time the boy spends in school is worth being given. Attendance on two half-days in different parts of the week is preferable to one whole day, but as employers prefer the latter plan, it is now arranged that first year apprentices come one day, second year apprentices the next, and so on. That leaves always two-thirds of the apprentices in the shop.

Influence of the Governments.

Most German States grant a subsidy only to towns that hold their continuation classes before seven o'clock in the evening. This is one of the cases in which sacrifices must be made by employers, by giving their apprentices the requisite time for school during the hours of work. The will to make this sacrifice was often extremely weak on the part of masters and manufacturers, but it received powerful support in the trade-regulation law of the German Empire issued in the year 1897. According to paragraph 120 of these regulations every employer is put under the obligation to dismiss his apprentices from work at the hours appointed by the town for school purposes, under penalty of a fine. I must add that the masters and manufacturers, especially of South Germany, are almost unanimously reconciled to this order of things. Indeed some employers and guilds in Munich have offered to send apprentices for longer instruction than the means at our disposal permitted us to provide.

Girls and Women Provided for.

It would be extremely one-sided to establish schools of this kind for men workers alone. The more the population of a country increases and the harder the struggle for existence consequently becomes, the more is the wife obliged to contribute to the support of the family and the more pressing is therefore the necessity of giving girls opportunities of training, not only in the household knowledge that helps to preserve a family from ruin, but also in the different branches of trade by which she may later earn a livelihood. Indeed in greatly overpopulated States the continuation school is even more important for the girls than for the boys.

In our great factory centres, where husband and wife go out to work, family life and family education are in innumerable cases well-nigh annihilated. Thus a new source of danger for the life of the State arises. If it were possible to develop a strong family feeling and to reinstate the family in old educational functions by training women to their duties as mothers and housewives and giving them the opportunity of performing these tasks, our anxiety for the education of growing lads would be considerably reduced.

The difficulty of organizing continuation schools for girls lies in the fact that these schools have to fulfil a twofold task. In the first place a girl must be trained for her vocation proper as mother and housewife, and in the second place, marriage being uncertain, for a calling by which she can support herself. It is therefore necessary for both elementary and continuation schools to keep these two objects in view. As long as the time at its disposal is too short, it will have to pay chief attention to the training of the housewife and mother and then turn to the training for a vocation.

Dr. Kerschensteiner's Conclusions.

The conclusion thus arrived at is that real scientific culture in union with that discipline of character which teaches thoroughness and devotion to aims lying outside of ourselves are of no less importance for the industrial development of a country than technical training. Technical capacity alone will not suffice. In my opinion, the German day trade schools suffer from the fact that they pay almost exclusive attention to technical training. I have already repeatedly remarked that the courses of instruction in our technical day trade schools differ undesirably from those of our eastern and western neighbours, in the small attention paid to civic education, which is to me identical with the formation of character.

Among the answers given by German manufacturers to the inquiry of the German Committee for Technical Schools there is one which lays its finger on the essential point of all education:

"A far more important problem for the machine-builders' schools than the exact amount of instruction in the single branches is to develop the character and intelligence of the pupils. Teaching suited to the future calling must be regarded merely as a means to this end. We shall always be able to work successfully with men of character and intelligence, whether their schooling has led them further in one branch of knowledge or another. Knowledge learnt at school can never be more than the simple rudiments of the knowledge gained by experience in special work."

This lesson which a German machine-builder gives the committee must be taken to heart by the German day trade schools and all the trade schools of the world. Technical instruction must be regarded in the first place as a means of character-training, and it must be supplemented by other forms of instruction with a view to making it as many-sided as possible. In the life of great economic groups and of nations there are moments, and they are the critical moments, in which neither knowledge nor skill, but character, decides the day,—character that has learned to regard its own egoistic interests as of no account when their sacrifice is demanded by the welfare of the community to which we belong, the welfare of the service that we have chosen, the welfare of the subordinates entrusted to our care.

SECTION 3: AIX-LA-CHAPELLE.

This city of 160,000 population, situated near the Belgian border, is an important coal-mining centre, and also has woollen mills and iron and steel works.

The general organization of technical education is as follows:—

1. Municipal Trade Continuation School (Compulsory).
2. Vocational Day School, including,
    (*a*) Voluntary Vocational Continuation School.
    (*b*) Voluntary Commercial Continuation School.
3. Vocational School For Boilermen and Machine-Minders.
4. Building-Trades School.
5. Machine Construction School.
6. Industrial Art School.
7. Textile School.
8. Mining School.

1. Municipal Trade Continuation School (Compulsory).

This was established in 1908, and has Commercial and Vocational Sections, of which the former is supported by the City, State and Chamber of Commerce equally, and the latter by the City and State. Fees are charged as follows:— Commercial Section, 24 marks per annum; Skilled Trades, 8 marks per annum; Unskilled Trades, 6 marks per annum, but necessitous pupils are received free of charge, and books are supplied in some cases. Attendance is compulsory up to 17 years of age. Of the 3000 pupils, 440 were taking commercial work, coming two half-days weekly, 8 hours in all. In the Vocational Section boys take one whole day weekly, working 8 hours. No evening work is done.

The Governing Body is composed of the mayor, representatives of the City, manufacturers, technical teachers, and a representative of the Chamber of Commerce.

2. Vocational Day School.

This school has been in existence for over 25 years as a Municipal Vocational School with a 2 years' course for pupils aged 14 to 16. It is supported equally by the City and State, after deducting fees, which amount to about 10,000 marks annually, the expenditure being 125,000 marks.

The school is intended for boys who have completed the elementary school course but do not want to go on to higher work, and yet wish to enter industry in some higher position than as mere craftsmen. Graduates enter business as clerks, stenographers, etc. and go on to a higher business school, or enter practical life for a year or two and then go forward to the Building Trades School or the Machine Construction School. Those entering trade as apprentices have no allowance made in length of apprenticeship. Completion of course exempts pupils from attendance at Compulsory Continuation School.

Building and equipment: The building, which cost 600,000 marks. was paid for by the City, and contains workshops (typewriting and electrotechnic), a splendid Library of 6,000 volumes, a fully-equipped Gymnasium and fine Drafting-room.

Remuneration of Teachers: 2,700 marks to 4,800 marks yearly, plus rent allowance of 920 marks according to ability and length of service. Also retiring pensions, maximum being two-thirds for 42 years' service.

Fees: 60 marks per annum.

COURSE OF STUDY.

Technical Department:

Lower Class 37 hrs. weekly.	Religion: Catholic. / Religion: Protestant. — 2 hrs. weekly. German and French. Arithmetic, Geometry, Algebra. Physics. Freehand Drawing. Workshop Training
Upper Class 38 hrs. weekly.	Same as Lower, with addition of Chemistry and Geometrical and Linear Drawing.

Commercial Department:

36-38 hrs. weekly.	German and Business Training. French. Gymnastics. English (in Upper Class)

(a) VOLUNTARY VOCATIONAL CONTINUATION SCHOOL.

This with the Industrial Drawing and Industrial Art Schools constitutes a regular Evening and Sunday Continuation School. Lessons are given on weekday evenings from 8 to 10 o'clock. There is also a Sunday morning class for outside pupils in arithmetic, business bookkeeping and writing, held between 7.30 and 9.30 a.m.

Subjects: German, business bookkeeping, practical arithmetic, elem. geometry, writing, physics, chemistry and electro-technics. The Study Plans of the Industrial Art School and Drawing School are so arranged that students can take both courses. In view of the fact that the syllabus of this Continuation School forms a necessary complement to the Drawing and Industrial Art School, the pupils of the latter may attend Continuation School free.

(b) VOLUNTARY COMMERCIAL CONTINUATION SCHOOL.

This offers opportunities to apprentices and assistants of the commercial classes to supplement the general knowledge gained in lower and higher schools, with special reference to their practical work, thus aiding and developing their industrial efficiency.

Choice of subjects is allowed as far as time table admits of it.

Course: 6 months. Classes are held on all weekdays except Saturday, from 8 to 10 p.m.

Subjects: German correspondence, French, English, Italian, Spanish, bookkeeping, commercial arithmetic, currency, shorthand, typewriting.

SECTION 4: COLOGNE.

A city of 516,000 inhabitants, situated on the banks of the Rhine. The principal industries are machinery and metal, printing, and the manufacture of perfume.

The organization of the Continuation Schools is as follows:—Vocational; Compulsory; General Commercial; Higher Commercial.

VOCATIONAL CONTINUATION SCHOOL.

This is supplementary to apprenticeship, pupils entering after completion of elementary school. The course covers 3 years and special classes are arranged as required. The classes are held in various elementary school buildings, and are under the control of the directors of the latter in most cases. The supreme control is vested in the Director of the local Continuation Schools, and a Curatorium is responsible for the external arrangements of this school and the compulsory Vocational Continuation School.

The teachers are not exclusively employed in this school, as there is no day instruction. Remuneration is according to number of hours: for each weekday hour 105 marks per year, more for drawing teachers.

Fees: For 4 hours instruction (unskilled and non-drawing) 4 marks yearly. For 7 hrs. instruction (drawing) 8 marks yearly.

There are about 70 free places.

The State gave 11,027 marks (1909–10) of the total cost, 58,478 marks.

Attendance: Two evenings a week for 2 hours, Drawing on Sunday morning.

The total attendance in the winter of 1909–10 was 1,643 pupils ; in the summer 1,696 pupils.

Compulsory Continuation School.

Organization: Erected 1903 by local statute. Attendance is compulsory for all workmen and apprentices in every branch of industry and commerce up to completion of 16th year, unless attending some other institution of a similar character.

Subjects: German, arithmetic and drawing, 2 hours each weekly. Drawing is not obligatory for those who do not require it in their business.

Attendance may be extended to 3 years at the discretion of the school authorities.

There are four Groups, and special classes as required:

1. Machine construction and metal work.
2. Building trade and allied trades.
3. Decorative and dress trades.
4. Non-drawing trades and unskilled workers.

Maintenance: The total cost in 1909–10 was 98,135 marks, of which the State contributed 23,086, the remainder being provided by the City. No fees are charged.

Attendance: Two evenings a week for 2 hours each. Drawing on Sunday. 6 hours a week is required of pupils taking drawing, 4 hours a week of others. The total number of students in the winter term of 1909–10 was 3,454, of whom 1,666 left at the close of the session.

The classes are held in various schools.

Materials are furnished free to necessitous and deserving students.

Special Features: No organized welfare work is undertaken owing to lack of funds, but some of the teachers make independent excursions with their pupils to various places in the neighbourhood, attendance being voluntary. Students are also encouraged to use the public and other libraries, and cultivate a taste for good literature.

SECTION 5: CREFELD.

A manufacturing centre, having about 130,000 inhabitants. Chief seat of the manufacture of velvets and silks.

Industrial Education is provided by:—

(1) The ordinary Elementary and Secondary Education as a basis. (2) Industrial Continuation Schools, compulsory for boys between the ages of 14 and 17 who are compelled to leave school and enter the industries.

Continuation School.

Governing Body: The Board of Directors consists of 19 men, most of them members of the City council or selected by that body; 4 are expert schoolmen, 5 manufacturers, 7 master mechanics, 1 an architect and 1 a merchant.

Aim: To equip boys between 14 and 17 to meet the demands of the present economic life and to furnish them with general instruction, having regard to the young man, (1) as an individual, (2) as a member of a trade, (3) as a citizen of the State.

Instruction is theoretical and practical.

The theoretical provides for:—

A. The purely technical side in (1) Industrial Science, (2) Technical Drawing, (3) Technical Mathematics.

B. The business or economic side in (1) Book-keeping, (2) Calculation of cost of production, (3) Business Correspondence.

The practical provides for workshop instruction in some of the trades to supplement the daily work and thus, in the end, to turn out a better all-round workman.

In all trades the minimum numbers of hours weekly is 4, divided as follows:—

Industrial Science and Civics	2 hours
Technical Mathematics and Book-keeping	1 hour
Business Correspondence	1 hour.

with 2 to 4 hours additional special trade instruction in various trades. First Aid courses held for the older pupils. 69 per cent of the instruction hours are in the day time.

Attendance, 1910–1911:

Mechanics' Apprentices	1,410
Factory Apprentices	1,229
Unskilled	681
	3,320

These numbers are distributed over about 26 trades, together with apprentices in commercial houses.

Fees: 6 marks yearly, paid quarterly by parents or employers.

Teachers: In addition to the Director, there are 14 teachers employed exclusively in the Continuation School, and 38 part-time teachers, 12 of whom are elementary school teachers, 2 technical teachers from the Royal Weaving School, and 24 are mechanics or engineers, who have had some training in teaching.

Other Features: The School aims to work in co-operation with the employer, and apart from actual trade requirements to develop the pupil in other directions, as a good citizen, able to take an intelligent part in the life of his country and district. Conditions of industrial life offer frequent opportunities for moral lessons, for inculcating self-control and devotion to duty, etc. The student goes out to his mechanical work with a mind stocked with useful ideas, and better still, a definite bias.

The relations of the School with the Guilds and Unions are very friendly, the latter being represented on the Board, and taking a friendly interest in the pupils.

An Apprentices' Club is maintained, under the supervision of one of the teachers, to provide rational amusement and occupation for the boys, and keep them off the streets. Savings Banks are also a feature of the Continuation School.

The Day School.

This School is an excellent preparation for those who have chosen a vocation in which a thorough training in Drawing is necessary. It also enables the boy who has graduated from the Elementary School to attain the same degree of education in 1 year of 38 hours weekly as a boy attending the Continuation School attains in 3 years; and, by a local ordinance, any boy who has satisfactorily attended the Industrial Day School for 1 year is excused from attendance at the Continuation School. He may then enter practical life, or become a day pupil in the Industrial Art School.

This School is under the Director of the Industrial Continuation School, both institutions being in one building and using the same equipment.

THE COURSES.

Two Courses are provided:—
Class A. Technical Course.
Class B. Course for Decorative Trades.

No.	Subjects.	Number of Hours. Class A — Technical Course	Number of Hours. Class B Course for Decorative Trades
1	Religion and moral teaching	2	2
2	Industry and science	2	2
3	Industrial composition and correspondence	2	2
4	Industrial bookkeeping	1	1
5	Study of materials	2	2
6	Industrial arithmetic	3	5
7	Algebra	3	0
8	Geometry	4	4
9	Natural history	2	2
10	Linear and perspective drawing	8	4
11	Technical and special drawing	8	4
12	Ornamental special drawing	3	8
13	Perspective drawing after models and patterns	3	3
14	Workshop instruction	3	3
	Total	38	38

One good result of this School is in preventing boys from selecting unsuitable occupations, and giving them an opportunity of discovering their bent.

Fees: 60 marks per annum, payable half yearly.

SECTION 6: FRANKFURT.

The population of Frankfurt is 415,000, the principal industries being the machinery and printing trades.

1. Compulsory Continuation School.

This School, which takes boys and girls up to 17, is under the control of a Committee representing civic, educational, industrial and commercial interests. It is maintained jointly by the State and City. The attendance in 1909 was 5,543, distributed over 208 classes.

Buildings and equipment: The main building cost 650,000 marks and there are two other buildings devoted entirely to Continuation work; cost of each 400,000 marks. Another building is projected.

The main building is a fine structure, and seemed well equipped for the teaching. The Director was very emphatic on the principle that the boys should have no real workshop instruction other than their regular handiwork that they get in the process of their daily vocation, so that no real workshops are provided.

Correlation: All the boys and girls who attend the schools are occupied as apprentices in industrial concerns or in commercial life. There are a few who attend who have left school but are temporarily not occupied in industry or business.

There is an extremely close correlation between the small masters in a few trades, such as carpenters, locksmiths, electric workmen and one or two others, whereby the handwork that would normally be done in a school is done under the direction of the master in the shop. The method is this:—

In the school the boy is shown a model of some sort connected with some handwork in his trade. This is discussed by the teacher and then the boy makes a drawing. He takes the drawing to the shop and there the master teaches him how to make it outside of working hours. The master keeps track of the boy's time and then shows him how to reckon the cost of the work. Then this model is taken back to the school and inspected by the teacher, and again discussed in class. At the end of the year there is an exhibition of the handwork and a committee of the masters awards prizes on the work.

It is most difficult to get any such correlation with a factory, or with any other than the smaller employers.

After the apprentice completes his period of service, the Director believes that he should have higher workshop instruction in the more special parts of his trade in workshop or master courses.

The Director said that he had received a great deal of inspiration and assistance from the Continuation Schools in Munich.

No lessons are given after 7 p.m. Usually 2-3 hours daily in morning and afternoon, 6 hours being the weekly minimum.

The Commercial section: Both boys and girls attend, the subjects being German, commercial arithmetic, geography and law, book-keeping.

The Trades section offers courses for the following:—Locksmiths, Installators and Tinsmiths, Mechanics and Locksmiths, Electric Fitters, Metal Workers, Wood Workers, Glaziers, Building Laborers, Leather Workers, Painters and Paperhangers, Bookprinters, Typesetters, Bookbinders and Lithographers, Painters, Whitewashers and Varnishers, Bakers and Confectioners, Waiters and Cooks, Butchers, Tailors, Barbers, Hairdressers and Dental Mechanics, Gardeners, Industrial Arts, Unskilled Workers.

Subjects: German, trade arithmetic, trade drawing, bookkeeping. Preparatory Classes are arranged if required.

Total number of classes, 208 (and 10 separate Drawing classes)

Total number of students, 5,513.

Teachers: For the practical subjects they must have had practical experience. They may do outside work or follow outside vocations so long as the school work does not suffer.

2. Municipal Vocational School.

This school has been in existence for 25 years, and always under the same Director—Dr. Bach. It is supported jointly by the State and City, fees being charged. The proportionate contributions are as follows:—City, 116,000 marks; State, 16,000 marks; fees 18,000 marks. The controlling body is a Curatorium of Continuation and Technical Schools, under the Minister of Industry and Commerce.

The aim of the school is to increase the knowledge and skill of industrial workers to enable them to meet modern conditions.

Building and Equipment: The building, which cost 1,100,000 marks, was very carefully planned in all its details, and is splendidly arranged in almost every particular. It would be a good model in many respects. Workshops were about to be added for machinists, cabinet-makers, etc.

Entrance Requirements: Students may enter at the age of 13 if they have passed into the highest class of the elementary school. Attendance at this school exempts from compulsory Continuation School. The students come from about 40 different trades, many being allowed by their employers to attend day classes.

Teachers: These are mostly practical men, without college or Technical High School training. Part of the staff is permanent and part is drawn from men who are engaged in industries in the day time. There are 10 permanent teachers who teach a minimum of 26 hrs. weekly and receive 3,000 to 5,000 marks. The part-time teachers are paid on a basis of 42 one-hour periods and receive 120-130 marks, reaching the maximum in the third year of their teaching. The permanent teachers receive extra pay for time over 30 hours. The rate is 3, 3¼, 3½ marks per hour. The School has 3 Departments, viz. A. *Evening*, B. *Day*, C. *Boys*.

A. EVENING SCHOOL.

This gives general and special instruction to masters, assistants and apprentices, in drawing (general and vocational), modeling, German, penmanship, bookkeeping, mathematics, geometry, physics and chemistry. The fee is 12 marks per annum for residents of Frankfurt, 20 marks for others.

B. DAY SCHOOL.

In this school special technical training is given to those who wish to study painting and drawing, and also to those who wish to take up industrial work but are not yet apprenticed, though past school age. The majority of the pupils are printers and typesetters, or draftsmen in building and machine-construction shops. The fees are 6 marks monthly.

C. BOYS' DIVISION.

For boys of 12-14. The subjects are drawing (freehand, geometrical and projection) and modeling. The fee is 6 marks per annum.

The Day and Evening classes are open to all industrial workers, and lessons are arranged according to ability and time of attendance. Apprentices are only accepted if they have passed the 2nd class of a Middle School. The Day School is also open to those wishing to learn a trade or industry.

Women and girls are instructed with the male pupils, and the arrangement has been found to be advantageous to both sexes. The female pupils are preparing for practical work or for teaching.

Some special Features.

Drawing boards for each room are placed in the hall outside in a recess in the wall.

A very large and handsomely furnished Conference Room is provided for the use of the Staff—also a large space on the 2nd floor for an exhibit of the students' work.

There was an especially fine photographic studio and a garden for growing flowers for use as models. The arrangement for cloak-rooms was admirable. A very fine Library.

Industrial firms have contributed a great many specimens to the School Museum.

Work and interests outside school are encouraged. Students practice painting and modelling from nature at the Palm-garden and Zoological Gardens. For flower painting, visits are paid to Art Exhibitions, Museums, and to industrial exhibitions and businesses.

A splendid school, and one of the finest seen. It stands between the Volksschule and the other higher schools, like the Building Trades Schools and Machine Construction Schools. It parallels the Continuation School, and also in some classes, like printing, lithography, ornamental ironwork, etc., the Industrial Art School,—but not without some jealousy. The mode of instruction is altogether individual. Boys are divided into classes according to vocations and each one gets along as fast as he can.

SECTION 7; DRESDEN.

Capital of the Kingdom of Saxony, with a population of 547,000. A noted centre of Art, with a world-famous Picture Gallery. The principal industries are machinery, metals, and trades related to art industries.

Information obtained in "Conversation" with Dr. Lyon, *Superintendent of Vocational Schools, Dresden.*

Handwork in the elementary school is in process of development, and workshops have been established in some schools. The best method for apprentices has been found to be the day class closing at 7 p. m., apprentices being divided into sections, so that they need not all be absent from the factory at the same time. Half-day classes have been found to be more satisfactory than classes for shorter periods, as regards the boys themselves, as it enables them to come to school direct from home.

The Continuation School work was initiated by the Guilds of the different trades, but the compulsory attendance was decreed by the Government. Employers at first were opposed to compulsion, but after about a year this opposition died down.

The Continuation Schools in Dresden have no workshops and very little equipment, but Dr. Lyon favors workshops in schools. The Head of the Continuation Schools, Dr. Hilbert, is entirely of the same opinion, and an ardent disciple of Dr. Kerschensteiner. He stated that school workshops were absolutely necessary to enable an apprentice to learn a whole trade, which, under the specialized conditions in modern factories, he cannot do at the shop.

In Munich, on the other hand, the Commission learnt that most of the manufacturing was done in small workshops. Workshops are therefore considered essential to either system. Dr. Hilbert thoroughly agreed with Dr. Kerschensteiner in his campaign for school workshops, but at the same time admitted that he had antagonized the employers by stating that the apprentices were given no chance in the workshops; and that this had hindered the movement in Saxony.

There are special classes for backward and dull pupils, with a special Continuation School for them up to age 17.

Regulations for Continuation Schools.

Staff: To receive the same remuneration as Volksschule teachers, with increases at stated intervals. Each teacher has to give 28 hours weekly. In addition to seminary-trained teachers, technical men may be employed. Each of the four schools has a Director and an assistant director chosen from the staff of the school, who receives a cash payment and a reduction of teaching hours, with the title "Oberlehrer".

Instruction is to be given between 7 a.m. and 7. p.m.; only a small number of pupils being permitted to work after 8 p.m. in special circumstances. All students have to take 4 hrs. minimum; plus 2 hrs. drawing for drawing classes and 2 hrs. commercial for business pupils.

Classes: Where there are not sufficient pupils of one trade to form a class, they may be drafted to other schools. Classes may not exceed 35, or 30 in drawing classes. A class for backward pupils may not exceed 30.

Training Teachers: Courses are held at the municipal Industrial School or elsewhere as required.

Guild Schools are incorporated with the Continuation Schools, the Guild authorities retaining a place on the committee.

Attendance is compulsory for a minimum of 4 hrs. weekly for 3 years after leaving the elementary school.

COURSES.

I. *Drawing Classes.*

A. Trade classes with drawing.

II. *Non-Drawing Classes.*

B. Trades without drawing.
C. Commercial.
D. Officials and clerks.
E. Unskilled workers.
F. Defectives.

Subjects: Trade subjects, materials and tools, technical and commercial compositions, reading of poetry and biography, industrial or otherwise, instruction on the use and meaning of public libraries, trade arithmetic, book-keeping, currency, political economy, civics, commerce, hygiene, and special subjects for the various departments.

SALARIES OF TEACHERS.

Married teachers commence at 2,400 marks, rising every two years up to 5,100 marks after 27 years' service. This includes lodging allowance.

Unmarried teachers commence at 2,300 marks and rise to 5,000 marks at the end of 27 years' service. Lodging allowance included.

Temporary teachers (not on permanent staff) 2,000 marks.

Municipal Trade School.

Has *Day*, *Evening* and *Sunday* Sections.

Day Section: For those who have left day school and wish to learn a trade.

1. General subjects.................................. 2 classes.
2. Building trade.................................. 3 "
3. Metal and machinery.................................. 2 "

One year's satisfactory work exempts from attendance at Continuation School.

Evening and Sunday Section: For apprentices, assistants and masters.

1. General continuation classes.
2. Technical classes for special trades.

Courses: The day courses last one year, and boys who complete a course, being exempt from further Continuation School, are sought after by employers.

The evening classes are attended by apprentices and also by journeymen who have progressed as far in the Guild schools as these will take them, and wish to advance further.

The City and State also help the Guild schools and supervise their courses.

Attendance: 230 in day classes, 800 in evening and Sunday classes. 550 pupils are taking master courses.

The same teachers take day and evening and Sunday classes.

Boys attending this school in lieu of another Continuation School have to take 8 hours a week and pay more fees, but on the other hand, they have more apparatus here.

The Director stated that this school would not be united with the general Continuation School, as so many unskilled boys attend the latter.

In the *Building trades department*, boys can take three short winter courses and two long intermediate summer courses, and then go to a Building School.

Equipment: Very abundant for demonstration purposes and for teaching and in objects (parts of machines) for drawing.

Teachers have to take from 24 to 30 hours a week. In many cases they are practical men who have had pedagogical training.

Subjects and Trades Taught: In the *Evening* and *Sunday Section* classes are held for masons, carpenters, stonemasons, tinsmiths, machine-builders, electro-technicians.

In the *Day Classes* there are classes for bakers, butchers, waiters, cooks, etc., for the building trades, and for locksmiths, mechanics and machine builders.

Classes for *Girls* are held both day and evening, and include general subjects, languages, typewriting and shorthand, dressmaking, sewing and millinery.

In the Commercial Department the usual commercial subjects are given, together with French and English.

In the *Evening Classes* the same subjects are taken as in the day classes, both in general and commercial subjects.

Fees: Day Classes, per half year 36 marks for Dresden pupils. Sunday and Evening, half year 4.50 marks 2 hours weekly, to 15 marks 8 hrs. weekly.

All fees are considerably higher for outsiders.

Fees can be remitted in deserving cases, and free places are available.

Special Features: There is a course in calculation for different industries. It was found that this was the weak point in all industrial courses, pupils being unable to estimate working expenses. Geometrical problems, estimates of flat and solid bodies, weights, motor power for workshops, simple and difficult problems for metal and smith work, etc. are worked out. Many shop masters brought problems to be worked out, which were done by the whole class. This course was most popular and very well attended.

SECTION 8: STUTTGART.

This city, which is the Capital of the Kingdom of Württenberg, has a population of 285,600. The principal industries are furniture, pianos, chemicals, colors, chocolate, carriages and leather.

Information obtained in "Conversation" with PRESIDENT VON MOSTHOF, *Superintendent of Vocational Schools.*

Württemberg was one of the first places to avail itself of the provisions of an Imperial law in relation to Continuation Schools, in para. 120 of an Imperial Education Bill passed about 1850. This Bill gave to communities the power to establish Industrial Continuation Schools. Some localities did avail themselves of this provision and established these schools. In these schools the instruction given was usually in the evenings and on Sundays. In 1895 Württemberg passed a law that Continuation Schools must be established giving at least 104 hours, instruction per annnum to boys between 14 and 18 who were engaged in industry. The teachers were for the most part drawn from the Volksschulen and were not as efficient to give instruction of a nature best adapted to a special vocation as was desired. There were a great number of teachers and the work was so much divided that no teacher felt especially responsible for the particular welfare of his students. The teachers were tired because they had had other teaching duties during the day, and the students were tired also.

In Stuttgart alone there were 400 teachers giving instruction in the Continuation Schools and the students were not getting as many hours a week instruction as they should, to profit by this system.

Schools Extended and Improved.

In 1906 a Bill was passed by the State Legislature of Württemberg to extend and improve the compulsory Continuation Schools. This Bill was due mainly to the efforts of President Von Mosthof, and it received the united support of Labor Unions, Chambers of Commerce and Employers' Associations. The only opposition came from the local Catholic body, because the Bill did not provide for any religious instruction in the Continuation Schools. The reason they did not include it was only for lack of time in the hours of instruction, which seemed to them only too short to accomplish the purpose of giving the apprentices all the general technical education they needed to give them the ability to become skilled workmen. In Munich, where the Catholics more largely prevail, religious instruction is included in the curriculum of the Continuation Schools. The Bill was passed, however, over the opposition of the Catholics, without religious instruction being included and came into force at once.

Compulsory Attendance.

This Bill provides that a Compulsory Continuation School must be established in every community that has more than 40 boys between the ages of 14 and 18 engaged in trade or commerce. This will be a commercial or industrial Continuation School if all the boys are in one occupation or the other, or will be one of these two schools with a department of instruction for the branch which does not predominate. The boys must attend this school for at least 7 hours a week from the age of 14 to 17, and the locality in which the school is established may compel the student to attend until 18 years of age if he does not attain a sufficiently high standard by the age of 17.

There is no real compulsion on the part of the State necessary to make the communities establish such schools for the most part, because there are communities which have such schools now where there are only 30 or 35 boys between the ages of 14 and 18 in trade and commerce. There has been special dispensation given by the State to certain small communities, so that the whole provisions will not be in complete force until the year 1914. The chief difficulty was found to be the scarcity of suitable teachers.

Securing Supply of Teachers.

To meet the need of a supply of suitable teachers, two different methods were adopted:—

1st. A body of the most promising teachers was selected from the Volksschulen and sent for a period of 3½ years to the special Training School for Trade School Teachers at Karlsruhe, Baden. Württemberg made a reciprocal agreement with Baden that the latter could send men to the Agricultural Schools in the former, which they had not themselves. These teachers received scholarships, where necessary, of about 1,000 marks per year. Then they had to go into industry for a year. These teachers had to promise that they would come back to Württemberg to teach. At present there are about 120 of these.

2nd. A selected number of graduates of the Building School and the Machinery School were given 1¼ years of training in pedagogy at Stuttgart. Now they get only about 1 year of such training. There are about 70 of these now employed in the Continuation Schools of Württemberg. The authorities try to get the two different kinds of teachers into contact as much as possible—the more pedagogical and the more practical—so that each shall supplement the other's knowledge and efficiency.

The same method was applied to training teachers for the Commercial Continuation Schools. They drew teachers from the School of Commerce and Higher School of Commerce and also sent some selected elementary teachers to a Commercial Training School.

There was no lack of applications for teaching positions because the teachers, once appointed, get fair salaries, good social position, pensions for old age, and a pension for their widows and children. There are four applications for every vacancy. Salaries range from 3,000 marks to 5,200 marks for ordinary teachers (usually the increase is extended over a period of 3 years). Principals of ordinary schools get from 3,900 to 6,000 marks. Principals of larger schools get 7,100 to 7,400 marks. Pensions may rise to as much as 90% of salary and a widow's may rise to 50%; children get one-fifth. Should a teacher fall ill, his salary is continued for a year if necessary.

President von Mosthof says that he attributes the fine type of teachers they have been able to secure, to the fact that they get good salaries, and that the future is assured for themselves and their families.

Some General Matters.

The school fees must be paid by the employer, but he has the right to deduct the amount from the wages if he wishes to do so.

The community has to put up the buildings and supply the necessary school furniture. The community and the Kingdom of Württemberg share equally in providing equipment, teachers' salaries and other running expenses.

In the case of very small towns, the State has occasionally provided 10% of the cost of the buildings. The Kingdom of Württemberg also pays the teachers' pensions, etc. so that it is really the larger contributor.

The teaching method is to have the same teacher carry the boy through the whole course and to give him all the subjects, as far as possible, This is to create the close personal touch between boy and teacher.

In Stuttgart, before the present law came into force, there were 400 part-time teachers; now there are 36 constantly employed.

The classes are all held between 7 a.m. and 7 p.m.

President von Mosthof said that the compulsory method was in his opinion the only real way to get at the masses and to give them a practical education and make them more efficient in industry.

The general method of instruction in the Industrial Continuation Schools is different in one important point from those in Munich, in that they have workshops in the Württemberg schools for demonstration purposes only and not for workshop instruction. It is thought that pupils should get the workshop instruction under the eye of the master and not in the school.

There are about 100 compulsory Continuation Schools under the control of President von Mosthof, besides special Vocational Schools,which were provided for the training of men who wanted to get particular training for positions of responsibility. These are given below:—

1. The Textile School at Reutlingen. This is a general Textile School for all kinds of fabrics and also for dyeing, having about 200 pupils. Comparatively high fees. Most of the students are sons of manufacturers. There are also four other Textile Schools in Württemberg.

2. The Trade School for Fine Machine Work at Schwenigen. Here the boys learn to construct watches, theodolites, instruments of precision and have electro-technics. They have a 3 year course, and this is accepted as apprenticeship. 70 pupils. 6 full-time teachers.

3. The Trade School for Precious Metal Work. 3 years course. 100-150 pupils. 7 full-time teachers. Has a good Museum attached. School is at Gmund.

4. The small School for Leather and Tanning Industry at Metzingen is attached to a factory. 12 pupils.

5. Several other small Trade Schools.

6. Three special Trade Schools for Master Courses in building construction trades, intended to relieve the Building Schools of those who formerly went there and did not want the full course.

CHAPTER XLVII: SCHOOLS FOR MACHINE AND METAL WORKERS.

SECTION 1: SUMMARY OF THE SYSTEM.

In the field of industrial instruction for metal workers the Central Industrial Office of Prussia met two problems when the transfer of Vocational Schools was made to the Ministry of Commerce and Industry. These were first how to separate the technical classes of some of the Secondary Schools (called Realschulen) and organize them independently and second how to increase the number of schools for metal workers to meet the practical needs of the industries. The change in the first respect was gradual during the last 20 years of the nineteenth century so that at present (1910) there are 23 Metal Workers' Schools with 115 classes, whereas in 1884 there were only 10 such institutions with 24 classes.

Many of the present engineering schools developed out of the schools for builders, the engineering departments being organized as independent institutions, and at the same time Workmaster Schools were inaugurated by the Government followed by Middle Technical Schools. In 1898 the Workmaster Schools were reorganized as Machine-Construction Schools or Engineering Schools, and the Middle Technical Schools became Higher Machine-Construction or Engineering Schools.

The value of and need for these schools increased from year to year, and they were liberally assisted by the Government, until they now offer the highest standard of instruction in these branches. They were reproduced in other parts of the German Empire, and it is through them that all the available powers of scientific knowledge and research are directed upon the problems of the iron industry, and that the products of German shops and foundries have become famous.

Where the industries of the district necessitate it, Metallurgical Schools are associated with the regular Engineering Schools, and in many cases Evening Classes are held in connection with both branches of these schools.

Reserved for Special Industries and Workers.

In Prussia, in accord with the wishes of the local Boards of Trustees which represent local manufacturing interests, it has always been recognized that the aims of these schools, which are intended for the lower or middle class of workers, should not be placed too high. Especially all approach to the Polytechnical Universities should be avoided and they should remain Monotechnical in scope. This principle was not only kept in view in the regulations issued in 1901, but is constantly adhered to in the deliberations concerning a still later reorganization now going on.

In the establishment of Monotechnical Schools for metal industries, the Central Office has insisted upon the principle that such schools should be opened only in the localities having adequate factories and that in provinces lacking metal industries no such schools were necessary. Experience has proved that the establishment of such schools is always the outcome of a flourishing industry, such as cutlery, locksmithing or machine building. Such a school then, is opened to prepare the required skilled laborers in large numbers, but it never calls into life a new industry, nor preserves the life of a dying industry.

Variety of Forms to meet Varying Needs.

In accordance with the varying needs of different industries, the vocational schools for metal workers have developed a variety of forms. Thus, at present, there are, besides the Machine Builders' Schools one Secondary School for the building of ships and ships' engines, two smelting schools, three schools for the cutlery and other small metal industries, one school for the bronze industry, one coppersmiths' school, and one school for electric mechanicians. The establishment of a school for electric installations is now under consideration.

The Central Industrial Office has paid much attention to the social aspects of the schools for the metal industries. For that reason it interests itself particularly in Machine Builders'Schools requiring for the admission of students, besides a practical shop experience of several years, only an elementary education, and its interest is directed also to Evening and Sunday Schools and special courses affiliated with Machine Builders' Schools.

The *Higher Engineering Schools* train young men who intend to become supervising or constructing engineers in large machine shops and to conduct the highest grade of engineering enterprise, and directors or owners of machinery works.

The *Lower Engineering Schools* train for a lower grade of supervising or constructing engineer, superintendents of smaller shops and factories, workmaster, foremen and mechanics of secondary foundries.

The *Evening Schools* meet the needs of those who have not the time or means to take a full course, but who can improve their knowledge and prospects appreciably by a course of study suited to their requirements.

Thus, each grade of schools supplies a certain grade of the industry with men suitably and adequately trained.

They Benefit Workers and Industries.

Through these Machine Builders' Schools (schools of mechanical engineering as some may be called) it is intended to improve the young men who must earn the money for tuition fees by the work of their hands in shops and factories. This is also in the interests of the factories, for experience shows that the graduates of these schools become the most useful workers. Factory owners, who for a time showed little sympathy for these schools, are much more friendly to them now that conviction of their usefulness spreads.

The Evening and Sunday classes, as well as the special limited courses, are intended chiefly for young metal workers who cannot afford to spend many hours in the Day Schools. They are of use not only to those who attend them, but also to the industry in general, since they increase the number of skilled laborers. That is the reason why the Evening and Sunday classes and special limited courses have increased their attendance so largely in recent years. In future these considerations will be decisive in the further growth of the system of Schools for Metal Workers.

Conditions of Admission.

The required preparation for admission to the lower schools may be proved: (1) by testimonials showing that the applicant has successfully attended a classical, semi-classical or modern Secondary School up to the grade called "Lower Secunda," that he possesses the necessary skill in drawing, and has done practical work in a workshop or factory for two years; (2) by giving proof of having attended for two years the preparatory class of any Machine Builders' School and possessing the required knowledge and skill for admission; (for admission to these preparatory classes a good elementary education and two and one half years' apprentice work in a workshop are required); (3) by producing a testimonial showing that he has obtained the privilege of one year's army service, that he possesses the required skill in drawing and that he has completed two years of practical work in shop and factory; (4) by producing a report of successful attendance at any vocational school designated by the Ministry of Commerce and Industry, and showing that he possesses the required skill in drawing, and that he has completed two years of practical work in shops or factories: (5) by passing an examination for admission and proving three years of practical experience in shops or factories. The Directors of the Institution may, with the consent of the local Board of Trustees, reduce the requirement of three years of experience.

Cost of Attendance.

Tuition fee, 75 marks (about $18) per semester. The school in Cologne charges 100 marks ($25). Other expenses for books, drawing utensils, stationery, etc., about 120 marks ($30); board and lodging for ten months are calculated to amount to about 500 to 700 marks ($125 to $175). Needy Prussian students may obtain bursaries or be released from paying tuition fees.

Curriculum.

The courses cover two years.

Higher Schools.

Business Practice, Mathematics, Physics, Chemistry, Mechanics, Machine Parts, Boilers, Levers, Engines, Hydraulic Motors, Gas Motors, Machine Tools, General Technology, Metallurgy, Electrotechnics, Constructive Engineering and Drafting, Estimating, Descriptive Geometry, Drafting of Machine Parts, and of Boilers, Levers, Engines, etc., Laboratory Practice, First Aid.

Total number of hours per week—42.

Lower Schools.

German, Business Law and Practice, Arithmetic, Mathematics (practical), Physics, Chemistry, Mechanics, Electrotechnics, Machine Parts, Boilers, Levers, Engines, Hydraulic motors, Gas Motors, Machine Tools, Metallurgy, General Technology, Constructive Engineering, Estimating, Geometrical, Freehand, Technical Drawing and Projections, Drafting of Machine Parts, etc., Laboratory Practice, First Aid.

Total number of hours per week—42.

In Lower Schools only offering 1½ year's course, more attention is given to German, Penmanship, Drawing (technical and freehand), Mathematics and more essential parts of the Engineering study, the total number of hours per week ranging from 46 to 48. The course is divided into 3 grades, each having 2 periods of 10 weeks each.

Metallurgy Schools.

German, Business Practice and Legislation, Mathematics, Experimental Chemistry, Mechanics, Electrotechnics, Theory of Combustion, Chemical Technology, General Science of Metallurgy, Metallurgy of iron and other metals, Mineralogy, Analytical Chemistry, Mechanical Technology, Engineering, Bookkeeping, Calibration of Rollers, Technical Freehand Drawing, Geometrical Drawing and Projection, Vertical Writing, Laboratory Practice, First Aid.

Final Examinations are held by a Committee appointed by the Government, and diplomas awarded to successful candidates by means of which they can obtain many good positions.

What the Schools Lead to.

The diploma of graduation from these schools serves as a proof of the student's possession of the required technical knowledge and skill for the position of technical secretary in the navy, for the position of administrative railroad engineer or for the position of railroad secretary in the administration of State railroads.

Conditions of admission, costs of attendance and privileges arising from attendance are somewhat similar, with the necessary variations in respect to the differences in the trades provided for in those of the following other classes of schools, grouped under those for metal workers.

Schools for Ship Builders and Ship Engine Builders (with a course of four semesters): These schools are intended to supply administrative engineers or officers of construction for shipyards, and offer future owners and superintendents of such industrial plants opportunities to acquire the necessary knowledge and skill.

Lower Machine Builders' Schools (with a course of four semesters): These schools are intended for lower technical foremen in shops and for clerks in the factory offices; also to equip owners of small shops with the required knowledge and skill in drawing.

Technical School for Coppersmiths: This school is intended to prepare foremen and technical heads for coppersmiths' works; also to offer the necessary knowledge to shop and factory owners, especially the required accomplishment in Drawing and Designing.

Other Technical Schools for the Iron and Steel Industry (with courses of from four to six semesters): These schools are intended to prepare skilled workers in the cutlery trade and in other so called small iron and steel industries; that is to offer the theoretical knowledge and practical skill to enable them to rise to higher positions such as foremen, inspectors and independent masters.

Evening and Sunday Schools for the Metal Trades: These schools are affiliated with Secondary Schools for the Metal Trades. The courses are for engine builders, locksmiths, blacksmiths, shipbuilders, etc. Their object is to impart the necessary knowledge for the various trades and to train the students in Drawing.

Courses for Locomotive Engineers (with two semesters, 10 hours a week): These courses offer only theoretical instruction for the preparation of locomotive engineers.

Do Not Train Foremen.

The development of the Lower Schools of Machinery in Prussia has been exceedingly satisfactory, and the pupils turned out by them have been able to meet all requirements of industry. They have never trained foremen. They give men, with a Primary School education and long practical experience, a technical training suitable to the preparation they have received, and leave the manner of their subsequent occupation to industry.

SECTION 2: COLOGNE.

Population 516,000. The principal industries are machinery, printing, and the manufacture of perfumes.

ROYAL UNITED ENGINEERING SCHOOL.

This school prepares young men for responsible positions in the machine-construction trades, in

1. Day Classes.
2. Evening and Sunday classes.

It also provides instruction for master-workmen who wish to improve their skill and knowledge in their respective trades.

The school is under the supervision and control of the City and State. Four members of the Board of Governors (Kuratorium) are members of the City Council.

Fees	40,000 marks.
City	30,000 marks.
State	150,000 marks.

Subscriptions are received also from the Society for the Encouragement of Industry in the Rhine Province and the Industrial Society of Cologne and Vicinity.

Courses.

A. Higher Machine Construction Course.
B. Machine Construction (Workmasters' Course).
C. Evening and Sunday Classes.
D. Special Courses for,—
    1. Gas and Water installation and fitting.
    2. Electric installation and fitting.
    3. Gas masters (plumbers).
    All these are finishing courses.

Entrance Requirements for the Courses.

Course A. Either (a) Einjahriger certificate, and at least 2 years' practical experience, or (b) evidence, by school certificate or examination, of necessary attainments, completion of 18th year, and at least 3 years' practical workshop experience.

For Preparatory School, leaving standard of Boys' Middle School and 3 years' practical work.

Course B. Volksschule leaving standard and at least 4 years' practical experience, and Continuation School if possible.

Course C. Only those not liable to compulsory attendance at Continuation School.

Those who have taken the higher course usually start to work afterwards at less salary than the ones who have come in with more practical experience, but they usually reach higher positions in the end.

Attendance. Number Summer	Winter	Length of Course.	Fees.
145	151	A. Five Classes, 2½ yrs........................	100 marks per term.
		Preparatory Class (if required) ½ yr.	
103	101	B. Three Classes, 1½ yr........................	30 marks "
342	340	C. Each half-year a complete course.	
		Up to 3 hrs. weekly........................	2 marks per lesson per term.
		Up to 7 hrs. weekly........................	1.50 marks per lesson per term.
	277	D. Two months.	

Foreigners pay five times above fees.

Subjects. A.

1. Civics, Commercial Law.
2. Mathematics.
3. Physics.
4. Chemistry.
5. Writing practice.
6. Geometrical drawing.
7. Mechanics.
8. Elements of machinery.
9. Power machines.
10. Lifting machines.
11. Electro-technics.
12. Construction.
13. Technology.
14. Laboratory work.
15. Prevention of accidents and business hygiene.

Subjects. B.

Foregoing subjects, (with addition of German) 1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15, plus Geometrical and Projection Drawing, Technical Freehand Drawing, and Arithmetic.

Subjects. C.

Evening. German, Machine Construction, Technology, Installation, Special Course for Stokers and Machine-minders, Planimetry, Stereometry, Physics, Electro-technics, Mechanics, Workshop Bookkeeping and Calculation, Arithmetic, Algebra and Chemistry.

Sunday. Geometrical and Projection Drawing, Technical Freehand Drawing, Drawing for Machine Construction, Electro-installation, Gas and Water Installation, and various classes of Metal Trades.

General Remarks.

This was the finest and best equipped Machine Construction School seen by the Commission. Not only does it prepare men in a 2½ year course for responsible positions in the machine construction industry, but, by establishing short courses for master workmen, the school has enabled the small manufacturer to learn the special technique of new developments in trades. It also enables the small manufacturer, by greater skill and special knowledge, to avoid impending ruin from factory competition. 1,000 masters have been trained in this way in the school,and they in turn have trained a lot of apprentices.

INSTITUTE FOR THE ENCOURAGEMENT OF INDUSTRIES IN THE RHINE PROVINCE.

This Institute was established under the auspices of the Industrial Society of Cologne and Vicinity, and is supported by the following:—

State	15,000 marks.
Province	3,000 marks.
City of Cologne	12,680 marks.
5 Chambers of Commerce in surrounding districts, 400 marks each	2,000 marks.
	32,680 marks.

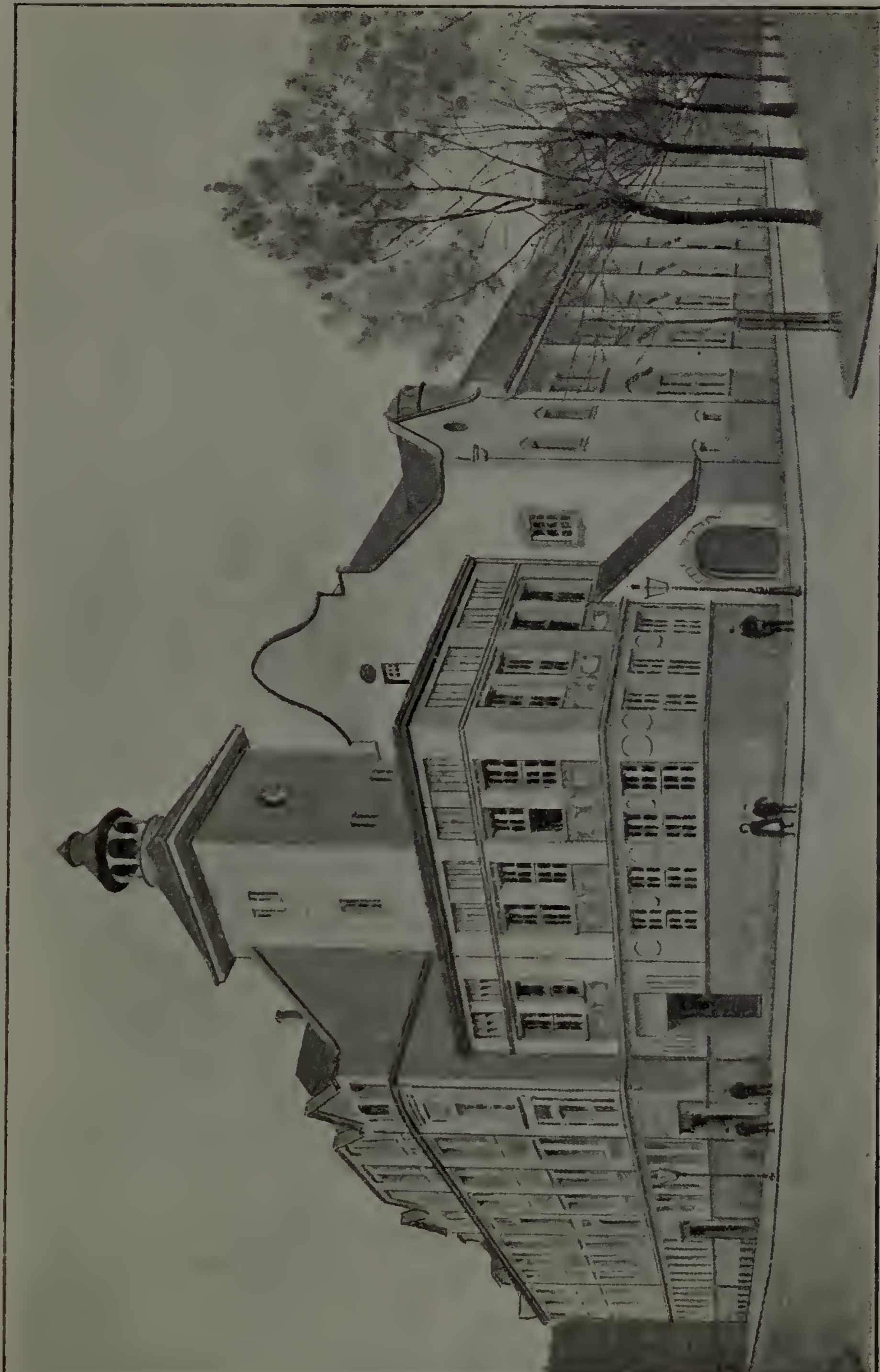
Special contributions from the above for Master Courses in various trades; 54,880 marks in all.

Controlling Body: Hon. President, Over-President of Rhine Province, Mayor of Cologne and Curatorium.

Under the Director of the Machine Construction School but in separate buildings.

Aim: To improve the technique, intelligence and skill of individual craftsmen who are working for themselves. It applies to several trades and is about to be extended. Classes in commerce are held in the same building, under the auspices of the Rhenish Association.

It provides also Company Courses, as business capacity combined with co-operation is the foundation on which handicraft may once more hope to flourish. Companies are frequently not formed for want of suitable people to control them, and often fail for the same reason. These Courses have met with great success in Berlin and elsewhere, both for Credit Companies and Raw-material and Labor Companies.



INSTITUTE FOR THE ENCOURAGEMENT OF INDUSTRY: COLOGNE.

Equipment: 1. Permanent exhibitions of machinery and tools for small businesses as well as noteworthy and peculiar products of handicraft and industry. Machines are shown at work, and trials are undertaken on request.

2. Master Courses for Masters and Assistants in the various trades with model workshops where they can learn the arrangement and use of the machines for their business, and receive business training.

3. To avoid duplication, part of the equipment of the Machine Construction School is available for some classes.

Methods: One necessary adjunct is the Exhibition or Museum, to show workers what is required. This collection is permanent and the 'exhibits' are kept up to date by co-operation with the manufacturers. Exhibitors are assured of material advantage. This Museum has had considerable influence on the industrial development of the Rhine Province and the City of Cologne.

Teachers are all skilled master-workmen, receiving 4,200 marks yearly.

Courses: Master courses, 3 courses yearly, of 8 weeks each, for carpenters, locksmiths, and iron workers, shoemakers and tailors (masters and journeymen). Lessons morning and afternoon. Classes limited to 10 pupils.

Part Courses are arranged for those who cannot spare time for full courses.

Fees: 50 marks per course.

Attendance (1909): 98 in all courses.

General.

Evidently the teachers are giving their men special knowledge and skill in several trades, such as cabinetmakers, tailors, chimney-sweeps, ornamental iron workers, etc., to enable them to make and do things that the factory cannot turn out.

The Commission saw the bootmakers making special boots for cripples and deformed people, and also specially fine shoes for the wealthy. The tailors, too, were making special stylish suits of fine quality for the better class of trade. They were given special instruction in the new development of trades such as metal-coloring, etc.

The school was doing exceptionally high-class work.

SECTION 3: DORTMUND.

In the Westphalian coal-mining district, having a population of 143,000. Mining is the principal industry, but there are also steel and iron works.

ROYAL UNITED MACHINE CONSTRUCTION SCHOOL, OR SCHOOL OF MECHANICAL ENGINEERING.

This school was established in 1889 as a Foremen's School of elementary school standard. In 1891 it was united with the new Technical Middle School of Machine Construction; and in 1893 the two schools were amalgamated as a

State institution bearing the present title, under the Ministry of Commerce and Industry, with a Curatorium on which industrialists are represented in immediate control of the school.

Support: The city provides the building and equipment in full. The annual maintenance is divided:—

City	12,000 marks.
Fees	40,000 marks.
State	138,000 marks.

Firms also contribute towards scholarships.

Control: A Curatorium on which industries are represented.

Entrance Requirements:

A. The 'Higher' School takes boys who have attained the Einjahrige standing, and who have had at least 2 years of practical experience in actual industry. A boy who has had three years of practical work may enter on passing an examination set by the Minister of Commerce and Industry.

B. The 'Lower' School takes boys who have Volksschule standing and have had at least four years of practical experience.

C. Takes students who attend the Evening and Sunday Classes and are assistants, journeymen, or master workmen of the neighbourhood.

FEES AND ATTENDANCE.

Department.	*Attendance.*	*Yearly Fee.*
A. Higher	80	150 marks.
B. Lower	237	60 marks.
C. Evening and Sunday	300	40 marks.

Foreigners are charged five times the usual fee.

Objects: A. Higher School. Training machine engineers and prospective owners. Eligible for railway service, Superintendents.

B. Lower School. Trains foremen, owners of small businesses and technical assistants in construction offices.

C. Sunday and Evening Classes. For apprentices and assistants. Course is equivalent to lowest class of B., so that students may enter one class higher on completing the Evening Course.

Building and Equipment: Building and equipment worth 750,000 marks of which 160,000 marks is due to equipment.

Teachers: University and Technical High School training plus practical experience in technical subjects.

Special Feature: Students' excursions to neighbouring works. Special (State-aided) tour of Director and staff to gain experience of home and foreign methods. One Engineer spent several months in America, others in various countries.

ROYAL MACHINE CONSTRUCTION SCHOOL: DORTMUND.

SECTION 4: DUISBURG.

Population of 93,000. Situated on the Rhine-Ruhr Canal, along which Westphalian coal is shipped to the Rhine and thence to the sea. The principal industries are machinery and iron works, shipbuilding, sawmills and canal shipping.

ROYAL SCHOOL OF MECHANICAL ENGINEERING—MACHINE CONSTRUCTION AND METALLURGY.

This is a Secondary or Middle School established in 1893, and now maintained jointly by State and City, as follows :—

	Marks.
Fees	18,000
Rhineland Province	10,000
City	5,000
State	147,000
	180,000

Also 29 industrial companies contribute towards scholarships of the school.

It is under the Minister of Commerce and Industry, and a Committee including industrialists.

The members of the Examining Committee, and also some of the members of the Curatorium, are leading captains of industry in the Rhine district.

Students come from industrial life, having elementary school standing, plus 4 years' practical experience in the work chosen, and Continuation School.

The total attendance is 320, two-thirds taking Machine Construction and one-third Metallurgy.

Students are mostly between 18 and 35 years at entrance and nearly all have been soldiers. This is considered of importance, as they have been taught the value of system and of hard and regular work.

This is a finishing school, and aims at training foremen, machine masters, etc. for the metallurgical and chemical trades. It also gives technical training to smiths, locksmiths, coppersmiths, tinsmiths, etc. Both foremen and masters obtain here a thorough knowledge of details, which they require to be successful in business.

COURSES.

A. Mechanical Engineering (Machine Construction) School.
B. Metallurgical School.
C. Evening and Sunday School.

A. and B have four classes of 6 months each, and both include all the science necessary.

In C. students take subjects as required for their occupations.

The Evening Classes are especially for those who wish to enter the third instead of the fourth class of the School, or those who do not wish to take the whole course.

Pupils are accepted in Government railway and building departments. Special preference is given to students of the Metallurgical School.

This school specializes in metallurgy of iron and steel, whereas the Metallurgical School in Gleiwitz is general and includes the non-ferrous metals as well.

Buildings and Equipment: A well-equipped, up-to-date, model school. Building cost 1,000,000 marks and equipment cost 300,000 marks, the latter showing signs of economy.

In the main building, two rooms at different ends of the building are fitted up one with all parts for machine construction, and the other with all parts connected with power transmission. On the side of each room is a sketching room, to which parts are taken. Thus each of the two collections may be used simultaneously by two different classes.

Teachers: There are 25 teachers on the regular staff and 4 additional. All must have had academical, Hochschule or University training. Teachers are allowed to, and most of them do, engage in outside work.

SECTION 5: MACHINERY SCHOOL, PRANCKHSTRASSE, MUNICH.

This school is intended for apprentices and helpers in the machinery and allied trades. There were 300 apprentices and 200 helpers attending the Machine Construction section. The chief trades taught are machine construction, mechanics, metal work, joinery, lead working, chemigraph printing and photographic work, bookbinding and printing. The chief trades are taught in 4 buildings; iron workers attend for one whole day a week. This school is one of six of a similar grade and character in the city, some of the trades being taught at one school and some at another, as required.

The classes range from 15 to 32 in the larger sections. The students make models of machines, and balances, which are sent to the Elementary Schools for use there.

The teachers begin as part-time teachers, but as the work develops, they are employed full time.

Each trade has to attend the *Chemistry* classes 16 or 20 hours a year for studying the fundamental principles of chemistry.

The Commission visited the rooms for the work in metal, lithography, printing and bookbinding. The enthusiasm of the boys was very marked. The Kleistine process for colouring paper covers of books was being used. The process of marbling was shown, the jelly for marbling paper being made from Icelandic moss. The boys seen were all apprentices, taking one whole day a week at the school. Those from different trades came on different days. The students in typography were making designs; printers were working in colors; the photo-engraving students were drawing.

In reply to questions, the Principal stated that wood and metal work is given in some of the Elementary Schools in the 7th year, but it is not general yet. The

8th year classes in the Elementary Schools are voluntary. Putting handwork in the 8th year classes had directed the children into skilled occupations, and things were improving considerably, as more children take the 8th year of school work. Of those attending compulsory apprentice classes, 1800 came from the Continuation Schools. The feeling in favor of compulsory attendance has been growing, and the bigger factories send their assistants, so that the difficulty is disappearing, and public opinion is considerably more friendly now, and becoming more so every day.

SECTION 6 : COURSES FOR TRADE SCHOOL* FOR MACHINISTS, INSTRUMENT AND GUN MAKERS; MUNICH.

Principles of Organization.

a. Corresponding to the apprenticeship term of four years, the school is divided into four progressive classes. The school is for all kinds of mechanical and gun-makers' apprentices, with the exception of the fine mechanics, for whom a special school is maintained.

b. The number of hours of instruction per week amounts to nine for all classes. The instruction is to be given on one week day.

c. The distribution of the periods of instruction among the various trades and the hours allowed to the different classes, are shown in the following tables.

d. The practical instruction in Materials and Trade Practice is given by capable workmen. The remaining intruction is taken care of by adequately trained teachers of the public and Continuation Schools of Munich.

Subjects of Instruction.	Hours of Instruction.					
	I Class	II Class	III Class	IV Class	III Class	IV Class
	Electro-mechanics				Mechanics	
Religion	1	1	......	......	1	......
Business Composition and Reading	1	1	1	......	1	......
Arithmetic and Bookkeeping	1	1	1	1	1	1
Hygiene and Civics	1	1	1	1	......	1
Physics	1	1	1	2	......	......
Electro-technics with Practical Exercises	......	......	......	3	......	......
Descripive Engineering	......	......	......	2	1	2
Trade Drawing	2	2	2	......	2	2
Practical Instruction in Materials and Trade Practice	2	2	3	......	3	3

*Meaning Continuation School.

a. RELIGION.

The subject-matter of instruction is selected by the higher ecclesiastical authorities.

b. BUSINESS COMPOSITION AND READING.

The instruction in composition is designed to enable the student to draw up the most important documents of private and business life and to fill out in writing the customary business and commercial forms. Exercises of general content and purpose are introduced in all classes as occasion dictates.

Class I. Private letters: communications to the family, to relatives and friends in regard to the apprentice's vocation, as well as on subjects occurring otherwise in the school exercises. Business letters: letters in regard to working conditions and apprenticeship affairs. Advertisements, acceptances, apprentice agreements, apprentices' certificates. Journeymen's affairs: advertisements, labor agreements, notifications and counter-notifications, notices of accident, offers of services, applications.

Class II. Private letters: communications in regard to matters relating to the journeyman-period. Business letters: inquiries as to prices, orders, notices of receipt, payments by means of money orders and registered letters, protest of remittance, offer of goods, execution of orders, delivery and receipt notices, consignment by parcel-post or freight, charges to follow bill with accompanying letter, acknowledgment of payment, receipt, inquiry in case of inaccurate order. Correspondence between the workman and his firm on the basis of certain business occurrences.

Class III. Setting up in business, giving attention to the difficulty of establishing independence. Request for a loan, certificate of indebtedness with security. Announcements, advertisements, circulars. Letters regarding conditions of payment: cash payment, notes and checks, postal checks. Pressing payment: dunning letters. Payment with excuse or request for extension of time. Postal orders. Admission to journeyman's examination with story of career.

As to the lessons in reading, the selection of materials in all classes is left to the teacher. This exercise aims to promote the general and moral development of the student and to stimulate his pleasure in and taste for good literature. For this purpose the school library is to be used and occasionally a strictly classical selection is to be read.

c. ARITHMETIC AND BOOKKEEPING.

This branch of instruction should impart to the student the knowledge necessary for keeping private and business accounts in a systematic way and acquaint him with the commercial and technical calculations of his trade. To attain the last mentioned object, attention is first to be given to geometrical arithmetic and all the determinations of weight based thereon; secondly, to the utilization of tables of cross-sections, weights and frequently recurring figures; and thirdly, to examples from workshop practice that are within the student's capacity and of importance for the comprehension and execution of his work.

Class I. Private and business accounts: earnings of apprentices and journeymen, expenditures for the necessaries of life. Technical arithmetic: introduction to general use of figures, to the extent that is sufficient for the requirements of the school. Geometrical arithmetic: square, triangle, Pythagorean theorem, polygon, circle and parts of the circle.

Class II. Business arithmetic: inventory of materials and tools, wear of tools and machines, transferring. Geometrical arithmetic: prism and cylinder, pyramid and cone. Technical arithmetic: the most important mechanical motions applied in trade practice, their application to wheels, pulleys, tools and objects. In connection with this, gear wheels, relation between pitch-line, pitch and number of cogs.

Class III. Business arithmetic: exercises in tax and insurance affairs, calculations of exchange, short course in bookkeeping, using simple business examples; simple cost calculations. Geometrical arithmetic: truncated pyramid and cone, sphere. Technical arithmetic: simple and complex gears in transmission and machine tools. Setting the change-wheel for screw-thread cutting.

Class IV. Geometrical arithmetic: calculation of surfaces by approximate conversion into simpler forms; calculation of parts of the sphere by approximation formulae; easy examples in finding the center of gravity; calculations on revolving bodies. Technical arithmetic: the work on machine tools, cutting speed, ratchet speed, working time.

d. HYGIENE AND CIVICS.

The object of this instruction is to teach the student the necessity for a rational mode of life. It consequently treats on the one hand of the problems of hygiene and on the other of the questions arising in connection with vocational, community and state organization, and aims at giving him a clear insight into the necessary correlation of interest of all social classes and industrial groups.

Class I. The apprentice, his status, his indenture. Deportment: conduct at home, in the school, in the street, in the social gathering, towards teachers and journeymen. Hygiene: consideration of the construction of the human body; the eye; nutrition, respiration, circulation of the blood, disorders in assimilation; automatic regulation of vital heat through the body. Clothing, dwelling-place. Disturbances in the regulation of bodily warmth. Bones, muscles, nerves. Work and recreation. Trade influences injurious to health and their obviation; first aid in accidents.

Class II. Civics: The most important features of trade organization: apprenticeship affairs, journeymen's examinations; journeymen's affairs, tribunals, workmen's protection, masters' examinations. Guilds, workingmen's assemblies. General trade history: domestic system, wage work, the handicraft; guild organization, zenith of German guilds, decline of the guild; transformation of production and commerce, separation of retail and wholesale business; associations.

Class III. Civics: Organization and government of the community; community economy; honorary offices of citizens of the community; district and circuit. The state constitution of Bavaria: rights, duties and honorary offices of citizens of the state; Bavaria's government; state economy. The constitution of the German Empire: review of the development of the Empire during the nineteenth century, the federal council, the imperial chamber, imperial officials, imperial diet, the federal upper-house, functions of the Empire; imperial economy; legislation relating to workingmen's insurance.

Class IV. Civics: History of mechanical trades in particular: forerunners in mechanics in ancient times and in the middle ages (Archimedes); the progressive development of mechanics in conjunction with the increasing knowledge of physical laws (Galileo); the principal fields of activity in mechanics in our own times; its gradual separation into special departments; mechanics proper, optics, electro-technology, allied trades. Germany's economic position in the world at large: importance of the German colonies; the consulates in foreign lands Imperial protective laws; patent laws, trade-pattern laws, trade-mark laws, original rights in patterns and models. Laws for workmen's protection; regulations in regard to mechanical apparatus and factory operation, regulations for the prevention of accidents. Industrial companies. Elaboration of the work in Class I on first aid to the injured.

e. PHYSICS.

The instruction is for the purpose of familiarizing the student with the laws of physical phenomena as far as this knowledge may be of service to him in the intelligent pursuit of his occupation. He must be taught to recognize natural forces as the conditions of resultant effects in his experiences and to understand the reciprocal interaction between physical cause and technical result. In the lessons on electricity, the most important phenomena and laws are to be discussed. Herein an effort is to be made with the aid of auxiliary demonstration and analogies, to afford the student an insight into processes so that he may be in a position to follow intelligently the subsequent lessons in electro-technology. The lessons, with due regard to the interest of the student, are to be based on well-chosen examples and as far as possible should be carried out in school exercises.

Class I. Fundamental laws of statics and dynamics. Force, simple combinations of forces. Equilibrium, the lever. Centre of gravity and immobility. Rectilinear and uniform circular movement. Inertia and centrifugal force. Pressure and pressure measurement, transmission of pressure in gases and fluids. Expansion and compression of gases. The air pump. Elastic properties of solid bodies.

Class II. Expansion through heat. Heat quantities, transmission of heat by conductivity, flow and radiation. Combustion heat. Evaporation and melting, evaporating and melting heat. Working efficiency. Heat and work. Working efficiency of gases and vapors.

Class III. The storage battery. Current production by contact, polarity, tension, conductors of the first and second class. Electrolysis. Electrolytic determination of strength of current. The electric light. Heating effect of the current; decrease of tension in conductors. Resistance: Ohm's law. Parallel and serial connection in current production and consumption. Current bifurcation; measuring resistance. Shunt; special consideration of incandescent lamps; the flame arc.

Class IV. The Galvanometer; deflection of the magnet, principles of multiplication; needle galvanometer. Electromagnet. Coil-winding instrument. Deflection of conductor in magnet field. The galvanometer as ampere and volt-meter. Other magnetic effects. Soft-iron instruments. Arc-light regulators. Automatic switches. The motor principle. Series and shunt motors. Disposition of the armature windings. Working efficiency of the current. Watt. Available efficiency. The generator. Fundamental phenomena of induction. The motor as generator. Dynamo principle. Counter electromotive power. Rules for winding. Regulators and starters.

f. ELECTRO-TECHNOLOGY.

Building on the lessons in electricity, the most important instruments, apparatus, devices and machines are to be explained as regards construction and method of operation, and opportunity is to be afforded the student to use the same in his work and to make simple experiments. He shall be instructed in the usual practical installations and in the directions and regulations related thereto.

Class IV. Minimum current installations: general considerations: conductors and insulations. Bells, relays, annunciators, contacts, switches, safeties. Connections and diagrams of same. Testing conductors. Intense current installations: general considerations; conductors and insulations; laying the conductors; commutators, switches, safety-catches, distribution boards. Setting and illuminating devices: incandescent lamps, arc lamps; conductor testing. Dynamo machines and motors, regulators and starters. The rules and regulations related to the above.

g. DESCRIPTIVE ENGINEERING.

The student must first learn to distinguish the most important and most generally used machine parts in regard to purpose, form, material and construction, and must be made to understand the internal relation of these various factors. He shall also be instructed in the construction and operation of the machines of greatest importance to him.

Class III. Mechanical elements, with particular regard to bicycle and power-vehicle parts, the essentials regarding power machines in general: the explosion motor.

Class IV. Power-vehicles according to development, construction and mode of operation; the most important systems. Traffic regulations.

Note. If there is a sufficient number of gun-makers' apprentices, there will be special instruction for them regarding the most important applications of physical laws in their calling, and concerning the subject of weapons.

h. TRADE DRAWING.

The primary object of this instruction is to afford the student a knowledge of technical drawings; moreover, his ability to draw is to be so far developed as to enable him to make a usable hand-sketch and a simple working-drawing of an existing or imaginary piece of work, as well as to pick out a part from a combination laid before him.

Class I. Simple geometrical constructions: division of straight lines, circles and angles, polygons. Rounding by quarter circle, tangents on simple forms used in the trade. Preparation of scale sketches in prescribed views and sections from models. Production of separate drawings from such sketches.

Class II. Construction of joined circles: the most important curves from suitable models; preparation of related sketches and drawings. Formation of threads and screws. Representation of screws; easy composite models.

Class III. Continuation of the exercises in sketching simple and composite models with regard to the special trade of the apprentice. Drawing of separate parts from combinations.

Class IV. More difficult composite models: for bicycle and automobile mec anics, bicycle and power-vehicle parts; for gun makers, gun parts with special consideration of the most used forms of lock construction; for electrical mechanics, apparatus, diagrams of connections, motor parts, motors.

i. PRACTICAL INSTRUCTION IN MATERIALS AND TRADE PRACTICE.

This instruction is intended to acquaint the student with the various technicalities of trade practice, to train him in precise, clean work, and to instruct him in making for himself the most necessary of his tools. It shall afford him opportunity to gain a knowledge of the most important measuring instruments, tools and machine-tools as regards their construction and operation, and an ability to use them. The instruction moreover imparts the necessary knowledge of the occurence, acquisition or production, properties and uses of the raw materials most important for the trade. Finally it affords the students an opportunity to put into practice and check up their knowledge by working from drawings.

Class I. Materials: iron; how obtained, the blast furnace and its products, crude iron, cast iron; wrought iron, welding-iron, welding-steel; cast iron, cast steel according to manufacturing process and properties; cementation steel, crucible steel, special steels; change in the quantity of carbon in finished pieces; tempering, inlaying; production of the commercial forms of wrought iron; defects, their causes and recognition. Practical instruction: filing exercises; smooth, parallel and rectangular filing without regard to measurement; the same with respect observance of measurement (plate, four-sided prism); fitting exercises and the necessary tools and measuring instruments (rule, point-compass, calipers and inside-calipers, slide-gauge, micrometer and vernier); turning a cylinder between points and between hollow centers; centering by means of the point-compass, high marker, eight-screw-chuck, three-jaw-chuck with chisel and centre-point, and in the lunette; simple tools: screw-drivers and the like.

Class II. Materials and Trade Practice: the remaining materials of the trade with special reference to the alloys: copper, lead, tin, zinc, nickel, aluminum; brass and the remaining alloys in regard to production or manufacture, properties, uses and working-up; commercial forms. Practical instruction: continuation of the filing and turning exercises (six-side, three-side, diagonal angle), simply tools (punch, centre-punch, breast-drill and tap, radius-gauge, flat cross-cutting chisel, grooving iron and knife steel); discussion of the necessary measuring, instruments and tools (universal angle, tenths gauge, internal, external and limit gauge); the lathe.

Class III. Trade Practice: turning, planing, milling, stamping, sawing, grinding; the tools and machines for these purposes; turning and threading cutters, planing cutters, milling cutters, saws; lathe, planing-machines, stamping Filing and turning exercises, diagonal measure, angle measure, vertical pivot machine, milling machine, stamps, grinding apparatus. Practical instruction; the manipulation of steel, forging tools; making tools for hand and rest turning; and canon drills; joining work; soft and hard soldering; finishing work, polishing and lacquering.

Class IV. Trade Practice: continuation of the discussion of machine tools with detailed consideration of special contrivances, apparatus. Practical instruction: various turning, filing, milling and planing operations with regard to the special vocation of the student; thread cutting on the slide lathe; square and sharp threads with nuts; making caliper points and thread dies; screw stocks; modern working methods; finishing work (gray and blue staining, yellow and black burning).

Note. The gun-makers' apprentices in this school will be sent for a certain number of hours to the trade school for engravers to gain a rudimentary know-edge of the use of the graver.

CHAPTER XLVIII: SCHOOLS FOR THE BUILDING TRADES.

The object of these schools is the training of masons, carpenters and other workers connected with building and giving then an opportunity of acquiring the theoretical knowledge and schooling necessary for successfully and independently carrying on their trade. Second, the education of assistants in the office and in practical building, such as draughtsmen, overseers, superintendents of offices and building operations. Third, the preparation for intermediate technical official work such as that of clerk to Boards of Works, technical, government and railway secretaries.

SECTION 1: SUMMARY OF SYSTEM.

When the administration of Secondary Schools for the building trades was transferred to the Ministry of Commerce and Industry there were only 7 institutions of this kind in existence in Prussia, and every year a large number of young workers engaged in the building trades were denied admission. The first object of the administration was therefore to increase the number of schools and to extend those already established. The State subsidies for the support of existing schools were therefore increased; more advantageous conditions than heretofore were offered to cities intending to establish new schools for the building trades; and finally when these inducements were not sufficient to obviate the difficulties, the State Authorities gradually took into their hands the schools already existing and induced Communal Governments to join hands with the State in the erection of new schoo' The results were an increase in the number of schools to 24, the organization of courses of ten grades, and an increase of students from 1,000 in 1885 to 9,000 in 1908. The number of students who had to be denied admittance was thus reduced to a minimum. This yigorous development of the system was made possible by increasing the State's quota for its support from 88,000 marks ($19,040) to 1,500,000 marks ($357,000), or an increase from 85 marks ($20.23) per capita of the students in 1885 to 166 marks ($39.51) in 1908. The cities increased their quota to even larger amounts, and in recent years the largest cities of the Kingdom have defrayed one half of all the expenses, or all expenses not covered by tuition fees and State subsidies.

The courses of study of the separate schools showed essential deviations, so that transfer from one institution to an advanced grade of another school was extremely difficult, if not impossible. Therefore in 1898, a normal or uniform course of study was prescribed, although only in outline, for all the schools for the building trades; and to secure results as uniform as possible, considering the often greatly differing standard of preparation of the students, uniform conditions of admission were officially prescribed.

The Surface Improvement Branches.

Together with the issuing of a normal course of study, a measure was taken which for the development of this school system has proved of great importance. It was this: the surface improvement branches (Tiefbaufächer) had hitherto found no attention, though many graduates were already engaged in hydraulic works and railroad building service, in city surface improvements, and in road bridge, and tunnel building. It was therefore determined that the schools for the building trades in Posen and Munster should open such courses for students who had already passed through two years' practical study of architecture. The students should devote the remaining two years to the essential branches of surface improvement (hydraulic works, road building, bridge and railroad building). How far this new arrangement met the existing needs is seen from the large number of applications for admission to the classes offering that kind of instruction. Year after year it became necessary to arrange new courses, so that at present all Schools for the Building Trades, except the one in Eckernforde, have such departments. The increase in the number of students from 30 in 1900 to about 1,500 in 1908 proves that many students, previous to the opening of such departments, had to be satisfied with an altogether insufficient preparation for their future calling.

Revision of Courses.

A thorough investigation resulted in the preparation of a new course by the Central Industrial Office, which prescribed a term of five semesters. After this course had been submitted to and discussed by expert teachers and men of affairs especially interested in the Schools for Builders, it was finally adopted in the autumn of 1908. In the deliberations concerning the best organization of this kind of instruction, not only the duration of the course, but also the extent of the subject matter of instruction received attention, especially the relation between æsthetic and constructive instruction and its methods, and consequently a thorough reorganization of the entire work of the Schools for the Building Trades took place. In consideration of the fact that the technical men who construct by far the greatest number of buildings in cities and in the country had come from the Schools for Builders, much weight was given to the æsthetic education of the students. The order in which the subject matter of the instruction was arranged resulted in the possibility of benefiting also those students whose capacity and means precluded graduation from the completed course or whose future vocation would not require them to go through the entire course of five winters. Such students are enabled now to take up the application of their architectural knowledge and skill after two or three winters and without having fully completed their departmental course.

The fact that architectural instruction (Hochbau) may be discontinued after three winter sessions makes it possible in the two upper grades to pay particular attention to surface building and improvements (Tiefbau), and to make the course in that department more thorough. In order to utilize these Schools for the Building Trades for ever widening circles it is considered of importance, if possible, to open Sunday and evening classes in all the existing schools.

Objects and Organization.

The Schools for the Building Trades are throughout vocational, intended to prepare, (1) laborers for the building trades who aim to become independent contractors, as masons, carpenters, stone masons: such schools offer opportunities for the acquisition of theoretical knowledge and accomplishments in drafting and designing, the necessary requisites for the independent practice of the trades; (2) to prepare for architecture and the work of surface improvement (Tiefbau) office draftsmen and designers, as well as building foremen; (3) to prepare for provincial, county and communal administrations, officers employed in governmental, military, railroad and city building or surface improvement.

In these schools the foundation is laid for official careers, such as those of architectural secretaries, inspectors and superintendents of the erection of waterworks, railroad contractors and construction engineers, building inspectors, secretaries of military works in the War Department and technical secretaries in the Navy Department. The communal administration also as a rule require for inspectors and contractors for their technical building and surface improvement, an education such as these Schools for the Building Trades furnish.

These schools are all State Schools except the one in Berlin, which is chiefly supported by the City Government. All are under the authority of the Minister of Commerce and Industry.

The schools for the Building Trades are divided into architectural schools and schools for surface improvement, and are of five grades. In Gorlitz (Silesia) special arrangements have been made for the technical preparation of stonecutters. The three lower grades offer instruction both in architecture and surface improvement, while in the two highest grades the two branches are separated. For students whose education is insufficient for admission preparatory classes may be opened.

The courses of study are arranged for semesters and are carried out in winter and summer; hence the course, if taken without interruption, may require only 2½years, but few students are able to pass through the entire course in that time. The students are advised not to interrupt their attendance by more than half a year and to attend the two highest grades without any interruption.

If a student shows that he is incapable of following the theoretical instruction owing to his lack of practical experience, further attendance may be denied him until he has gained that experience. Students wishing to enter a higher grade than the first must prove to the satisfaction of the Faculty that they possess the required knowledge and skill; hence an examination for admission is necessary.

Tuition Fees.

The tuition fee is 80 marks ($20) per Semester; in the schools at Cologne, Frankfurt on the Main, Essen and Berlin it is 100 marks ($25). Foreign students must pay 400 marks ($100) and 500 marks ($125) respectively. In exceptional cases a reduction may be granted by the Provincial governments. The fees must be paid in advance at the beginning of each Semester. If a student enters later than on the day of opening, or leaves before the Semester is closed, no reduction or rebate is allowed. Besides the tuition fees a small contribution for accident insurance is charged. The required drawing boards, utensils and drawing materials, as well as the text-books, blue prints, etc., must be bought by the students themselves. Information as to the things required is given at the beginning of the term.

Free Tuition and Bursaries.

Indigent students may be released from paying the prescribed fees after they have passed through the work of one grade with success, and have conducted themselves faultlessly. Bursaries are granted only to indigent and successful students.

Regulations regarding the decorum and conduct of students inside and outside the school are quite full. Certain privileges arise from attendance at any School for Builders recognized by the State. The following two indicate the appreciation of the technical instruction by the authorities:

In selecting clerks and secretaries of building, Communal or State, for the offices of building administration, or clerks and secretaries in Army and Navy Offices, applicants must produce a diploma from a State School for the Building Trades, or from a similar institution designated by the authorities as of equal efficiency.

Students who have gone through the two courses, architecture and surface improvement, are preferred in filling subordinate technical positions in any hydraulic or railroad construction office under the Government.

There are in Germany altogether about 40 Building Trades Schools supported by public authorities and 7 private institutions.

SECTION 2: BUILDING TRADES SCHOOLS AT BERLIN.

There are three classes in the Building Trades in Germany as follows:—

1. Artisans, apprentices and helpers.
2. Masters.
3. Employees of University rank.

The Handwerkschule is for men preparing for the 2nd class, and they take 2½ years, concluded by an examination. They work every day from 8 to 5. That means that a young man puts in 3½ years of hard work as a journeyman after the age of 18. Most of them save money and then come here for full-time instruction, taking the higher course of 2 or 3 years after having been at work for wages.

The fees are 100 marks per term of 6 months.

There are about 50% of pupils who pay no fees, having free scholarships from the city. The Handwerkerschule grade is so inexpensive as to be practically free.

Courses. Mathematics, physics (theory), then physics, chemistry and the materials of construction, modeling, drawing, constructing on paper all that is done. Then follows designing, in two divisions, viz. actual construction and drafting or planning; the composition of building materials used in large construction. Pupils are able to help both the *architect* and *builder*, thus being more useful than if trained in only one department. They can do both drafting and building, but are not architects proper, merely expert workmen, able to estimate quantitites. There is not time here for artistic architectural work; it is pure technique. The highest class has to plan actual houses; first they select the site, then estimate, and adjust to local by-laws; make plans with the architect, and then make working drawings, finally figuring out the actual cost.

They use light tracing paper for their plans, and the work is rapid and sketchy at first; afterwards they make scale drawings. Students suggest the character of the buildings. In the lowest class they are given simple construction of detail. In the middle stage they draw different sections of a building, such as roof, dome, joints, etc., with written explanations. Students, when they finish, are able to construct any kind of roof.

The students were strong, clean, bright fellows, aged 22 to 26.

Entrance Requirements (to lowest division).

Age 16, with 12 months' practical work as mason, carpenter, stonemason or roofer. Educational requirements:—writing, arithmetic to decimals, plane geometry to triangles, and freehand drawing.

Leaving Examination. A large committee is formed from the Guild or Government and the school authorities. The teachers of the school examine, and the others attend to see that all is properly conducted and give the certificates to successful students.

Students must have put in three half-years of practical work before receiving Leaving Certificate.

SECTION 3: THE ROYAL BUILDING TRADES SCHOOL, AT AIX-LA-CHAPELLE.

A coal-mining centre of 160,000 inhabitants, situated near the Belgian border, having textile and woollen mills and iron and steel works.

This is an Intermediate or Secondary School, one of 24 such in Prussia.

The School was established in 1900; the present building was erected in 1907.

It is a State School under the Minister of Commerce and Industry and is inspected by a Government District Officer from time to time and every two years from Berlin. The District Inspector is also Chairman of the Examining Board of the School.

Support.	Fees	30,000 to 40,000 marks
	Aix City	12,000
	State	balance
Approximate total expenses		120,000 marks

Students enter from building trades directly they have had at least one year's practical handwork (not office work) and are 16 years of age.

Objects. To produce architectural draftsmen, private architects for smaller buildings, estimators for contractors, middle officials for Government and municipal service, railway work etc. Students are given preference in Government employment.

For specially good work, such as design, in this school, students may have their work accepted in lieu of languages and thus qualify as "Einjahriger", enabling them to postpone military service until completion of course.

Building and Equipment. Building and site were provided by city, value 650,000 marks. There are a fine library, a very complete set of models and an up-to-date equipment.

Teachers. Have Technical High School training generally.

Salaries 2,400 to 7,200 marks plus 990 marks for rent allowance and the usual pensions. Allowed to do private work.

Courses are offered in (1) building above ground, (2) underground, hydraulic and railway building.

Royal Building Trades School, Aix-la-Chapelle

SECTION 4: THE ROYAL BUILDING TRADES SCHOOL AT BARMEN-ELBERFELD.

A textile centre, having a population of about 300,000 in the two towns combined.

This school grew up from a few classes in Drawing and Handwork applied to building construction, which were formerly given in the Mechanics' and Industrial Art School. It is supervised and financed jointly by the State and City. The powers and duties of the Curatorium are nominal except in matters concerning the general welfare of the School. The Director is the real guiding spirit and administrative head of the School.

Entrance Conditions. Elementary School standard with one year of practical work.

Objects. This is a finishing school for bricklayers, carpenters, stonemasons, assistants to building contractors, assistants to architects, who come here to learn the theory, drawing and science, applied to construction, in order that they may rise to positions of medium responsibility in the branches of industry connected with construction.

The Government draws a very large number of its middle grade technical officials for the Civil Service from these Building Construction Schools.

Courses. They consist of 5 half-years, the three first being identical for both above ground and underground departments.

Teachers. In all technical subjects the teachers have had a Technical High School training plus 3 years' practical experience. They are put on probation for 2 or 3 years before they are definitely appointed.

Observations. This School devoted more effort and time to handwork than the other schools of this class visited. In the basement were two shops for carpentry and cabinet-making, where the students constructed models of roofs to scale; and in the lower hall there were models of arch work and masonry construction, made by using small cement brick.

Annual Revenue from	Marks.
City of Barmen	12,000
City of Elberfeld	12,000
Fees	24,000
State	110,000
	158,000

Attendance:—Summer	116
Winter	198
	314

SECTION 5 : COURSES FOR THE SCHOOL FOR WORKERS IN THE BUILDING TRADES AT MUNICH.

Principles of Organization.

a. The trade school* for workers in the building trades comprises, corresponding to the term of apprenticeship of the pupils, three progressive yearly classes, instruction in which is given during the period from September 15th until July 14th in each year.

b. Attendance at these classes is compulsory for all masons', stone-cutters' and carpenters' apprentices during the entire period of their apprenticeship or until the completion of the eighteenth year of their age.

c. Instruction is confined strictly to the above-mentioned trades and includes the following subjects: Religion, Business Composition and Reading, Trade Arithmetic and Bookkeeping, Hygiene and Civics, Trade Drawing and Practical Instruction in Materials and Tools.

d. The hours of instruction are ten per week in all three trades during the winter semester, that is, from October 15th to March 15th; and during the summer semester, that is from March 15th to October 15th, six hours per week. In the winter these hours fall on a single workday from 7 to 12 o'clock in the forenoon and from 2 to 7 o'clock in the afternoon; and in the summer, on the afternoon of a single workday, from 1 to 7 o'clock. Care is to be taken, however, that apprentices of different grades coming from the same concern, do not attend school on the same day.

e. The course of study is distributed as follows over the three school years and the respective ten and six hours of instruction:

Subject.	Hours per week in the three classes.	
	In winter semester.	In summer semester.
Religion	1	1
Business Composition and Reading	1	1
Trade Arithmetic and Bookkeeping	1	1
Hygiene and Civics	1	1
Trade Drawing	3	2
Practical Instruction in Materials and Tools	3	—

f. The instruction in drawing and the practical instruction in materials and tools is to be imparted by craftsmen; the remaining instruction is to be given by the trained teaching staff of the public and Continuation Schools of Munich. It is, however, provided in advance that all the teachers shall be in very close

* Meaning trade Continuation School.

touch with the trades, so that, with a view to practical application, they may be familiar with trade requirements.

g. The defrayal of the expenses of instruction, as well as the provision of the necessary classrooms, remains as heretofore the duty of the community of Munich.

h. The Guild of Master-Builders (masons, stonecutters, and carpenters), announces its willingness to undertake to supplement the supply of wood and plaster models for the drawing instruction or of observation models for the instruction in materials, where such need shall at times arise.

Scope and Distribution of the Subject-Matter of Instruction.

The subject-matter of instruction, with regard to the vocation of the pupils, shall accord with the following schedule:

a. RELIGION.

Lessons following the regulations of the Archiepiscopal Inspectorate, or the Protestant Superior Council.

b. BUSINESS COMPOSITION AND READING.

The instruction in Composition aims at preparing the pupil to draft with grammatical, orthographical and formal correctness all of the more important forms of private and business correspondence.

Class I. Ordinary private letters to members of the family, relatives and friends, relating to events in the life and vocation of the pupil; inquiries and replies, applications for employment, announcements, statements of acceptance, declinations, indentures. (In connection with this, postal forms). Compositions on the subjects of hygiene and materials.

Class II. Compositions on matters of purchase and labor: written and open bids on building materials, inquiries as to prices, orders for goods and labor, purchase and labor agreements, business instructions, delivery notices, bills, cash payments, receipts, part payments, refusal of payments and suspension of payments. (In connection with this, the procedure of the money and parcels post and of the freight traffic). Complaints, excuses, opinions, certificates, recommendations. Compositions on the subject of materials.

Class III. Compositions on the subject of indebtedness; shipment of goods on credit, certificates of indebtedness and security bonds, dunning letters, claim letters, letters of respite, abatements, correspondence on bills of exchange, drawing-up mortgages and notification on same. Correspondence with officials: petitions to magistrates, to the city building commissioner, state building officials, commercial and industrial commissions, the government, and trade tribunals.

The instruction in reading is intended above all to promote the general and moral education of the pupil. It is also designed to arouse the pupil's interest in the best literary works. For this purpose the school library is also to be utilized and now and again a classic poem should be read. In order to further the above objects, the teacher in each class is to make a suitable, systematic choice of appropriate selections.

c. ARITHMETIC AND BOOKKEEPING.

The instruction in arithmetic has for its object primarily to impress on the pupil the necessity for acquiring a thorough system of private and business accounting and to instruct him in the proper method of conducting the same. But in addition it shall prepare the pupil to make, with as much self-dependence as possible, the more simple calculations of cost and estimates, and in particular it shall ensure his adequate skill in special building calculations. The work in arithmetic for the three classes is arranged as follows:

Class I. Personal accounts: earnings and living expenses of the building-trades workman; reckoning of hourly, daily and weekly wages, wages ledger and pay roll, monthly and yearly income, comparison and equalization of summer and winter earnings; the daily, weekly, monthly and yearly expenditures of an individual, of a family; household expense book, monthly and yearly balances. Calculations of percentages: savings accounts and interest (various methods of calculating interest, up to absolute accuracy). Geometrical calculations with direct reference to problems in building, exercises in lines, simple surfaces and solids (square, extraction of square root, rectangle, cube, four-sided prism), calculation especially of extent of walls on metric system, old style measurements and their conversion (foot, square foot, land measure, decimals).

Class II. Geometrical calculations, extension of the work in surfaces and solids (rhombus, rhomboid, trapezium, triangle, Pythagorean theorem, triangular prism, circle, circumference, cylinder, hollow-cylinder, pyramid, and cone and sphere with special application to examples from masons', stone-cutters' and carpenters' practice). In connection with the above, practical calculation of weights.

Class III. Business accounts: With the instruction of this class in business accounts is connected the bookkeeping, as far as its formal completion can be effected in the classroom. Purchase of building materials, purchase and sale of land and buildings, with accompanying profit and loss, calculation of averages and more complicated problems in percentage. Work by the day and job work, including partnership calculations, transportation of building materials and outfit, sundry other trade calculations. Cost figuring for building trades. Calculations and estimates of a simple character. Liquidation of debt, instalment calculations, computing the value of financial paper, notes and checks, calculations of tax and insurance.

d. HYGIENE AND CIVICS.

The instruction in hygiene and civics has the purpose of familiarizing the pupil with a rational way of living, physical and intellectual, and consequently relates on the one hand to sanitary matters, with special consideration of workshop hygiene; on the other hand, it deals with the duties of life in the vocation, the community and the state, and above all else, with those affairs from which the pupil will most quickly gain a recognition of the necessary interdependence of interest of all social and industrial groups.

Class I. The apprentice: a. admission to employment, indentures. The workshops and factories from the hygienic aspect, the observance of cleanliness. b. Deportment: behaviour at home, in the school, towards fellow workmen and employers in the workshop, on the street, in social gatherings. c. Hygiene: construction of the human body in general, nourishment, food and food luxuries according to their value or uselessness. Respiration and the circulation of the blood. Lodging and clothing. Work and recreation, care of the sense organs and nervous system. First aid to the injured, practice in bandaging.

Class II. Trade History. Development of architectural plans and processes, especially in Germany; in connection therewith, the conditions of the building-trades craftsman; masters who have been prominent in the building trades. The development of the building-trades guild in Munich from the fourteenth century to the present time; trade guilds and associations, the free corporation.

Class III. The most important features of trade organization. Journeymen's and masters' examinations. Workmen's protection and social legislation. Trades Council. Trade arbitration. Trade tribunals. The building-trades craftsman as a member of the community. Community organization. Problems of the community. Honorary offices of the citizens of the community. The building-trades artisan as a citizen of the state. The state constitution of Bavaria. Objects of the state organization. Honorary offices of citizens of the state. Government of the Bavarian Kingdom. Duties of the state authorities. Constitution of the German Empire. Trade and commerce in modern times and its importance to the welfare of the citizen. Competition. Allied trades. The importance of labor in the state. The interconnection of trade interests. The value of the German foreign consulate.

e. DRAWING.

The instruction in drawing is intended to impart to the student in addition to the greatest possible accuracy and dexterity in the use of drawing tools, the capacity for presenting clear and intelligible drawings of individual masonry, stone-cutting and carpentry operations and constructions, as well as for drafting simple sketches of plans correctly and preparing original plans. He must therefore be made acquainted with the various methods of drawing and coloring. Where it appears practicable the student's comprehension of his work shall be promoted and tested by the execution of working plans, or the isometric reproductions of single parts. A further feature of this instruction is to be found in the arousing and increase of the interest of the pupil in the buildings and architectural affairs of the city as well as of his æsthetic and artistic taste in general. The instruction is divided into mechanical and free-hand drawing. The latter is in every respect to be so planned that wherever possible it shall support and supplement the former; in all classes, as far as possible, practice is to be given on designs or models that are actually used in the trade. The general principles of drawing that prevail in all trade schools are to be kept in view. The subject-matter of instruction is as follows:

Theoretical Work for Masons.

Class I. Geometrical and projection drawing. The most important geometrical elements, with constant reference to their technical execution and their application to practical examples of masonry; linear designs, erection of perpendiculars on a brick wall, line division for a wall design, metrical measurement for a pedestal with reduction to scale, angle division for a crown arch. The circle and its elements in a round window. Finding the centre point for arch construction, circular division and polygons in a chimney plan. Tangential theory in door and window plans. Diminished arch for a church window. Ellipse in a house entry. Building-stone measurement. Patterns for facing walls.

Class II. Technical drawing (from models only). The elements of mouldings and their combinations to form mouldings. Simple solids used in building done in horizontal, vertical and side projection, and horizontal and vertical cross sections of the same; isometrical representation of single building stones and simple elements of building construction. The different styles of wall-bonds (stretcher, binder, English and lateral bond), wall angles, joining and crossing walls; chimneys, hollow walls, buttresses. Construction of main and partition walls for several adjoining apartments.

Class III. Technical drawing (from models only). Irregular forms of walls; arch construction in brick (crown, depressed, round, flat, pointed and relief arches), their form-stones and mouldings. Decorative work on windows and doorways. Simple dome construction; simple lunettes.

Free-hand drawing: In free-hand drawing for masons and stone cutters the object is, in all three classes, to impress the principle that only such decorative work is of value and artistic importance as answers a constructive purpose or which is designed to give the building and its surfaces rhythm, articulation and graceful proportions. For this reason, no model is to be drawn unless its connection with the whole is clear to the pupil. Besides there can be selected as models, simple serial ornaments for wall bands and parts of mouldings; various fillings for square, rectangular, circular and oval wall surfaces, for wall friezes and pilaster strips, for window casings, etc.; simpler and more ornate foliage and flower forms for templet work or ornament; spiral scrolls and their decoration, their use in consoles, keystones and gables. Coats of arms, shields and cartouches for facade ornamentation.

Applied Art for Masons.

Class I. Purpose of the school workshop: general idea of building; lessons on tools; scaffold building; instruction in brickwork bonds (English and lateral bond, partly with model stones, partly in the forms of dry masonry, with bricks and sand).

Lessons on materials: Lime, lime slaking, preparation and hardening of air mortar. Bricks: face bricks, moulded, perforated and arch bricks, Dutch bricks, paving tiles, flags, roof tiles, earthenware pipe, chamotte clay and stone.

Class II. Instruction in bonding acute and obtuse wall-angles, as well as bonded-in walls and piers. Suavian and Dutch bond, herring-bone bond. Exercises in English and cross-bond with adhesive material. Lessons on materials. Cement (its production, properties, and application, Roman and Portland cements), concrete, concrete moulding; plaster and its use; wall decay by efflorescence (its cause and prevention); wood fungus (its cause and prevention); sand, gravel (river and pit sand); the natural building-stones; lime stone, sand stone, volcanic stones (trass, from near Nordlingen) granite; gompholite (its origin).

Class III. Masonry with facing stones, masonry of chimneys and arches with practical exercises. Arch masonry work. Setting of window and door uprights. Caulking the interstices of window uprights with excelsior or similar material. Protecting structural parts from climatic influence. Setting and building-in overload supports. The finishing coat. Its preparation with lime and cement mortar (inside and outside finish): mouldings with bends, etc. Explanations in regard to the nature and construction of foundations. Anchoring and under-pinning the structural parts. Preparation, clearing the ground, etc., for quite simple rectangular buildings. Method of constructing simple firing contrivances (wash-fire places, country baking ovens). Steps for the protection of wood against danger of fire. Suggestions regarding drainage arrangements of buildings. Rabitz, Monier and plaster-board walls. Concrete ceiling. Covering of iron parts.

Theoretical Work for Stone-Cutters.

Class I. Geometric and projection drawing. The geometric elements with constant regard to their practical-technical execution and their employment in stone-cutting; line patterns, laying-out angles from a stone base. Line dividing on a free-stone wall, scale and transfer of scale on a stone pedestal, angles and their division in bossage or a window lintel. The circle and its parts, finding the centre of a segment arch or a circular window. Circle division and polygons in a stone filling. Tangent problems in a torsional twist, in a window scale. Basket-handle arch for a church window. Ellipse on a bridge arch. Spiral in a stairway.

Class II. Technical drawing (from models only). Moulding details and their combination into mouldings. Simple forms of stones in ground, front and side plan. Cut forms and isometric representations of the same. Cut-stone bonds, building them into brickwork. The various types of arch construction (crown, depressed, round, pointed and elliptic arches, smooth and serrated arches, coupled arches). Pillars, railings and balustrades. Simple projections.

Class III. Technical drawing (from models only). Patterns of garden pillars and columns. Base, belt and main moulding-courses and building them into brick walls. Round and pointed-arch moulding. More ornate window and doorway construction. Niches. Free and wall curbs. Simple open steps. Projection of complicated stones.

Freehand drawing: For each of the three years, there is a systematic selection of suitable patterns in stone sculpture adapted to the proficiency of the students in drawing, such as: egg and leaf-stem mouldings, other serial ornaments, various fillings in friezes and pilaster strips, in stone bases and pediments, in door and window scrolls, in balustrades and other railings. Stone volutes and their ornamentation. Scroll, leaf and flower work for wall surfaces, door jambs, capitals and key-stones. Foliage and fruit scroll work, arms, shields and cartouches as façade decorations, for pilaster and pillar ornament, decorative columns, simple animal forms and allegorical figures, lettering.

Applied Art for Stone-Cutters.

Class I. Explanation of the tools used by masons and stone-cutters. Various lifting apparatus (from the iron crow-bar to the devices for power operation). Setting up scaffolding. Setting into the brick masonry bond (English bond with three-quarter and split stones). Practical exercises in slaking lime and building (foundations, carrying out of stairways, setting cut stone). Working cut stone (practical exercise on an easily cut stone and one more difficult to cut, lime-stone and granite), gurletted, chiselled, granulated, axed, smoothed and polished.

Instruction in materials: Properties, production and uses of bricks; properties, production and uses of air or white lime mortar. Quarries and quarry operation. Masonry of unfinished and cut stone. Concerning the setting of cut stone, lime-stone and varieties of gypsum.

Class II. Stone-working machines. Pneumatic chisel, lathes, rubbing machines, etc. Practical exercise in making setting-joints (explanation of stone-cutting). Exercise in stone-cutting on plaster models or soft stones. Working on model in granite (entry steps, steps without profile, end-step with nosing, main exit steps with pedestals, steps with profile). Models in lime-stone (simple stone-cutting, various mouldings).

Lessons in materials: All the stones occurring in nature with regard to their applicability to building (granite, lime-stone, sand-stone and volcanic stone, and clays, e.g. pozzolona, terranova, etc.).

Class III. Practical exercises: Splitting and working up of simple and complicated stones (for instance, core arches, wagon-vault and groined vaulting), first of all in gypsum. Making of various springers and keystones in limestone. Making the necessary wood forms for core-arches. Making core-arch springers of granite. *Lessons on materials:* Plaster mortar, water, hydraulic or cement mortar, the cements (Roman and Portland cement) in greater detail. Concrete and artificial stone.

Theoretical Work for Carpenters.

Class I. Geometrical and technical drawing: Elements of geometrical drawing with constant regard to their technical execution and application to carpentry. Line patterns and laying-out of rectangles. Line division in board and picket fence. Metric measurement, reduced scale, and transfer of measurements on a wooden column. Angles and their division in a garden gate. The circle and its parts in a roof window. Circle division and polygon in a well enclosure. Tangent exercises on a sawed-out gable. Three-centered arch in a window-frame. Ellipse for a gallery. Moulding elements and their assembly.

Class II. Technical drawing: Simple wood solids done in horizontal, vertical and side projection, cross sections of the same, their design in isometrical presentation. Beam joints (running-joint, tie-joint, mortise-joint, dovetail-joint skew-notch-joint, upper strut, hanging tie, strut frame—all from models). Close walls, balconies. Simple doors and gates. Centering.

Class III. Technical drawing: Roof plans, location of beams, simple raising. Roof-prop parts. Roof-prop details at the eaves, at the intermediate purlins, at the ridge (by use of models). Jack rafters. Simple roof supports: standing, lying purlins, collar-beam and truss-frame roofs, dormer-window plans. Plans for simple stairways.

Freehand drawing: Adapting the various exercises to the drawing ability of the student during the entire three years' course, a suitable and systematic selection is made from the manifold forms of beam and board ornamentation: various patterns of hanging tenons, upper-strut and beamhead decorations, tappets, coronas, barge, verge and hanging boards. Other kinds of sawed work. Simple carved panels of smaller and larger dimensions. Sketches of details of peasants' houses obtained on walking excursions.

Applied Art for Carpenters.

Practical Instruction in Materials and Tools: The object of this instruction is to familiarize the student with the most important tools, instruments and machines of his trade, and with the appearance, properties and varieties, the relations and comparative prices, the proper manipulation and the practical use of the materials used in the trade. This instruction is designed especially to fit the student for making correct estimates, and for this reason as close a connection as possible is to be made with the instruction in arithmetic in order to have it become a real aid in estimating. The lessons include the following subjects, given separately for the three trade branches of the school, and relate in matter as closely as possible to the given field.

Class I. Tools and instruments. Practical exercises, first of all in the use of tools. Technology of wood: wood as building material; its growth, properties, varieties, defects and diseases (wood fungus, its origin and prevention). Felling and further working-up of wood into cut goods. Priming and impregnation of wood.

Class II. Exhaustive consideration of the domestic varieties of wood: fir, pine, spruce, larch, summer and winter oak, red and white beech, maple, ash (woods more rarely used: alder, lime, elm, birch, poplar, willow, pitch pine). The utilization of these woods according to their properties. The most important fruit trees and foreign building woods. Wood-working machines. In the practical exercises, making of the various simple wood-joints always in connection with the drawing instruction. Concrete moulds.

Class III. Extension of the practical instruction to include the more difficult joints, beam setting and roof joining, according to the ability and advancement of the individual students. Note: The practical instruction for the third and fourth classes is related to the drawing lessons in the respective classes.

THE ROYAL BUILDING TRADES SCHOOL: BARMEN-ELBERFELD.

CHAPTER XLIX: SCHOOLS FOR TEXTILE INDUSTRIES.

Introductory.

The schools for textile industries were founded originally to meet the requirements of trade and industry. The introduction of the power-loom turned the workman himself into a machine. All that he had to do, or that he still has to do, is to watch the unvarying movement of a machine that is complete in itself. He has nothing to do with the process of weaving and nothing with the building of the machine. Thus he generally lacks any kind of stimulation from without, and consequently remains devoid of any higher mental or technical development. Yet even the textile industry requires intelligent workers who can be made use of as foremen and directors. This fact led manufacturers to demand the establishment of Lower Schools for Weaving and Spinning, and in some cases even to take the matter into their own hands.

In other districts, where weaving was extensively carried on at home in the winter months, schools were founded in order to give peasants' daughters and servants, and young men as well, an opportunity of at least learning how to make linen, half-linen and cotton fabrics for personal use. This last object was the origin of the numerous weaving workshops in Hanover and Silesia. As the artistic taste for hand-woven carpets, curtains, and furniture covers is increasing in Germany, it is not improbable that these simple opportunities of instruction will spread still further in poor districts, as has been the case in Sweden.

Later on, after the number of power-looms had multiplied exceedingly, and the processes of weaving wool, cotton, linen, silk and velvet had been correspondingly developed, the sons of manufacturers began to feel the need of Higher Schools. The foundation of these Higher Schools was also favoured by the desire on the part of the manufacturers to make themselves independent of foreign countries. In the first half of the 19th century young men who wished to learn the secrets of weaving were forced to go, at great expense, to Lyons, where both public and private weaving schools had long existed.

Drawing, Commercial Courses and Dressmaking.

German industry was also greatly hampered by the difficulty of procuring patterns, and the necessity of training pattern draftsmen became self-evident. Courses in Drawing had become especially indispensable in the schools for the woollen industry, in which the pattern is generally attended to by the same employee who has the post of supervision in the machine room. The Higher Weaving Schools could be made use of for this purpose. A factory-pattern

Drawing School was soon attached to the oldest German Weaving School, in Elberfeld, founded in 1845. A second Weaving School was founded in 1854 at Mulheim on the Rhine, and a third in 1855 at Crefeld. The Elberfeld school was also enlarged, at the suggestion of the manufacturers, by a chemical department for dyers, printers and bleachers. In the same manner the development of German trade made it necessary to add commercial courses to the weaving schools, for the instruction of clerks in drapers' shops and factories in the knowledge of wares and the processes of work in the different branches of the textile industry. And finally the weaving schools are sometimes combined with courses for dressmaking, frequented mostly by female pupils. These courses are most numerous in Berlin, the principal seat of dressmaking in Germany.

SECTION 1: SUMMARY OF THE SYSTEM IN PRUSSIA.

Instruction in textile schools was conducted for a long time differently from that offered in other vocational schools. It consisted chiefly of free lectures and exercises, and the teachers rarely determined by examinations whether their lessons were successful or not. The teachers imitated university professors, but for such methods the students were too immature. For that reason, during the last decade of the past century new courses of study and rules were formulated which guaranteed earnest and diligent study and work on the part of the students. Graduation examinations were prescribed also, in which it was necessary for teachers and students to prove that the prescribed objects in view had been reached. Hand in hand with this change went the establishment of separate courses for workmen, foremen, superintendents and factory owners. For the practical education of workmen, shops for weavers were established; for foremen, Secondary Technical Textile Schools; and for superintendents and factory owners, Higher Schools which taught all the branches of the textile industry. Naturally the latter courses were opened also to foremen, and even to ordinary workers if they were capable of following them. A separation of vocations further led to the inauguration of courses for model draftsmen, merchants, etc.

Experience finally proved indisputably that it was not possible to teach all the branches and bearings of the vastly extensive textile industry in a single school. Neither was it possible to obtain teachers who possessed the knowledge of every textile branch, nor could a school be conducted successfully if it attempted to cover such a vast amount of work. Hence special schools were established for the cotton, wool, linen and silk industries. These schools did not confine themselves, however, to teaching weaving, but each undertook to teach also spinning, dyeing, finishing, lacemaking, ribbon weaving, machine knitting, and finally, all the numerous bearings of its branch. In consequence of this policy it is to-day possible in Prussia to have represented every branch of the textile industry in schools, to equip the latter with good shops, machines, raw materials, and to provide thoroughly expert teachers for the staff.

Objects and Organization.

These schools are classed as Weavers' Apprentice Shops, Lower Textile Schools, and Higher Technical Schools for the Textile Industries. In the Weavers' Apprentice Shops young men are trained in serving at mechanical looms, and women and girls from the country are trained in using hand looms at their own homes during the winter. In the Lower Technical Textile Schools foremen are trained, and in the Higher Textile Schools it is the superintendents, owners and directors of factories who receive a thorough preparation. In this particular each institution pertains to a specific branch of the vast industry represented in the locality. In some institutions separate classes are opened for merchants and for designers, some have separate classes in which the young women are taught intricate handiwork, preparing linen for the market, and tailoring.

The tuition fees for the full higher course are 100 marks ($25) for natives, 500 marks ($125) for foreigners, per semester. Students who take part only in the practical exercises pay 50 marks ($12.50) if natives; 250 marks ($62.50) if foreigners. For native temporary attendants, who may choose their own lectures the fees are 15 marks ($3.75) for one course (a lecture and attending exercise) a week; for foreigners 50 marks ($12.50). There is also an admission fee for foreigners of 60 marks ($15.00) for the full course.

The fee for a full course in the Lower Technical Schools amounts to 30 marks ($7.50) per semester for natives; 250 marks ($62.50) for foreigners. Students who take part in the practical exercises only pay 30 marks ($7.50) per month if natives, 125 marks ($31.25) if foreigners. The admission fee is 30 marks ($7.50) for the full course, but this is charged only to foreigners.

The fees for the courses for designers and dressmakers, as well as for the evening and Sunday schools, vary a good deal and are adapted to the prevailing local conditions.

SECTION 2: MUNICIPAL HIGHER WEAVING SCHOOL AT BERLIN.

This is a day school with courses as follows:—

A. 1. Commercial course for textile workers (various kinds of textiles).
   2. Designing.
   3. Dressmaking.
   4. Trimming.
   5. Hand and machine embroidery.
   6. Weaving and knitting courses.
   7. Dyeing course.

B. There are evening and Sunday schools. These provide:—
   1. Commercial course.
   2. Dyeing course.
   3. General instruction.

520 pupils in day and evening classes. Pupils come from Continuation Schools. Very few have been at work. There is an advanatge with those who have.

Drawing.

Preliminary Drawing first from form then later with color schemes. Students begin to make designs from units of natural objects conventionalized such as butterfly, grasshopper, flower, etc. They then make Drawings for designs. To make clear that the designs are practicable, students afterwards make designs on cards for the loom and proceed to weave them in materials.

All students start with hand looms to increase definite and exact knowledge of weaving processes and then go on to the higher forms of machine weaving.

Equipment.

There are many one-person embroidery machines, in form like an ordinary sewing machine and one power embroidery machine which enlarges the pattern in the materials from a needle point traced over design in sight of the operator. Products from looms are sold to students at cost of materials only. When not wanted by students any surplus of products is sold to friends of the students or put in the school.

SECTION 3: ROYAL HIGHER TECHNICAL SCHOOL FOR TEXTILES AT AIX-LA-CHAPELLE.

A technical institution for instruction in cloth-weaving, giving theoretical and practical instruction in the production and preparation of woollen goods, The Dyeing department comprises wool, cotton, half-wool, silks, etc. There are 4 sections, viz.:—

1. Spinning.
2. Weaving.
3. Dyeing.
4. Shrinking and finishing.

Entrance: Age 16 and ordinary education, with (if possible) practical experience, but this is not an essential.

Courses: Half a year each, of about 21 weeks, with 44 hours instruction weekly.

Fees: Germans, 100 marks per term; foreigners, 500 marks.

Support: The school is the property of the Weaving School Society of Aix, and receives assistance fom the Prussian Government, the Provincial Government of the Rhine Province, the local Union for the Encouragement of Industry and the Cloth Manufacturers' Association. The contributions of these various bodies are as follows:

Rhine Province 10,000 marks annually.
City gave site and gives 3,000 marks annually.
Prussian Government two-thirds of the deficit.
Weaving School Society the balance.

Aim: Prepares buyers and sellers of woollen goods, superintendents and managers of factories, dye experts and dye chemists, designers of textile machinery, spinners and weavers, etc.

Buildings and Equipment: These were not very well arranged at the time of the Commission's visit, but plans were in hand for a new factory, with up-to-date machinery. In each department they had *special small* machines for demonstration, a number of Jacquard looms (foot-power) and power-looms.

Special Feature: The school has a regular factory and takes outside orders. 30 to 40 workmen and some boy apprentices are employed 9½ hours daily. The latter learn the weaving and spinning trade, but receive no special instruction in day or evening classes.

Teachers: All have had practical experience, some only practical, while others, as in chemistry, physics, dyeing, etc., have had Technical High School training as well. Some are sent abroad to study.

Attendance: Day, 60 to 70. Evening and Sundayclasses limited to 60. Most of the day students are sons of employers, and of mature age. The total attendance for 1909—both terms—was 295.

Spinning Department: In this department special attention is devoted to woollens, the other materials being taken up incidentally. The subjects are:—Spinning (theory), Materials, Weaving (theory), Special Arithmetic and Book-keeping, Chemistry and Dyeing, General Machinery Instruction, Drawing and Sketching, Textile Law, and practical work.

Weaving Department: Weaving (theory) Chemistry and Dyeing, General Theory of Machinery, Drawing and Sketching, Textile Industrial Law, and practical work.

Dyeing and Finishing Departments: As above, with special stress on subjects belonging to these departments.

SECTION 4: ROYAL HIGHER WEAVING SCHOOL AT BARMEN-ELBERFELD.

The combined population of the two towns is nearly 300,000. The textile industry is the principal one.

This school grew out of an Evening Class, and started in 1899, using an old school building for the purpose. A factory building and equipment were added later.

It is supported by fees, by State and City aid, and by a special Grant from the Rhineland Province. Some manufacturers contribute towards scholarships and the financial assistance granted to necessitous students.

The attendance at Day Classes is 130, at Evening Classes, 270.

Entrance: Einjahriger standing required in case of manufacturers' sons, owners and managers. Full Volksschule course in case of designers and foremen.

Object: For the instruction of owners, managers, salesmen, designers, merchants, stock clerks, foremen, weighing-room assistants, apprentices and workmen of the textile industries in the vicinity, and women superintendents.

To supply the technical knowledge demanded by the very varied textile industry of Barmen, which is best obtained in an institution fitted with all necessary appliances.

Teachers: Only one of the staff is a Technical High School graduate, the others were selected from the industries, stressing:—(1) expertness in his special line; (2) general personal qualities for teaching.

The Curatorium deals with the general welfare of the school, particularly financial matters.

Courses: The following table gives particulars of the courses:—

DAY COURSES (44 hrs. weekly.)

	Length of Course.	Tuition.*	Books.
		$	$
1. Manufacturers, (owners and managers)			
(a) Cloth Weaving	1 yr.	50 00	10 00
(b) Ribbon and trimmings, weaving and lace	1 yr.	50 00	10 00
(c) Braiding	1 yr.	50 00	10 00
2. Dyeing and Chemistry	1 to 2 yr.	50 00	10 00
3. Designers and foremen	1 yr. or more	15 00	10 00

EVENING COURSES (6 hrs. weekly.)

1. Foremen, warehousemen and weighing assistants (as a, b, c of Day School)	2 yrs.	7 50	3 75
2. Designers and stencillers	1 to 2 yrs.	7 50	3 75

SPECIAL COURSES FOR GIRLS.

1. Plain Hand and Machine Sewing	6 mos.	15 00 inclusive	10 00
2. Fancy Work	1-2 to 1 yr.		
3. Dress and Mantle Making	1-2 to 1 yr.		
4. Trimmings	1 yr.		

Subjects of Instruction: All departments are considered with which pupils will have to be acquainted—not only one special line. Where possible, *individual instruction* is given. Special stress is laid on practical work as early as possible in the course to accustom students to independent work.

*Foreigners pay five times the usual tuition fees.

Means of Instruction: First-rate appliances and collections for theoretical instruction, constantly being added to. Dyeing laboratories well stocked with latest inventions. Shed for practical experiments. Library of over 1,000 volumes, and large collections of Bergiach Verein for the advance of Textile Industry, giving students the opportunity of observing patterns of various articles and developments of fashions. Instructors have had practical as well as school experience. Machines are of German make, except in the case of some of the weaving looms.

The Course for Textile Designers trains Designers for the following branches of industry:—

1. Weaving, patterning plain linen and cotton goods, silk, furnishing goods, carpets, etc.
2. Ribbon-weaving—bands, trimming, upholstery trimmings, etc.
3. Lace Manufacture—especially Valenciennes (duchess) and Torchons.
4. Hand and Machine Embroidery, viz., decoration of costumes and interior decorations.

The Dyeing Course aims at giving practical and theoretical instruction in all branches of dyeing. Instruction mostly individual and combined with practical study in bleaching, washing, dyeing, etc., in the new, up-to-date dyeing establishment attached to the school.

Excursions are made to other works and scientific expeditions are organized.

Course for Salesmen in Textile and Making Up Branches: It is necessary for salesmen, both wholesale and retail, to have a thorough knowledge of manufacturing processes, possibilities of design, nature of raw materials, etc. The salesmen's course provides for this and offers opportunity for studying processes of manufacture in actual practice.

Girls' Division has for its general aim and object preparation for both the home and the trade in Day and Evening classes. The study plan includes:—Plain and Machine Sewing, Fancy Sewing, Dress and Mantle Making, Trimming, Designing, German, Arithmetic, Knowledge of different kinds of Weaves, Laws of Textile Industry.

SECTION 5: TEXTILE SCHOOL AT CREFELD.

A manufacturing centre of 130,000 population. The principal products are velvet and silks.

A.—The Spinning and Weaving School.

Erected and maintained by State and City, it prepares men as managers, owners, superintendents, designers, buyers and salesmen in the textile branches. It also provides supplementary education for workmen wishing to better their positions, and has a Girls' Department where instruction is given in Dressmaking, Millinery and Embroidery for home purposes. A spinning and weaving factory in connection employs 40 hands and a number of boy and girl apprentices.

300 students were in attendance.

Students must be 16 years of age and have a good preparatory training, which should include some practical knowledge.

Equipment: The School has the newest machinery and can meet all requirements.

Departments:

1. Silk Waste Spinning, with Silk Waste and Cotton Winding.
2. Weaving.
3. Pattern Drawing.
4. Fancy Embroidery by hand and machine.
5. White Sewing.
6. Dressmaking.

A Dyeing and Finishing establishment is attached for practical work.

Those intending to go in for textile machine building can practise in workshops attached.

The Silk Waste Spinning Dept. has about 540 fine spindles and 120 cotton spindles. Spinning process in all its stages from the raw product to the finished thread, learnt theoretically and practically.

The Weaving Dept. has about 30 hand looms, 75 mechanical looms and all other necessary machinery.

The Pattern Drawing Dept. gives practical as well as artistic training.

The Royal Weaving Collection, second largest in Germany, is at the disposal of students.

The course extends over 18 months, the fees being 200 marks per annum for Germans, and 1,000 marks for foreigners.

B.—Dyeing and Finishing School.

Under the same Curatorium as the previous School, but having a different Director. It is one of the best of its kind.

Students are sons of employers, apprentices and workmen seeking to better their condition, and also men from other schools who wish to obtain a special knowledge of the dyeing industry. The entrance requirements are as in A, and the course covers 3 years.

No regular factory is attached, as in the former school, but when necessary for instruction orders are taken.

The objects of this School are:—

(1) To give theoretical and practical instruction in all branches of Chemistry, with special reference to manufacturing and practical applications.

(2) To instruct persons who wish to devote themselves to any branch of color industry, especially in chemical processes, dyeing, printing and finishing of fabrics, manufacture of dyes and mordants, etc.

Some of the pupils are sons of industrial employers, destined to enter their father's business. The remainder find good positions as masters, dyeing experts, colorists, etc. Some wish to qualify in special branches, such as straw or leather dyeing, wood, paper, etc.

The differences between fees and cost of maintenance is made up as to two-thirds by the State and one-third by the City. The State paid for the building and extension, the site having been presented for the purpose. The building contains several large halls—two lecture rooms with preparation rooms, library, weighing-room, two chemical laboratories, one chemical-technical laboratory, one dyeing laboratory, one dyeing room with drying-room and dye kitchen, bleaching room, blue dyeing and printing and finishing rooms, and several smaller rooms, besides necessary storerooms for chemicals, utensils, etc.

Experience showed it was useless to make small patterns on narrow machines, so machines were built over and new, full sized ones installed, to width of 180 cm. The 50 machines and appliances of different systems admit of all kinds of material being handled.

Museum of Textiles.

At Crefeld the Royal Museum of Textiles has a collection of ancient and mediaeval stuffs. It has also samples of the best modern productions and is visited by many thousands of designers in the course of the year. There is evidence of the practical value of the well planned, well organized and well supplied museum under competent direction. Exhibitions of textile fabrics are held occasionally. Sometimes these result in the foundation of new industries. These museums are generally replete with examples of all classes of industrial art, design and workmanship, ancient and modern, native and foreign. They contain collections of art and technical books. Practically all the current journals and publications relating to art and industry together with trade catalogues, directories and address books of other countries are on the fyle. The officials give every assistance to designers and manufacturers.

SECTION 6: THE ROYAL SAXON ART SCHOOL FOR THE TEXTILE INDUSTRY AT PLAUEN.

The Textile Museum is Important.

Plauen is known as an important centre of the lace and embroidery industry. The Art School for the Textile industry was visited. The director, Prof. Albert Forkel, was most courteous and communicative. The school was established and continued by the Industrial Association of Plauen. It is a school and museum combined. The museum part is open to the public free. It is particularly well supplied with selected specimens of lace from different countries. Manufacturers may borrow these in order to imitate them. The collection is most extensive and is kept up from year to year, new specimens being chosen by the Director. The grant for the museum amounts to 15,000 marks annually from the State of Saxony and between 6,000 marks and 7,000 marks from the Industrial Association. The fullness and completeness of its contents was very noticeable. There are examples of old productions as well as of modern. Portions of contents of museum were sent to eight other places which were in association with Plauen for this purpose. The museum had also a collection of examples of modern patterns of wall paper. These were used by the students in connection with the making of designs for laces and room draperies.

Drawing from Flowers.

Much time was devoted by students to drawing from flowers for patterns. They were drawing from single flowers, a few flowers, a bunch, and large bunches. The school has a garden and conservatory to furnish specimens for drawing in order to produce designs. The Drawing Room was divided into sections by means of moveable screens. The students sat with their left side to the window and faced the screen. It was made of what appeared to be burlap material, brown in color, medium tobacco shade. These screens were moveable and extended across the room leaving a passage only at the side on which there were no windows. Four or five students in a row were working in front of each screen.

Objects of the School.

The school aims to furnish competent workers to local textile art industry. Large factories are inspected for study in practical execution of designs. Lectures on lace industry are given to the public and apprentices. Collections and library are open to the public. Objects from museums are lent for other exhibitions.

The Departments are:

(1) Pattern-drawing.

(2) Manufactures.

(3) Drawing apprentices. (Four branch schools for drawing apprentices).

(4) Women's work.

Department (1) gives the necessary artistic training to young people who wish to take up pattern drawing. Evening lectures are given on the development of old and modern lace, and lacemaking machines.

Department (2) is for young business men and others interested in freehand drawing, practical manufacture of hand and bobbin machine work and weaving.

Deprtment (3) for drawing apprentices gives the necessary drawing training.

The branch schools aim chiefly to give to pattern and stencilling machine apprentices a knowledge of ornamental and plant forms which will enable them to transfer patterns in an artistic manner. Three year courses.

Department (4) for women's work specially trains women and girls for whitewear making, and also seeks to enable women of the industrial classes to practise either at home or in business. It provides also embroidery lessons. With this course is combined one for needlework teachers.

The school contains a library with a collection of patterns, a museum of the textile trade, a collection of models and a collection of natural history. Whilst serving in the first place as a means of instruction, they are also open to the industrial population. Manufacturers also have the opportunity to exhibit specially successful products in a hall reserved for the purpose, free of charge. Other collections borrow patterns from here for their own use.

Conditions of Admission:

Elementary education.

Entrance examination in drawing.

Fee: Germans, 60 marks; foreigners, 300 marks.

Preparatory class (six months) three classes; and trade class (one year each).

Subjects (*General*): Drawing and painting of ornaments, animals, plants, etc., from nature; figures; designs of plant ornament, with help from nature; conventionalised ornament; linear drawing; projections, shadows; perspective; German, arithmetic, book-keeping, physical training; (*Special*): practical weaving, stencilling, machine embroidery; technical drawing of patterns for machine embroidery and lace; designing patterns for lace, hand and machine embroidery, weaving of curtains and stuffs from historical models and from previously made ornamental studies of plants, animals, etc., for every kind of textile product.

EVENING COURSE.

(1) Lectures on the development of lace and on the manufacturing of lace on the bobbin machine. Fee: 10 marks; foreigners, 120 marks.

(2). Machine embroidery; technique of weaving; and freehand drawing and enlargement of patterns. Admission as machines are available.

Fee: 20 marks for Germans; 120 marks for foreigners.

Subjects: (*a*) Practical embroidery, four hours weekly; comparison of hand and machine work; details of machines (hand and bobbin); materials; dissection of patterns and calculation of stitches; practical illustration by teacher on various materials; theory of weaving, three hours weekly (materials, calculation, dissecting patterns).

(*b*) Practical weaving: materials and tools, various kinds of looms, hand and mechanical looms; freehand drawing and pattern enlarging; general practice; drawing applied; enlarging patterns, to attain proficiency in sketching.

(3) Three classes, three years' course. Fee: Germans, 20 marks; foreigners, 120 marks.

1st Year: Drawing from nature and ornament; linear drawing; German and arithmetic.

2nd Year: Drawing as above; drawing historical lace; study of style and taste; German; arithmetic; theory and technique of machine embroidery and principles of enlarging.

3rd Year: Elementary pattern designing for machine embroidery; composition from historical models; drawing from nature and ornament, lectures on lace.

(4) One and a half years' course—three classes, graduated; also (1) Department for fancy embroidery and pattern designing, and (2) Preparatory course for needlework teachers' examination. Fee: 60 marks for Germans; 300 marks for foreigners.

Lower class (half year):

Drawing patterns for underwear; hand sewing; freehand drawing; white embroidery; book-keeping; German.

Middle class (half year):

Making of underwear; drawing patterns for the same; freehand drawing; white embroidery; millinery; book-keeping; German; ironing.

Upper class (half year):

Dressmaking patterns; freehand drawing; white embroidery; millinery; ironing.

In the fancy embroidery and pattern drawing department, 34 hours weekly, taking principal branches of the subject; also, if desired, drawing and pattern designing.

Preparation of Needlework Teachers (1½ Years).

Subjects: Knitting, crocheting, cross stitch design, hand and machine sewing, white sewing, embroidery, darning, dressmaking, freehand drawing, pedagogics, German.

The branch establishments give three years' courses in drawing, painting, pattern drawing, and enlarging.

Museum and Collections.

The Library contains 6,252 works, including artistic supplements to magazines, etc. (6,000 sheets with 23,000 pictures).

The Collection of copies contains 155,626 pieces (lace, woven goods, printed stuffs, trimmings, curtains, carpets).

The Library also includes patent registration office. Patents can be seen and studied at any time.

The Museum of textile industry has departments for embroidery, lace, woven goods, printed stuffs, trimmings, curtains, carpets.

Regulations and methods: Only such articles are included as will be of value as models to the local industry. Archaeological considerations have no weight.

Preference is given to modern patterns, but older ones are not excluded if of value as models. The Museum contains 21,092 articles.

A collection of models for teaching purposes only contains 1,306 plaster casts and wood carved models.

The total number of objects in the collections is 186,613. They are free to the public to view but only members of the local Industrial Society may borrow them. The public drawing hall and collections were visited by 50,000 persons in the course of the year 1908-9.

INDUSTRIAL SOCIETY.

The Industrial Society exists for the promotion of home industries by the following means:—

(*a*.) Supporting and adding to collections at Textile Art School and making them available to the public.

(*b*.) Instituting travelling exhibitions (loans from collections) in the area of its operations.

(*c*.) Carrying on discussions of subjects relating to the industry.

Membership: Any citizen may belong. The annual subscription is twenty marks, in return for which the member may take out any object from the collection on loan whenever he likes.

Management: The management is by a committee of 17 elected for four years, four and five members respectively retiring the third and fourth years. They are eligible for re-election.

CHAPTER L: SCHOOLS OF ART FOR INDUSTRIAL TRADES.

SECTION 1: INTRODUCTORY.

The number of Secondary Schools devoted to the industrial arts and trades in Prussia in 1884 at the time of the transfer to the Ministry of Commerce and Industry, was 19. Of these a few have been abondoned. The list for 1909 contains 41 such institutions, which illustrates the extensive growth of industrial art and trade instruction during the last 25 years. Still more remarkable is the change that has taken place in the internal organization and management of the schools. Of these institutions it may be said that they are a new creation during these 25 years, for nothing like them existed before. The time previous to 1884 was marked by industrial drawing schools—that is institutions in which a trade worker learned the drafting more or less necessary in his particular trade. Side by side with these drawing schools there were in existence a few vocational schools fitted for certain manufactories and designed for the special purpose of promoting certain local industries. Real industrial art schools, schools of design with vocational lessons in the daytime, were not anywhere in existence in Germany.

New Type of School.

At about 1885 a new type of trade and industrial art school began to take shape in Prussia, and at the close of the century the present form of such schools developed rapidly. This effective change had its origin in the evening schools devoted to trade drawing, which schools, feeling the pulse of the time, took on a more and more vocational character. Certain occupations required a change from evening classes to day schools for more advanced workers. It also became necessary to consider the wishes of those who meant to devote some years to their vocational improvement as designers, model draftsmen, pattern-makers, etc. The fusion of purely trade education, such as is offered in evening drawing schools and vocational classes of trade schools, with the more artistic instruction offered in day classes in schools of design, is a characteristic feature of the development in Germany. This fusion ensures a natural selection of more talented students, and makes it possible for the buildings and means of instruction of one institution to serve both purposes.

Nature Study the Basis of Drawing and Design.

The change in artistic taste which began about 1895, and was recognized not only in Germany, but more or less in all European countries, has affected the instruction in trade schools and industrial art schools. The change was marked by the partial abandonment of the study of conventialized historic ornament and its replacement by thorough nature study, which latter is today the basis of the entire instruction in ornamentation. From that comes recognition of the necessity of supplementing the work on the drawing board by work in materials in order to arrive at more purposeful and realistic forms. This recognition has led to the establishment of school workshops (the need of which had been urged by Gottfried Semper in his first program of industrial art education as early as 1851, and the establishment of which had been repeatedly called for in memorials by commissions of experts). The workshops have become, since then, an integral part of all Prussian industrial art and trade schools. They have extended and deepened their courses of study by adding the training of the hand; above all, they have exercised a perceptible influence upon the erection of new school buildings, for in the old ones a combination of drafting rooms and workshops could not always be arranged.

Objects and Organization.

The institutions called variously "Industrial Art Schools," "Schools for Industrial Arts and Trades," "Trade Schools and Schools for Industry," or simply "Trade Schools," serve the purpose of furnishing skilled labor and intelligent direction for all kinds of industries or trades. The Industrial Art Schools are mostly day schools; the Industrial Art and Trade Schools are open during the day and offer evening lessons to workers who are employed in wage earning work and cannot attend in the daytime. The Trade Schools are almost all Evening Schools, and arrange their lessons so as to serve young workers and apprentices.

One feature is common to all schools, namely, that each adapts its course or program of studies to fit the peculiar industrial conditions of the locality; they offer opportunities for instruction in all kinds of skilled labor and all branches of art industry (designing). The program of studies consists partly of individual courses in exclusive arts, partly of groups of courses all related to a predominant local industry; for such groups a fixed course of study is arranged. In no school is the course so rigidly enforced, however, as to prevent talented students from branching out into individual and original work. In most schools of this kind preparatory classes are opened, either for students insufficiently prepared for admission, or for those deficient in sketching and drawing. At every school of this kind vocational classes are organized at which the purely artistic work in designing or general technical drawing are taught. Lectures in these schools give way to designing and drawing, and in late years the workshops have assumed an ever increasing importance.

Evening Schools.

The Evening Schools for apprentices provide for both demands—designing and technical work. In many schools instruction is given also in mathematics, mechanics, physics and knowledge of metals. The different branches of Drawing in the day schools are divided into general and technical branches; the general branches are differentiated again into artistic Design and practical working Drawing.

Courses Adapted to Vocations.

The vocational courses for which the general Drawing Courses prepare, are the most important part of the instruction in Industrial Art Schools. Adaptation to local industrial conditions is the reason why few of these schools have uniform programs of vocational study. In all Industrial Art Schools are found fixed courses for decorative painters, for furniture designers, for sculptors and modellers, for locksmiths and jewelers. Most of these schools offer, besides those mentioned, courses for engravers, etchers, enamelers, chasers, flat design draftsmen, lithographers and book designers; in some there are courses of wall decoration, of ceramic arts and of bookbinding and some teach weaving designs for hand looms and women's artistic handiwork.

In every one of these specifically vocational courses the student receives, as far as possible, complete preparation for his occupation, so that he or she may sketch or design all artistic work or trade plans and be enabled to practically execute in material proposed designs or plans, as well as invent designs. The program of each vocational class offers instruction and adequate training also in the related artistic and technical arts, as well as careful application of working drawings and vocational designs. Aside from the various Drawing classes, there are lectures on technical subjects, such as knowledge of metals, science of construction, making estimates, and business rules relating to trades.

In the form of class lectures all Industrial Art and Trade Schools treat the history of art and principles of style with which knowledge of ornamental forms is connected. A further subject of class lectures is anatomy.

Workshops are Used.

All these schools have a number of workshops. The shops most frequently found are those of the decorators, modelers, chasers, engravers, enamelers, and wood carvers. In classes for decorators the actual application of size-watercolors is practised. Some schools have workshops for lithographers, jewelers and printers; a few have also shops for artistic bookbinding and gilding, for the ceramic arts, for handweaving, stone cutting, women's art work, leather working and photography. The aim is everywhere the same, not to replace the master courses, but, first of all, to raise the execution of any task to a higher artistic and technical level.

Drawing is Emphasised.

In all Industrial Art and Trade Schools evening and Sunday classes are maintained. Instruction in these classes is confined strictly to the limits of the separate trades. Every apprentice has the opportunity during the evening to participate in lessons of vital interest to his trade; and the abundant provision of such lessons,as well as the liberty granted him to select from among them, enables him to find interesting instruction and work for every evening of the week. The lessons in Drawing and Designing during the day are divided into general artistic and vocational Drawing lessons. In general lessons instrumental and geometric Drawing are preferably taught from the first or elementary steps upward. In freehand Drawing the subjects are human forms as well as tools and objects of nature; in many schools copying from plaster casts and flat copies is found. For lessons in lettering, especially round-hand lettering, all these schools make provision.

Technical or vocational Drawing begins here, as it does in Continuation Schools, with Drawing according to scale of objects pertaining to the particular trade of the student. For trades approaching art industry, such as those dealing with ornamentation, ornamental Drawing and Modelling are taught from the beginning.

The vocational classes in the evenings cannot, as a matter of course, aim, like the classes in day schools, at making original designs; but they offer to their students of the more technical vocations an amount of knowledge and skill in Drawing which proves very useful in the pursuit of their trades. In more artistic vocations at least a certain artistic taste is developed.

The duration of these vocational courses varies from two to four years; most of them are arranged for from six to eight semesters.

Development in Scope and Numbers.

Attendance at these schools does not result in any kind of privileges, except that in some schools, having classes for the building trades or for machine building, the privileges held out to students of the Builders' and Machine Builders' Schools are granted likewise. The principals of Industrial Art Schools are often able to secure for their students the privilege of only one year's army service granted students of Schools of Fine Arts.

Foreigners are uniformly charged five times the amount of tuition fees paid by natives.

Besides the 41 institutions in Prussia there are 3 in Bavaria, 56 in Saxony, 7 in Wurttemberg, and 5 in the other States. There are also numerous vocational schools for special industries and crafts, part of them provided with workshops, as for example, schools for woodworking, for basket making, for lock work, for watch making, for printing, for carving in ivory, for die-making, photography, violin making, for the millers' trade, for tanning, etc.

For pottery and tile making there are in Prussia 3 and in Bavaria 2, and in other States 2 Provincial schools. By "Handwerkerschulen" (artisan or trade schools) is meant those schools in which for the various handicrafts full day teaching is given. A trade is not taught in the schools, but instruction is given to handworkers in drawing, mathematics and science, and theoretical subjects related to the trades. The course may be one of only a year or half a year. Such schools are often called "Kunst-Gewerbeschulen" (industrial schools of art). As Drawing is the chief subject of instruction in these, frequently they cannot be distinguished from the Higher Industrial Schools of Art.

SECTION 2: HANDWERKSCHULE, Lindenstrasse, BERLIN.

This general industrial and technical, also Industrial Art School, contains 30 or 40 branches, in which evening classes are given. Some day classes are also held for men who can afford to leave their practice and come here for full time.

The evening school is principally finishing from the Continuation Classes, and well advanced pupils may come here for the special Drawing in the second year.

Aim:—This school caters especially for apprentices and helpers, as a supplement to the workshop, and also takes prospective teachers of Continuation Schools.

Entrance Requirements: Completed Elementary School. Attendance does not exempt from Continuation School until the second year.

Free choice of courses is allowed as required. Classes are principally in the afternoon and evening, some on Sunday morning and a few on weekday mornings.

Subjects: freehand drawing, water-color, circles and projections, descriptive geometry, trade drawing (as required), building and architectural drawing, carpenters' and joiners' drawing, decorative painting, industrial drawing, modeling, arithmetic, mathematics, physics, mechanics, electro-technics and practical exercises, machinery, chemistry, technology, book-keeping, and various trade classes.

Special Features: A day school for painters is held during the winter months, to give them an opportunity of improving their drawing and painting and learning the various technical branches of their trade, especially drawing sketches and working plans. Pupils are given work suited to their attainments on entering the school. The fees for this class are 10 marks monthly, foreigners paying five times this amount.

The day classf or carpenters includes drawing (freehand, geometric and technical); proportions (of furniture, etc.); and book-keeping. The upper division takes more advanced courses in the same subjects. Fee is 10 marks monthly (five times this amount for foreigners), with some free places for needy and deserving pupils.

SECTION 3: MECHANICS' AND INDUSTRIAL ART SCHOOL AT BARMEN-ELBERFELD.

The school was established in 1894. It originated from a Continuation School.

Both State and City unite in the provision and support. Each pays half the annual cost after deducting fees. It is controlled by Government from Dusseldorf, being under supreme control of the Minister of Commerce and Industry and a Curatorium. It aims to train designers and foremen for handwork and artistic work, as well as for the development of manual dexterity on the completion of workshop course, in day, evening and Sunday classes; it also gives full preparation for Master's Certificate and for Drawing Master's Certificate. Talented students can qualify for their Einjahriger examination.

A special feature is the Course for the trades associated with the printer's art.

Sons of employers or others, wishing to qualify themselves for technical or commercial conduct of a printing business, had no opportunity of acquiring in a short time the necessary knowledge. Competing firms will not take them and technical schools are almost exclusively devoted to the training of assistants in special branches.

This course, started in October, 1910, exclusively for sons of principals, *i.e.*, future owners or managers of businesses, has aroused great interest, both at home and abroad.

The course gives a thorough training in the whole field of the printing trade—setting up, book printing, lithography and chemical printing. Course lasts one year, and comprises:—

1. Demonstration, explanation and personal practical work.
2. Lectures on subjects bearing on printing trade.

Only one teacher had academic training; the others have had a good deal of practical experience in their special lines; they are appointed on 2 years' probation.

Attendance:

Summer.	Day, 100.	Evening, 300.
Winter.	Day, 150.	Evening, 400.

Entrance Requirements:

Assistants over 17—without further test.
Apprentices under 17—if sufficiently qualified.
Half-day students—if room.

Departments.

Day.	*Evening.*
I. (a) Decorators (painters).	Printers and Lithographers.
(b) Drawing Teachers.	Book Printers and Setters.
	Photo-mechanical process.
II. (a) Printers and Lithographers.	Painters (3 sections).
(b) Book Printers and Setters.	Painting from Nature.
(c) Photo-mechanical process.	Sculptors and Modellers.
	Engravers and Stencillers.
III. (a) Furniture Designers.	Building Trade Laborers.
(b) Carpenters' Foremen.	Carpenters.
(c) Workshop Training.	Locksmiths, Tinsmiths, Mechanics.
(d) Architectural Designers.	Electro-technical.
IV. (a) Sculptors and Modellers.	Shoemakers, Tailors.
(b) Engravers and Stencillers.	Master's Certificate and extra subjects.

Excursions are conducted by teachers and others to places of interest such as:—A glass-painting establishment, the Berlin Industrial Art Museum, Hamburg Natural History Museum, Exhibition at Folkwang, and 'Garden City' in connection therewith, oriental carpet factories and exhibitions, etc.

SECTION 4: MECHANICS' AND INDUSTRIAL ART SCHOOL AT CREFELD.

This is a development from an elementary Industrial School. It is under the control of the Minister of Commerce and Industry and is supported by the State, the municipality, and fees.

Aim: To prepare sufficient craftsmen for the requirements of the art handicrafts and industries; also efficient teachers of drawing, and architects.

Entrance Requirements: Full pupils must have adequate experience in practical work and drawing (minimum 2 yrs.). Pupils the nature of whose occupation makes it impossible to continue during the winter (building trades), may be accepted with one half-year's practical experience, on pledging themselves to resume work the following summer. The only pupils received exceptionally without practical experience are those who have attended the Crefeld Industrial Day School (preparatory for handwork and technical, with workshop instruction in wood and metal) for one year, or, by examination, those who hold Einjahriger certificate. For training as drawing teachers, only those having Einjahriger certificate, or, for female teachers, those who have completed course at Higher Girls' School.

Leaving certificate is only given after 3 years' satisfactory attendance.

Day Classes: 8 a.m. to 12 noon, and 2 to 6 p.m. except Saturdays. Day pupils may join Sunday and evening classes free.

Half-time pupils (up to 4 half days per week) who cannot attend whole time, are accepted, but have to pay extra for Sunday and evening classes.

Evening and Sunday Classes in drawing and technical subjects for masters, journeymen and other adults; for apprentices and journeymen still subject to Continuation School attendance who have completed the Industrial Continuation Course; and for masters' and journeymen's certificates.

Certificates from technical or Continuation Schools previously attended must be produced.

Outside students can attend Sunday drawing classes without further previous training.

Fees: Day students, 30 marks half-yearly; half-time students, 15 marks; (maximum 16 hours weekly). Evening and Sunday students 6 marks half yearly (2 to 12 hours weekly). Free places for needy and deserving students.

Bursaries are awarded to students who distinguish themselves. Competitions are held for money prizes and diplomas.

BOYS' ELEMENTARY DRAWING SCHOOL: CREFELD.

A municipal school under the Director and Curatorium of the Crefeld Industrial Arts School.

The course is an optional one of 3 years' duration. Boys of 11 to 14 may enter from the Elementary and other schools. About 400 in attendance. The fee is 3 marks half-yearly.

Annual cost of up-keep 6,000 marks.

The hours of instruction are: Wednesday and Saturday 2 to 4 and 4 to 6 p.m.

Attendance at this school is particularly recommended for those students who later intend to learn a manual trade, industrial art trade, or a technical trade, as for these trades a good knowledge of drawing is most important, and, further, knowledge of such a kind as will be required in the future trade. The aim of this school is, therefore, to follow the modern spirit of Art in industry, by avoiding mechanical reproduction of natural and ornamental forms, rather to stimulate intelligence and encourage initiative, to awaken a sense of proportion, and by the use of colors to develop the feeling for beauty in the pupils. The same objects are kept in view in the modeling class.

In the workshops attached to the school, endeavor is made to cultivate not only the mental but manual talent of the boys, and by means of methodical hand training to direct the creative instinct of youth, to instil practical sense, love of work and respect for manual labor. Further, the work done is to develop good taste in the production of artistic work, and to help the man of the future to be capable of the simpler handwork required in everyday life, to cultivate his resourcefulness, even if he does not eventually take up any trade. The results so far obtained have been gratifying.

Pupils, who have attended this school satisfactorily, obtain better results at the Industrial Day School and Continuation Schools which they may subsequently attend, and can more speedily reach the stage of actual technical instruction than they otherwise would. Those requiring apprentices give the preference to pupils of this school.

Diplomas and rewards are given at the end of each year, and special certificates are awarded when drawings and other works are retained for exhibition purposes.

Courses: Freehand, ornament, linear drawing, modeling, woodcarving, application of modeling to woodcarving.

Pupils construct objects in the workshop from their own drawings.

Art Exhibition.

The members of the Commission visited the Art Exhibition at Crefeld. Here was a very creditable exhibition of work of the Industrial Art School, the Industrial Day School, Industrial Continuation School and Boys' Drawing School.

The most striking feature of the work was the Drawing and Design of the Boys' Drawing School, boys of 10 to 14 showing remarkable ability in freehand Drawing, conventional color design and mathematical Drawing.

SECTION 5: ROYAL ART SCHOOL AT MUNICH.

The aim of this school is to teach the various branches of industrial art from the artistic and technical side; also to train art teachers. It is an institution amalgamated from two others founded respectively in 1868 and 1872. The courses are both general and special.

Students must be 16 and not over 30, and have school certificates and adequate educational attainment plus an examination in freehand drawing and modelling. The special courses or classes require special qualifications for admission.

Fees are charged: Winter term 30 marks; Summer term, 20 marks, plus insurance and entrance fee. Foreigners pay double. There are various scholarships and bursaries.

The total number of pupils in 1909–10 was 400, of which 256 were men and 144 women.

In the Royal Industrial Art School there is a *Women's Department* which provides complete drawing courses, general and applied to the various trades, including lithography, leather work, stencilling, etc. There is also a drawing teachers' class. Of the 144 women pupils, 12 took drawing courses for general personal use and 132 for industrial use . These may be classed as follows:—27, pattern drawing for textile industries; 10, decorative painting and drawing; 10, illustration and lithography; 5, plastic work and sculpture; 4, chasing; 1, glass painting; 2, architectural drawing; 72, as drawing teachers.

CHAPTER LI: COMMERCIAL TECHNICAL SCHOOLS.

SECTION 1: INTRODUCTORY.

In Germany there is no system of Commercial Technical Education covering the whole country. Industrial Training and Technical Education are much in advance of Commercial Technical Education. Some of their own authorities state that Commercial Technical Education is only now at about the same stage of organization and development as was Technical Industrial Education twenty-five to thirty years ago. There are a few Commercial High Schools of almost equal status with the Technical High Schools. Commercial Middle Schools to do, for those engaged in commerce, what the Middle Technical Schools do, for those engaged in industries, are few. On the other hand there are a great number of Lower Commercial Schools which, in addition to preparing for commercial occupations, do some general educational work. They serve a similar purpose to that which is served by the Continuation Schools and the Lower Technical Schools. In the Commercial Schools the courses of study and instruction are not specialized for different divisions of commercial work as they are in the case of industrial work. No sharp or clear division is made between those who are to be leaders and those who are to be assistants. That may be due to the fact that in commerce more than in industry, every competent assistant may expect to be a leader or a principal.

Four Grades of Schools.

1. The Handels-Hochschule (Commercial High School) stands for the Commercial University. It is for the purpose of giving to young people who intend to devote themselves to commerce a scientific training necessary for, or advantageous to, them in the management of business affairs. In addition these schools train for public positions, such as those of officials in the Chambers of Commerce. The training of the teachers for the other commercial institutions is also a part of the work of these Commercial High Schools. The central interests in the course of study are in national economics, the elements of law, and foreign languages. Attention is also given to geography, the study of articles of commerce, and the principles and methods of commercial technique. Commercial technique includes the science and art of business bookkeeping, arithmetic and correspondence. The plan of instruction is similar to that in other Technical Colleges—lectures and class work.

2. The Middle Commercial Technical Schools usually go by the name of Higher Commercial Schools. Sometimes they are organized as separate institutions; in other cases they form one division of a general educational institution,

such as a Realschule. In that respect they resemble the commercial department of a High School in Ontario or the commercial department of an Academy in one of the other provinces of Canada where that name is used.

3. The Lower Commercial Technical Schools are usually called Commercial Schools. Of these there are three kinds. The first is a purely technical school giving a special training for one or two years in geography, languages and the technique of commerce, in order that the pupils who are to enter commerce afterwards may make more progress as apprentices; or this class of school is for those who have already finished their apprenticeship to commerce in offices or elsewhere. They give them the special training in the general technique of commerce, in its relation to special branches of business, and give instruction in the principles of commerce and law.

4. Two other classes of Commercial Schools are organized in connection with general educational institutions. The one gives a general course, so arranged that it will prepare the student in the most thorough way for apprenticeship. The other specializes more on the technique of commerce and the actual work which an apprentice will be occupied in doing. It partakes more of the nature of the trade school and less of the general preparation for the specific parts of the apprentice's work.

The great mass of the young people in commerce must receive the educational help which is available to them after they leave the elementary school by means of the Commercial Continuation Schools. These schools differ according to the needs of the pupils who attend, considering the kind of employment, the length of time during which they can take the courses, the time per week which they can give to the instruction, evening, morning or other hours when they can be free from business, and in the character of the teachers who are available.

SECTION 2: MUNICIPAL COMMERCIAL SCHOOLS AT DUSSELDORF.

These schools comprise:—

1. Commercial Continuation Schools.
    - (a) For Boys.
    - (b) For Girls.
2. Commercial School for Girls.
3. Trade or Special Commercial School for Boys.
    - (a) Course for assistants in business.
    - (b) Course for apprentices qualified as 'Einjahriger.'
    - (c) Optional course for continuation scholars.

The Commercial Schools above given cover the field of commercial education for girls, between the Elementary School and the Commercial High School, and for boys who wish to enter commercial life as apprentices or clerks, and also for boys and men who are in commercial life, and want to further their knowledge along that special line.

The buildings in which the schools are held are far from types of good management. The scholars, on the contrary, seemed to be making good use of their time. Many of them were young women.

Commercial Continuation Schools.

The following is a synopsis of Dusseldorf's By-law *re* attendance at Commercial Continuation Schools.

All business employees of both sexes are obliged to attend up to completion of 17 years. This period may be extended if progress is unsatisfactory. Exempt are those who have passed Einjahrige examination or graduated from a higher school of 9 classes, or from a commercial day school. Persons engaged in business, but not compelled to attend, may do so on payment of 5 marks quarterly. For every employee liable to attend, the employer has to pay, in advance to the City, 5 marks quarterly as a contribution towards the maintenance of the school. On proof of poverty being furnished, the school fees may be partially or wholly remitted. Parents and guardians are required to see that employees attend, and employers to notify the headmasters of employees liable to attendance and to notify cases of illness. The penalty for non-compliance on the part of parents, guardians and employers, is a fine of not exceeding 20 marks or 3 days' imprisonment.

Classes are arranged from 8-12, 2-4 or 2-5, so as to give each 6 hours weekly.

COMMERCIAL CONTINUATION SCHOOL FOR BOYS.

A. Preparatory Class—3 grades: for those whose general education is insufficient to enable them to join the Continuation School. Hence, subjects are more general than special—German, arithmetic, writing.

B. Continuation School, Lower Division: German lessons treat of subjects familiar to pupil, thus adding to his general knowledge whilst improving his German. Historical buildings, monuments, etc., may form subjects of lesson, thus fostering patriotism. Commercial subjects are treated on similar lines. Owing to limited time, choice of subjects is left to discretion of teacher. Pupils are guided as to reading and encouraged to read at home on subjects given. Recitation and story-telling evenings are held—where possible with lantern slides. Verbal and written exercises include the re-telling of stories, etc., studied in lesson.

Middle and Higher Division: The same system is followed; subjects become more commercial, such as business correspondence, general commercial subjects, commercial law.

COMMERCIAL CONTINUATION SCHOOL FOR GIRLS.

I. Lower Grade: 1. German and writing, the object being to increase knowledge and fluency. Subjects are,—the shop or business, its various departments, duties of employees, etc. Special attention is paid to handwriting. Correspondence and commercial law are combined, so that the latter may be taught by means of the former. Instruction is given in forms of commercial correspondence.

2. Commercial law; origin and history of commerce; the more important details of commercial, civil and industrial law; further attention to composition and German. Subjects are,—commerce, retail trade, companies, etc. Letters are composed orally and in writing, with special attention to improvement of power of expression.

3. Arithmetic; review; foreign money; weights and measures; mental arithmetic.

II. Middle Grade: The main subject of instruction is credit, from business, legal and commercial view; letters on the various forms of credit; practical exercises; arithmetic, commercial geography, bookkeeping.

III. Upper Grade: 1. Correspondence and commercial law. correspondence in connection with bookkeeping; letters on all subjects arising therefrom; commission business, transport, foreign trade arrangements; banking; towards end of course, the more important rules and decisions of civil law.

2. Arithmetic; 3 methods of calculating interest; special attention to mental arithmetic.

3. Commercial geography and study of various classes of goods.

4. Bookkeeping, with special attention to neatness in keeping books.

COMMERCIAL SCHOOL FOR GIRLS.

2 grades: one year in each grade.

1. *Upper Grade:* The aim is to give such instruction in commercial subjects, foreign languages, international law and commercial geography, as will enable its students on the completion of the course to perform the work of an office efficiently and intelligently.

2. *Lower Grade:* This gives theoretical and practical instruction to the standard required of apprentices in commercial houses.

Entrance Requirements: Graduates of Higher Girls' School or 9-class Middle School without examination to Upper Grade. Others by examination. To Lower Grade, graduates of Elementary School or corresponding class in Middle or Higher School—or by examination.

COURSE OF STUDY.

1. *Upper Grade:* German correspondence and office work, commercial arithmetic, commercial geography, commercial law, bookkeeping, laws of

business, French or English, shorthand and typewriting, physical training, singing. (A second foreign language optional.)

2. *Lower Grade*: Same as Upper, with addition of German and writing.

Trade Commercial School for Boys.

A. Commercial Course for Business Employees.

To enable business employees to add to their knowledge. Specially intended for those who have completed course at Commercial Continuation School and wish to supplement their knowledge. For those who have not attended any Continuation School, and therefore cannot follow the course with the others, special supplementary courses may be arranged.

The subjects are:—German correspondence and commercial law, book-keeping (double entry), commercial arithmetic, commercial geography, shorthand, French, English, other languages if sufficient pupils.

All students must select at least two courses, but they are advised not to take too many.

B. Commercial Course for Apprentices holding Einjahriger certificate and therefore exempt from Continuation School attendance.

The subjects are the same as in *A*. and there is the same stipulation as to courses.

C. Optional Course for Continuation School Pupils.

As the time table of the Commercial Continuation School does not allow for either foreign languages or shorthand, these optional courses have been arranged so that continuation scholars may have an opportunity of studying these subjects. Any pupil of a Continuation School may attend. The subjects are: French, English, shorthand. (Only one language may be taken at a time.)

The course is 1 year for languages, 6 months for shorthand.

SECTION 3: COMMERCIAL SCHOOLS AT DORTMUND.

Commercial education is provided for by:—

A. Higher Commercial School,

B. Commercial School,

C. Compulsory Commercial Continuation School,

D. Voluntary Commercial Evening Course.

All these started from voluntary evening classes and are controlled by the City, except for a State contribution to the evening classes.

Entrance Requirements: The Higher Commercial School takes pupils who have had secondary education up to the 'Einjahrige' standing. The other departments require only a Volksschule leaving certificate.

Attendance:	Boys	Girls	Total
Higher Commercial	21	32	53
Commercial (boys' section to be started)	..	32	32
Voluntary Evening School (mixed)	..	..	387
Compulsory Continuation School	587	223	810

Graduates enter trade and commerce. The demand for graduates of the Higher Commercial School exceeds the supply.

The teachers are mostly graduates of the Higher Commercial School, except in Continuation and Evening Classes. Some of the teachers in the Continuation School have been elementary teachers, and some of the Evening Class teachers are specialists engaged in trade and commerce during the day.

Courses:	Length.	Fees.
Higher Commercial School	1 yr.	250 marks
Commercial School	1 yr.	100 marks
Voluntary Evening School	1 yr.	vary.
Compulsory Continuation School	3 yrs.	"

	Weekly Periods	
Subjects:	Boys.	Girls.
Higher Commercial School:		
Commercial Arithmetic	5	5
Bookkeeping and Model Counting House	4	4
Commercial Correspondence and Office Work	2	2
French and French Correspondence	4	3
English and English Correspondence	4	3
Trade and Currency	3	2
Political Economy and Civics	2	1
Commercial Geography and Merchandise	3	2
Physical Technology	2	..
Commercial History	1	..
Handwriting	2	2
Typewriting	1	3
Shorthand	2	3
Commercial School:		
Correspondence and German	4	4
Commercial Arithmetic	5	4
Bookkeeping	4	4
Commercial Law and Civics	3	2
Political Geography and Merchandise	2	2
Writing	2	2
Typewriting	2	3
Shorthand	2	3

Compulsory Continuation School:

Lower Grade:	
Arithmetic	2 hrs.
German and Commercial Correspondence	2 hr.
Bookkeeping(Single Entry)	1 hr.
Writing	1 hr.
	6 hrs.

Middle Grade:	Boys and Girls.
Arithmetic	2 hrs.
Commercial Law and Correspondence	2 hrs.
Bookkeeping (Double Entry)	2 hrs.
	6 hrs.

Upper Grade:	
Arithmetic	1 hr.
Commercial Law and Civics	2 hrs.
Bookkeeping and Correspondence	2 hrs.
Political Geography	1 hr.
	6 hrs.

Voluntary Evening Courses:

1. Bookkeeping (simple, advanced and elaborate)	2 hrs. and 1 hr.
2. Arithmetic (3 grades)	2 hrs. and 1 hr.
3 a. Correspondence and German	2 hrs.
b. Correspondence, Exchange and Currency	2 hrs.
4. English for beginners	2 hrs.
English, advanced	2 hrs.
4. French, beginners	2 hrs.
French, advanced	2 hrs.
5. Foreign Correspondence (advanced) German and French, 1 hr. each	2 hrs.
7. Elements of German Commercial Law	1 hr.
8. Elements of Political Economy and Civics	1 hr.
9. Political and Commercial Geography	1 hr.
10. Handwriting (round hand and ornamental or only one)	2 hrs. or 1 hr.
11. Typewriting	2 hrs.
12. Shorthand (2 systems)	2 hrs.

The by-law *re* attendance at Continuation School is similar to that at Dusseldorf.

SECTION 4: COMMERCIAL SCHOOLS AT COLOGNE.

(1) GENERAL COMMERCIAL CONTINUATION SCHOOL.

This school provides a three years' course for apprentices who wish for a more complete course than the ordinary Continuation School. Attendance exempts from attendance at Continuation School.

COURSES.

1st year (Lower). German, writing, arithmetic, with introductory course in office work and commercial correspondence.

2nd year (Middle). German and writing (roundhand), with further practice in correspondence, arithmetic, and simple bookkeeping.

3rd year (Upper). Arithmetic, shorthand, bookkeeping, (double entry and American system), industrial law.

Pupils are required to attend for 6 hours weekly, the classes being held on Wednesday and Saturday afternoons from 2 o'clock to 6 for 42 weeks in the year. The time given to the various subjects is as follows:—

German (with correspondence), 2 hours first two years; writing, 1 hour first year; office work, 1 hour in each year; commercial arithmetic, 2 hours first year, 1 hour second and third; bookkeeping, 2 hours second and third years; shorthand, 2 hours in last year.

The teachers are not exclusively employed at this work. Remuneration is according to number of hours given.

The expenses are 23,239 marks, of which the State gives 4,417 marks. Fees charged are 4 marks half-yearly, and there are 37 free places.

The attendance in Summer is 840, in Winter 780.

(2) HIGHER COMMERCIAL CONTINUATION SCHOOL.

For young people either engaged in, or about to be engaged in, commercial pursuits, to supplement their knowledge more satisfactorily than they could do in a general Continuation School. Attendance exempts from latter. The School has two Divisions: Lower, 3 years; Higher, 2 years.

Entrance Requirements:

Lower Division—Leaving standard of elementary school, or equivalent.

Higher Division—Einjahrige certificate or equivalent; business assistants having adequate knowledge; students who have passed Lower Division satisfactorily.

The Lower Division has 3 grades—Lower, Middle, and Higher.

The following are compulsory subjects in the Lower Division:—

Grade 1.	Grade 2.	Grade 3.
German.	Correspondence.	Correspondence.
Writing (office work).	Commercial Law and Civics.	Commercial Law and Civics.
Arithmetic.	Arithmetic.	Arithmetic.
	Simple Bookkeeping.	Bookkeeping (d.e.).

Optional subjects:

Grade 1.	Grade 2.	Grade 3.
French or English. 2 hrs. each.	Shorthand. French. English. } 2 hrs. each.	Political Economy. French. English, } (2 hrs. each).

Typewriting for advanced pupils only.

In the Upper Division (two years) the following subjects are taken:—

1st Year.		2nd Year.	
Correspondence, Commercial Law and Civics	2 hrs.	Polit. Economy	2 hrs.
Bookkeeping (2 grades)	2 hrs.	Bookkeeping (American and other system)	2 hrs.
Commercial Arithmetic	2 hrs.	French (Corresp. and Conversation)	2 hrs.
French (Correspondence and Conversation)	2 hrs.	English "	2 hrs.
English (beginners)	4 hrs.	Italian	2 hrs.
" (advanced)	2 hrs.	Spanish	2 hrs.

Two Courses are held for teachers.

Classes are held every evening but Saturday and last 1 hour and 50 minutes.

Expenses in 1909-10 were 22,723 marks, of which the State gave 1,470 marks.

Fees for both divisions are 30 marks yearly for 2 lessons weekly; if more than 2 lessons are taken, 40 marks.

There are thirty free places and one assisted pupil.

The attendance in summer is 474, in winter 410.

(3) COMMERCIAL REALSCHULE.

(A 6-year Realschule plus 1 year of commercial work.)

This was an ordinary 6-year Realschule up to 1897, when a commercial class was added and the name changed. It is administered and supported by the town, but comes under the supervision of both the Minister of Public Instruction and the Minister of Commerce and Industry. The fees are 90-120 marks annually.

In the last two years of the school course, an optional course in bookkeeping is added, but the commercial class is only open to boys who have obtained Einjahrige standing, and continues for 1 year. There are 500 regular students, 16 commercial.

The building is 10 years old, and cost 1,000,000 marks; equipment and collection additional. It has splendid equipment for physics and chemical demonstration, but no students' laboratory; also a fine room for a very complete collection of charts and specimens relating to biology, zoology, botany, etc., and also a second fine room for a splendid collection of charts, maps, etc., for history and geography.

No handwork or manual training is done.

Boys of the commercial class are prepared for business life. With 2 years in actual business after taking commercial class course, a boy may enter the Higher Commercial School, but very few go higher than this school.

Courses of study for Commercial Class, after Einjahrige standing is obtained are as follows:—

German (reading classics and literature)	2	hours weekly.
Commercial Correspondence, Commercial and Political Economy	2	"
French Language and Correspondence	5	"
English Language and Correspondence	5	"
Commercial Geography	2	"
Commercial History	2	"
Merchandise (chemical technology)	2	"
Commercial Arithmetic	5	"
Bookkeeping	2	"
Commercial Law	1	"
Physics and Mechanical Technology	2	"
Shorthand and Writing	2	"
Physical Training		

(4) COMMERCIAL HIGH SCHOOL (of University Standing).

1,500,000 marks was donated by a private citizen towards establishing this school. It was erected by the City—under the Ministry of Commerce and Industry and the Minister of Public Instruction.

The sources of income are:—Fees, 120,000 marks; City, 300,000 marks.

The Chamber of Commerce grants anually 10,000 marks towards upkeep of the Industrial Museum. and 6,000 marks towards that of the Library.

Aims of the School.

The aims set forth in the regulations are:—

1. To provide young persons wishing to devote themselves to commercial pursuits with a broader and deeper measure of general commercial instruction.

2. The special theoretical and practical instruction of future teachers of commercial schools.

3. To enable younger administrative and consular officials, secretaries of Chambers of Commerce and similar persons to ground themselves in the elements of commercial science.

4. To afford opportunities to persons engaged in business and commerce of increasing their knowledge of commercial matters and operations.

Qualifications for Admission.

The following are eligible:—

(a) Graduates of higher 9-year German schools or equivalent.

(b) Commercial people (industrial, bank, insurance, etc.) with Einjahrige standing and at least 2 years' apprenticeship.

(c) Foreigners having equivalent attainments to those required of German candidates.

(d) Seminary-trained teachers who have passed 2nd examination.

Most of students have already served 3 years in actual business before entering.

Courses.

Political economy; commercial technics (commercial business, including bookkeeping); law, private and public.

Optional subjects:—

Insurance and company matters; geography and merchandise; natural science and technique; languages; public lectures.

Pedagogic training for commercial teachers of both sexes is given.

The teachers have University or Technical High School qualification.

Remarks.

The building is a very splendid and dignified structure. It has admirable equipment for physics and chemistry. The Industrial Museum contains splendid models and photographs showing the processes of manufacture and the products. Nearly one half of the museum was devoted to the mining industry and contained a more complete set of models than some of the special mining schools or the mining department of the Hochschule visited in Aix.

SECTION 5: COMMERCIAL SCHOOLS AT FRANKFURT.

(1) COMMERCIAL APPRENTICES IN THE PREPARATORY SCHOOL.

The question of the theoretical training of apprentices has been much discussed. The annual Report deals with it as follows: Compulsory Continuation School interferes with work, consequently employers will not take apprentices liable to Continuation School attendance. The only solution is the Preparatory School which the boy can attend for a year after leaving school and acquire commercial knowledge. The drawback is that the boy has no acquaintance with practical work, and therefore takes less interest in the lessons. A Preparatory School will not be able to impart knowledge which can only be really acquired in conjunction with practical work. Three years of Continuation School during apprenticeship are of more value than one year at Preparatory School before apprenticeship. From moral and educational standpoints too, the Continuation School is desirable—its influence is longer continued, at the time when this is most necessary (until 16 or 17).

If both schools are sanctioned, it means that each place must have two schools, one for those pupils who can afford the extra school year, and the ordinary Continuation School for the rest.

(2). MUNICIPAL COMMERCIAL SCHOOL.

Comprises:—

A. Higher Commercial School for Boys.
B. Commercial Realschule for Boys.
C. One-Year Commercial School for Girls.
D. Two-Year Commercial School for Girls.
E. Commercial Technical School for male apprentices and employees.

(a) One Year's Course.
(b) Three Years' Course.
(c) Druggists' Course.
(d) Preparatory Course in French for Middle School pupils.

F. Special Subjects—Evening Course.

This is a City Institution, under supervision of the Minister of Commerce and Industry, but controlled by the Municipal Board.

The sources of income are as follows:—

City	165,000 marks
Fees	90,000 marks
Chamber of Commerce	15,000 marks
	270,000 marks

It supplies commercial education in the forenoon to boys who are in actual businesss apprenticeship. It does not do as much for girls as it does for boys.

The buildings are somewhat old. The science equipment is complete and modern—also the equipment for teaching druggists.

Teachers are of University or Commercial High School standing in the higher departments only.

Subjects in the Different Schools.

A. German, French (and corespondence), English (and correspondence); commercial arithmetic, commercial law, German business correspondence, bookkeeping, exchange and mercantile law, political economy, general commercial history, commercial and political geography, physics, chemistry and chemical technology, raw materials and mechanical technology, writing, physical training.

There were 37 pupils (in 2 classes) in 1911.

B. Religion, German (with history) French, English, history, physical geography, nature study, physics, chemistry and technology, mathematics, arithmetic, exchange and currency, correspondence and bookkeeping, writing, shorthand, freehand drawing, physical training, singing.

Six classes, with 265 pupils.

C.	German and Correspondence	3 hrs. weekly.
	French "	4 " "
	English "	4 " "
	Commercial Arithmetic	4 " "
	Bookkeeping	4 " "
	Exchange and Commerce	3 " "
	Commercial Geography	3 " "
	Shorthand	3 " "
	Writing	2 " "
		30 hrs. weekly.
	Typewriting (optional)	2 hrs. weekly.
		32 hrs. weekly.

114 pupils.

D. Same as C., with addition of commercial correspondence and singing. 24-25 hrs. weekly.

E. (a) 1 year's course: French, English, commercial arithmetic, business correspondence and bookkeeping, exchange and commerce. 7 pupils, Feb., 1911. (b) Three years' course: German, civics, commercial arithmetic, exchange and commerce, correspondence, bookkeeping, commercial geography, raw materials, writing. Optional: English, French, shorthand. 12-14 hrs. weekly. 208 pupils in 3 classes. (c) Druggists' Class: Same subjects as (b) with addition of chemistry, physics and drugs. 74 pupils in 3 classes.

F. Special Evening Classes: Attendance in summer 418, in winter 392.

CHAPTER LII : HIGHER GIRLS' SCHOOLS IN PRUSSIA.

SECTION 1 : GENERAL EDUCATION.

The Prussian system of Higher Girls' Schools is the result of forces which for years have been at work among the people, but may be said to date from the Weimar Conference of 1872, called together by Director Kreyenberg of Iserlohn, with a view of crystallizing the prevailing views on female education. This conference, which was attended by 164 teachers, 54 of whom were women, resulted in a memorial being presented to the various governments, setting forth the demands for female education as follows:—(1) that the Higher Girls' Schools with a ten-year course should be under State control and under the same jurisdiction as the boys' schools; (2) that two foreign languages should be taught; (3) that the qualifications, salaries and pensions of the teachers be on exactly the same footing as of those in boys' schools; (4) that the Higher Girls' School be distinguished from the Middle School; (5) that State Normal Schools be established for the training of teachers.

The promotors of the Weimar Conference called another meeting in the following year, at Hanover, with the result that an association entitled "The German Association for the Secondary Education of Girls" was formed. This body has had a tremendous influence in the development of female education in Germany.

THE STEPS OF PROGRESS.

In 1894 the Prussian Government issued regulations on Girls' Schools and Teacher Training, prescribing a 9-years course; special elective courses subsequent to this course; the inclusion of two foreign languages; and a higher examination for women teachers leading to the title of Oberlehrerin (Higher Teacher) and the right to teach in the upper classes.

Formerly the State only provided for the establishment of Higher Grade Schools and Normal Schools, with no further provision, except for the elective courses, which were inadequate. The course only covered 9 years, and tended more towards the development of feeling than of the understanding. Practically nothing was done for the training of the future housewife and mother, or for the girl who wished to go to the University. The teaching conditions made it difficult to secure good teachers for these schools.

The present system of Secondary Education for girls in Prussia comprises:—

(1) The Higher Girls' School.

(2) The Lyceum, consisting of (a) The Women's School and (b) The Higher Normal School.

(3) The University Preparatory School.

Provision for Different Kinds.

To make the situation clear, 8 typical girls will be taken, requiring 8 different classes of education, and their careers traced throughout their school life, beginning at 6 years of age.

The first girl, who merely desires a general education, to terminate as soon as possible, can go through the Higher Girls' School, spending a year in each class, and receive her diploma at 16.

The second girl desires the same general education, but also further training for domestic duties. She remains 10 years in the Higher Grade School, and then passes to the Women's School, where she spends two more years, and receives her diploma at 18.

The third girl wishes to become a Kindergarten teacher, and after completing the Higher Grade course enters the training school for Kindergarten teachers (a part of the Lyceum), receiving her diploma in 2 years' time (at 18).

The fourth girl wishes to teach domestic science, and enters the Women's School at 16, receiving a diploma at the end of 2 years' training which qualifies her to teach this subject in Elementary and Middle Schools. For teaching in Higher Grade Schools, further training is required.

The fifth girl intends to be a teacher, not University-trained, but for ordinary teaching. She enters the Higher Normal School at 16, and takes a 4 years' course, the last year being practical work. On completing this course she is qualified to teach in an Elementary, Intermediate or Higher Grade School, and should she wish to take a University Course later on, she is free to do so.

The sixth girl desires to go to a University, and therefore takes the full classical course, entering the lowest class of the University Preparatory School at 13, when she begins Latin. At 15 she begins Greek, and at 19 she passes her matriculation examination.

The seventh girl requires the same as the previous one, but without Greek, and therefore goes at 15 into the 'Realgymnasium' or modern course, taking her matriculation diploma at 19.

The last girl, No. 8, wishes for neither Latin nor Greek, so remains a year longer in the Higher Grade School, takes the Oberrealschule course, with modern languages, and likewise passes her matriculation examination at 19.

Provision for Domestic Science.

In the Higher Girls' Schools of Prussia provision is made for Domestic Science. During two years, courses of 5 hours weekly are given, 4 of which are devoted to practical work, such as firing and preparation for cooking simple meals, children's meals, invalid cookery, cleaning of utensils, kitchen and dining rooms, laying table, cleaning, scrubbing, handling linen.

In the oral lessons the following are taken:—Arrangement of household, household arithmetic, cost of food, clothing, furniture, decoration, etc.; year's scheme of expenditure, including service, social expenses, entertaining and amusements, saving, management of income, simple book-keeping, correspondence, etc.

Domestic Science occupies 5 hours a week for 2 years, of which 3 or 4 are devoted to practical work. The equipment is not elaborate, but the work is thorough and seems well calculated to meet the ends for which the course is planned. There are two sections in the class, those who intend to become teachers, and those who merely desire to prepare for home duties, and the instruction is varied accordingly.

Domestic Book-keeping receives 1 hour a week for 2 years. The pupils make sample estimates of percentage of expenditure on different requirements according to income, and although the system is somewhat too elaborate to be carried out by a busy housewife, it teaches the girls the relative cost of different items, and the general cost of living. Sample household budgets for 2 incomes, one of 1,200 marks and the other of 3,600 marks, are as follows:—

Item.	Income of 1,200 M.	Income of 3,600 M.
	%	%
Rent	20	18
Clothes	12	10
Food	44	42
Heat and Light	5	4
Physical Improvement	4	4
Intellectual Improvement	4	4
Insurance and Taxes	4	5
Wages	....	5
Repairs and Replacements	4	3
Minor Expenses	1	2
Reserve Fund	1	2
Savings	1	1

There is also a 2 years' course of 4 hours weekly in Hygiene for personal, home and child management, with practice in children's homes, cooking for children, supervision of work and play, encouraging children in domestic activities, first as visitors, then as helpers, and finally independently. There is also a brief nursing and first aid course. Lessons in theory occupy not above 2 hours weekly.

There are also courses in needlework for home use, including the cutting and making of home decorations, sewing, crocheting, knitting, embroidery, darning, mending, machine sewing. There are advanced courses, including dressmaking, millinery and fancy work.

SECTION 2: VOCATIONAL SCHOOLS FOR GIRLS.

Introductory.

Most of the Elementary Schools in the towns of Germany provide instruction in home-making and women's trades in the latter years of the course. These courses are not always popular with the elementary teachers, but this opposition is diminishing. Many good schoolmen, however, insist that this is not enough and that the elementary school cannot solve this particular problem, which is not a problem of educating children, but of educating adolescents. Dr. Otto Lyon, Director of the schools of Dresden, urges the importance of a Continuation School for girls which shall be neither a continuation of nor a supplement to the Elementary School instruction, but rather an independent institution with its own peculiar character.

Continuation Schools for girls are not very numerous in Germany, but there is a decided tendency to increase them in number and efficiency. Great organizations of women throughout the Empire are agitating for industrial schools of all sorts and are supporting many by their own contributions.

According to the Prussian vocation statistics of 1895, of the 1,259,000 girls between the ages of 14 and 17, there were 661,000 or 51.9 per cent actually engaged in earning a livelihood. Of these, 218,000 or 17.2 per cent were engaged in domestic service, and 443,000 or 34.7 per cent in the industries. In 1901, there were in the 603 Prussian public and private schools for girls, including 339 commercial, trade, industrial, cooking and household arts schools and 204 sewing, embroidery and weaving schools, altogether only 24,313 pupils, leaving in Prussia 638,687 girls without any Continuation School instruction. These figures prove that only about 3 per cent of the girls now receive vocational instruction in the schools.

In the report of an Industrial School for girls in one of Germany's most famous cities, the following appears:—

"Different but equal opportunities must be provided for the two sexes. 'The various vocations open to women must be taught in the schools, with 'the constant thought that each woman is a member of a family and will be 'the centre of a new family. In vocational education it must be remembered 'that the boy is to be a citizen as well as a workman. In the education of 'girls it must be remembered that they are centres of family life as well as 'workers in industries."

The inference is that the boy must be taught civics and the girl housekeeping.

(1) DOMESTIC SCIENCE SCHOOLS.

Apart from the schools for industries are the Domestic Schools, which originally were intended for the lower classes who had to earn their living on leaving school at 14. These also grew up during the latter part of the 19th century, when the aforementioned Central Prussian Society called attention to the necessity for Continuation (Welfare) Schools for girls of working class families, because often homes and marriages were wrecked by reason of the girls, early independent, spending their earnings on amusements and luxuries and not having the necessary skill in sewing, mending and patching, dress-making, cooking, or any training in economy, domesticity, and management. Such schools increased rapidly with the larger numbers of women workers in hand and factory work, during the last 25 years, especially those established by welfare societies and by large manufacturers for their female workers.

Wide Forward Movement.

Latterly the need was felt for the same kind of training for daughters of the well-to-do classes. It was more widely recognized that the training acquired at home alone was often insufficient for the management and care of a household, as the majority of mothers have neither the inclination, time nor ability to train their daughters adequately for present requirements. Hence in addition to industrial schools, cookery and housewifery schools have grown up. Latterly some of them have been combined with industrial and commercial courses. Commercial and Industrial Continuation Schools had been established for the benefit of girls of the lower classes; and recently there has been a marked tendency, due to social and political considerations, not to separate the classes but to provide institutions which all can attend equally. All who are qualified to express an opinion on the subject agree that the industrial and domestic training of all girls, of whatever station, should be assured by suitable provision being made. This has become so expensive of late that it can no longer be undertaken adequately by private bodies or individuals. Consequently Women's Societies, the State, Province, District, Communities and Trade and Commerce Guilds have helped more extensively every year.

Elementary and Advanced.

Young women who wish to become familiar with the duties of housewives must enter the Department of Domestic Science. Here they are taught according to a fixed plan, cooking, washing, ironing, various work required in a household, and the supplementary arts of economy, including the keeping of books for household expenses; also, simple handiwork, such as sewing, patching, darning, mending and machine sewing; lastly they are taught hygiene, nursing of children and invalids. After the completion of this course the student may acquire more thorough improvement in the main branches in separately arranged post-graduate courses. To these special courses, other students, not having had the benefit of the general course outlined above, are not admitted unless they can prove to the satisfaction of the authorities that they possess the knowledge and skill required to pursue the advanced special courses. Thus, for instance, no student is admitted to the course in making underclothes if she lacks the accomplishment of plain sewing, and no one is admitted to the course of tailoring who lacks skill in machine sewing. Almost all middle and advanced institutions for girls' vocational education have adapted themselves to this organization. The practical results have contributed much to the gratifying development of these institutions.

(2) SCHOOLS FOR INDUSTRIAL AND DOMESTIC TRAINING.

But little provision was made in Prussia for training girls or women in industrial or domestic subjects until about 1860 or 1870. Formerly only the daughters of the working classes had to earn a living, and they went into service, factories, shops, or skilled trades, such as dressmaking. The establishment and extension of these Vocational Schools resulted from the more and more keenly felt need or desire of the middle and upper classes for economic independence for their daughters. The large numbers of unmarried girls of the middle classes for whom there was no provision at home, and who could only go out as governesses or companions, at low pay, called for keen sympathy not only among the class concerned, but all thinking people. This led to the establishment of private Commercial Schools in various cities. It was not, however, till the "Central Prussian Society for the Welfare of the Working Classes" took the matter up that anything systematic was done. Dr. Adolf Lette, the President of the Society, had published a pamphlet on this subject in 1865. The result was a Society bearing his name, which still does good work for the higher education of women in earning occupations, by a variety of methods.

Objects of the "Lette-Verein."

This Association set before itself the following objects:

1. The removal of obstacles and prejudices in the way of employment of women.

2. The fostering of industrial institutions for the commercial and industrial education of women.

3. The furnishing of information regarding opportunities for learning trades and securing situations and help, in so far as existing institutions were inadequate.

4. The establishment of women's exchanges for the exhibition and sale of women's handwork and other artistic products.

5. The protection of working women from danger, moral and otherwise, especially by giving them information regarding suitable lodging houses and by organizing credit societies to enable them to secure sewing machines.

The institution of the "Lette-Verein" is a large one, with over 3,000 students. It includes a Commercial School for Girls, with a 2 years' course, and a so-called "Industrial School," with courses in handicrafts, machine sewing, tailoring, history of costumes, dressmaking, millinery, hairdressing, embroidery (both hand and machine), industrial design and composition, washing and ironing, lacemaking, cooking, diet for the sick, sewing, preserving of fruits and vegetables, ordinary housework, and simple book-keeping. There are also divisions for kindergarten work, training teachers for industrial schools, training servants for houses, tailoring, bookbinding and photography. An Employment Bureau is maintained to assist women in securing positions.

Extent of Problems and Schools.

Other similar societies followed, and the "General German Women's Society" founded industrial schools, hostels, and finally higher schools for girls. The work was then generally imitated and numerous private schools were started, many of which, however, had neither the equipment nor facilities to fulfil their objects.

Many cities have taken up the work of women's education, and great progress has been made in the commercial, industrial and art training of girls under the direction of the public authorities.

In Prussia there were in 1901, 603 public and private institutions for girls, industrial, commercial or domestic, having 24,313 pupils. Bavaria had 39 women's work schools with 3,462 pupils, and 5 seminaries for the teachers of the same, with 73 pupils. Saxony had 14 industrial schools, 30 bobbin schools and 3 straw-plaiting schools, attended by 1,800 pupils. Wurttemberg had 16 female continuation schools and 26 women's work schools, with 5,422 pupils. Baden had 36 women's work schools. The other States nearly all had one or more.

There seems to be a necessity for looking deeper and going further. There are 866,414 more women than men in Germany. Early marriages must be given up, as the modern home offers less opportunity for work or occupation than formerly. Better education leads the girl to other aims, and makes her less willing to be a household drudge than hitherto. The German vocation census of 1907 shows a great growth in women's work in the industries. The number of women who are in the industries has doubled in 25 years. In 1882 it was 4,200,000 ; in 1907, 8,200,000. Almost one-half of the grown-up women of the country are at work in the industries.

SECTION 3 : TRAINING OF TEACHERS FOR VOCATIONAL COURSES.

Improvements in Courses of Study.

Until recently the courses of instruction in the industrial schools for girls in Prussia were not laid out according to plan, but were fitted to the various purposes of the pupils. Nor was a distinct aim prescribed; consequently neither in regard to the branches of study nor to the hours of study per week, nor to the duration of the course, were any definite rules in force. Gradually some of the schools, supported and directed by efficient societies, abandoned this free-and-easy mode of procedure and adopted a more pedagogic organization and management. The results accomplished in such schools led to the adoption of regular courses of study in three State institutions, to wit, in Posen, Rheydt and Potsdam, to which lately has been added the school at Thorn. The entire matter of instruction was divided into separate and ascending courses, and the length of each fitted to the difficulties of the separate branches. If a student wished to be admitted to the middle or higher grades, it was necessary for her to prove that she was in possession of sufficient knowledge and skill of the matters taught in the lower grades. This provision secured a more uniform preparation of the classes and the accomplishment of more uniform results of the prescribed courses.

In Prussia the difficulty of giving the various classes of vocational teachers pedagogic training has been only partly overcome. The training of the younger class of teachers for Girls' Industrial Schools has progressed according to strict rules, but the steadily increasing importance of the system of Girls' Industrial Schools resulted in an order being issued by the Government in 1907, stipulating that a normal department should be established in connection with all Schools of Domestic Science and Art, and subsidized by the State; also regulating the courses of such departments.

Three State Institutions.

The three State institutions at Posen, Rheydt and Potsdam all undertake the training of teachers for women's vocational work. Each of these schools has four divisions: A school of household arts, an industrial school, a commercial school, and a seminary for training teachers. Every student is urged to take the course in household arts, which includes an outline of all that a good housekeeper should know. The students receive instruction in cleaning and other household tasks, cooking, baking, sewing, mending, science of nourishment, care of children and of the sick. Special optional classes are given, such as courses for continuation school work and simple handiwork, dressmaking, sewing, millinery, drawing and painting, cooking, baking, washing and ironing. It is proposed to add also a training course in kindergarten work.

Three Groups of Teachers.

There are three groups of teachers for vocational work for women in Prussia: (1) teachers of women's handiwork; (2) teachers of household arts; (3) vocational teachers for the industries. Careful provision is made for training teachers of each of these classes. Teachers of the first group are specially prepared for the work of teaching children in the Elementary, Middle and Higher Schools to do some handiwork, such as knitting, crocheting, sewing and embroidery. Teachers of the second group are trained to give instruction in school kitchens of the Elementary Schools where cooking and ordinary housework are taught. Teachers of the third class are prepared to teach older girls in the special Continuation Schools the finer handiwork required in tailoring, dressmaking, and millinery. It has been usual, but not universal, for the vocational teacher of the industry to qualify first as a teacher of women's handiwork and household arts, and then build upon this for the higher position of a teacher of an industry.

Finally, the training in methods of instruction can be successfully pursued only when a candidate is both trained in theory and has had experience in the industry itself. To sum up, the entire training consists of three stages: Theoretical instruction in the Training School, practical experience in the industry, and probationary teaching.

The Government permits the experience in the industry to be gained there before or after attendance at the training school. On the contrary, the probationary year must follow the instruction in the school, and in no case can the probationary year be used for ordinary teaching; it must be reserved for the vocational training of the young teacher. For this reason only a small number of probationary students are sent to any one school.

Several different kinds of certificates are given to teachers, depending upon the specialty they select. As has been stated, an industrial teacher is qualified to teach a class in handwork or in household arts. A teacher of millinery must be able to give instruction in other vocational subjects. In order to accustom themselves to the various types and sizes of schools, every teacher must be able to handle more than one vocational subject.

(1) ROYAL SCHOOL OF COMMERCE AND INDUSTRY FOR GIRLS, POTSDAM.

This School, which is one of the three State institutions already referred to, offers two courses in Domestic Science, one being for simple housekeeping, extending over 1 year, and the other for professional housekeepers, the courses covering from 6 months to 2 years, according to the subjects elected.

In the 1-year course, which aims at preparing girls for ordinary household management, the subjects are:—Housekeeping and Instruction in Housework; Washing and Ironing; Plain Needlework; Mending, Plain white Embroidery; Machine Sewing; Cookery and Food Values, including Invalid Cookery, Baking and Preserving; Hygiene, Care of Children and Invalids, Arithmetic, Household Book-keeping, German, Drawing, Singing, Physical Training.

Pupils desiring to proceed further, on completion of this course, may take any subjects in the following (Professional) course.

The Professional Housekeepers' Course consists of Housekeeping and Housework, Washing and Ironing (plain and fancy), Cooking and Baking, Plain Needlework, Machine Sewing and Whitewear, Dressmaking, Millinery, Fancy Needlework and Drawing, Drawing and Painting.

Pupils are not obliged to take more than 6 months of any one course, even if the course covers longer; but they are recommended to take the complete course, in order to attain to practical industrial efficiency.

Pupils taking Needlework, Dressmaking and Millinery have to take 2 hours weekly of Drawing.

The fee for the Plain Housekeeping Course (30 lessons weekly for 1 year) is 75 marks; for the Professional Courses it varies according to the subject, ranging from 15 marks per six months course to 75 marks.

There is a boarding house in connection with the school for girls coming from a distance. Rates 1200 marks for Germans, 1500 marks for foreigners.

Teachers are trained in the Seminary Department of this School for teaching Domestic Science in Elementary and Middle Schools, and Needlework in Elementary, Middle and Higher Girls' Schools. Candidates must be 18 years of age, and have the usual certificates.

Domestic Science Teachers for Elementary Schools. These students are preparing to teach Domestic Science subjects in the upper classes of the Elementary Schools, viz.: plain cookery, and ordinary housework as required in a working-class home. The subjects taken comprise Cookery, Housework, including Washing and Ironing, Needlework, Elementary Science as applied to foodstuffs, Housekeeping, Arithmetic, Pedagogy, Teaching Practice and Method, Hygiene, German and Civics, Arithmetic, Drawing, with 4 hours a week Physical Training and Singing.

Teachers of Needlework. The aim of this course is to qualify teachers of ordinary household needlework, together with simple dressmaking and mending, for elementary, middle and higher grade schools. The subjects taken include Needlework, Machine Sewing, Cutting out and making Simple Garments; Materials; Drawing, Pedagogy, Practice and Method; Hygiene, German and Civics; Arithmetic; with 4 hours a week Singing and Physical Training.

Teachers for Continuation, Housewifery and Industrial Schools. Courses are held in Cookery and Housewifery, Plain and Fancy Needlework and Machine Sewing; Dressmaking, Millinery, Fancy Work. These courses extend over 1 year, of 40 hours weekly.

(2) WOMEN'S WORK SCHOOL AND WORK TEACHERS' SEMINARY: MUNICH.

This is a Middle School founded by a Popular Education Society. It gives theoretical and practical instruction in women's work for home and industries. It was opened in 1873, and was one of the pioneers on which other schools have been modelled.

It is controlled by a Committee of 15, appointed partly by the Government, partly by the City, and partly by the Popular Education Society.

The subjects taught comprise all kinds of Needlework, Tapestry, Lace, Dressmaking, Fitting, Fine Laundering and Ironing, Millinery, Freehand and Geometrical Drawing, Physical Training, Games, Singing, Book-keeping and Shorthand.

There are whole-day and half-day courses. In the Continuation Classes the studies comprise Religion, Housewifery, Hygiene, German, Arithmetic, Household and Business Book-keeping, and optional French.

The entrance requirement is 7 years' completed attendance at a public day school. Fees are charged, one morning class costing 45 marks half-yearly; one afternoon class 40 marks half-yearly.

There is a special department devoted to training *Teachers of Design.* All pupils make original designs, which are drawn and then criticised as to workableness, material, arrangement of threads, etc. This applies especially to embroidery. Most of the pupils are doing work for their homes or for their own satisfaction. Graduates of the school are eagerly sought for by employers, but only about 3 in every 20 required can be supplied. This school trains women for their homes, with refined tastes and standards in art and needlework, and is doing more in the way of training leaders of society than teachers for schools.

Housewifery Lessons in Elementary Schools.

The first housewifery lessons are given in the eighth class of the Elementary Schools. The study plan for one of these schools sets forth that the main objects to be kept in view are general education and development of intelligence and economy, the latter especially in cookery and housewifery classes. Instruction is given in the school kitchen. Very full information is given under 35 headings on foods and cookery, with minute details, and similar information is given in regard to dress and the home. Extended detailed information of a similar character is given regarding each of the main subjects dealt with in the schools.

(3) CONTINUATION CLASSES FOR GIRLS AND WOMEN: MUNICH.

There are compulsory Continuation Schools for girls of 14 to 17 years of age, where instruction is given in housewifery; also optional Continuation Schools which give housewifery and commercial and industrial training.

The aim of these classes is to train girls for ordinary middle-class housekeeping. A year's theoretical and practical course dealing with samples, preparations, experiments and pictures, simple experiments in chemistry, use of various cookers, is given, lessons being held once a week. A fee of 6 marks half yearly is charged. The ground covered deals with foodstuffs, their sources, qualities, and preparation, health and nutrition, and first aid. Practical instruction is given in the use and care of the house and its equipment.

Optional or Voluntary Girls' Continuation School.

In the dressmaking class, the girls make models in small size before making the actual article for use. Instruction is given in art as applied to dress. Geometry is included in drawing from measurements of the person, and the drawings are to prepare for cutting blouses and skirts. The measurements are taken, drawings made from these, and materials cut from the drawings.

Many samples of materials and fabrics are kept at hand, in order to give the girls a knowledge of qualities and prices.

The courses cover 6 months each. The girls are drilled in analyzing the proportions of income to be devoted to the various items of expenditure, such as rent, fuel, food, clothing, amusements, etc. At one school visited the unit used was 120 marks ($30) per month. The teacher examined the girls, answers being given orally. It was observed that the girls spoke clearly and enunciated with more force and precision than is common in Canadian schools. They looked healthy, interested and animated at their class work.

This school occupied a building used also for a Primary School and and in the afternoons for gymnastics and singing. This voluntary Girls' Continuation School has the use of all the equipment in the afternoons and evenings. The attendance is about 700 in winter, and 630 in summer.

Scholarships are available to girls whose parents are in poor circumstances —about 10 per cent of the total number of pupils occupying these free places.

There was evidence that the dignity and importance of the position of the teachers were recognized. That was the impression received from the personality and general manner of teachers and pupils.

SECTION 4: WOMEN'S SOCIETIES WHICH PROVIDE CLASSES.

There is in Germany, as elsewhere, a rural uplift movement at the present time, supported largely by women's clubs. Through the instrumentality of these associations itinerant or peripatetic Housekeeping Schools have been maintained for the service of rural communities with occasional aid from public funds.

Swabian Women's Society.

The *Swabian Women's Society*, which has been in existence for forty years, has for its object the training of young women and the improvement of their social and economic position by making them independent; the opening out of new fields for them, thereby securing for woman her proper place. The need for such work is more pressing than ever before.

At Stuttgart there are two Women's Schools under the auspices of the Swabian Women's Society, viz., a Women's Work School, established about 40 years ago, and a Cooking School. The former was taken over after 5 years by the City, which administers it under State aid, President von Mosthof being the Director. The Cooking School is solely under the Women's Society, receiving no outside support. It makes a small profit out of sales and fees.

The Women's Work School trains for the home, for teaching, business management, industry and industrial art occupations. The instruction is adapted to the requirements of the pupils, the aim being to turn out competent and reliable workers. New courses are introduced as needed, such as a course in merchandise, relating to the origin and preparation of materials, especially textiles; an advanced freehand drawing course for middle-school teachers, where embroidery designs are originated; and a mending and sewing class for girls over 14, which is greatly appreciated, girls coming long distances to attend it. The Industrial Art section does well, and the directress and teachers visited the Brussels Exhibition, making notes of what they saw.

A kindergarten and teachers' training school are attached, where teachers can study the physical care of children.

Other departments of the Society's work include itinerant cooking schools, (including care of children), with course in landscape gardening and nature study, as well as courses in singing, dancing, millinery and common law.

The *Commercial School* offers a 1 year's general and special course, including thorough training in commercial subjects.

An *Employment Bureau*, in connection with the Society's work, checks the output of incompetent help, while finding positions for those who are qualified.

Social evenings are held by the students of the various institutions.

There is a library for the Domestic Science students.

A fund has been raised by voluntary subscription to enable poor students to attend the schools free of charge.

Courses in the Women's Work School.

1. Sewing and pattern designing, mending, etc.
2. Machine sewing and pattern drawing—more elaborate linen.
3. Dressmaking and pattern drawing—more elaborate dresses, etc.
4. Embroidery, designing and pattern drawing—industrial, artistic.
5. Seminary for needlework and drawing teachers.
6. Dancing and deportment.

Instruction in geometrical and freehand drawing compulsory in all courses except 6.

In the Cooking School.

The Cooking School gives thorough training in all branches of cooking, both for home and teaching purposes, beginning with plain, simple meals, and going on to high-class cooking—cakes, tarts, fancy cakes, decorating dishes, preserving fruit and vegetables, together with instruction on nutritive values of foods, effects of cooking on same, the purchase and storing of raw materials. A course on dishing-up, laying table and waiting is given with the cookery course. In order to arouse a feeling of responsibility and make the pupils independent, the various dishes are prepared by the pupils in pairs, and recipes given for a small party only. Dinners can be had at the school at small cost, and orders are taken for hot and cold dishes. The dining-room is available for receptions, etc.

The course lasts three months. There are 32 pupils in a course, in two sections; 5 lessons weekly are given. Fees are 100 marks for the course, plus 3 marks for service.

Prepare Teachers and Housekeepers.

The Women's Work School and the Cooking School prepare Volksschule teachers of sewing and handiwork, manageresses of business, and a small proportion who enter dressmaking shops. Girls from these schools get good places in domestic service as housekeepers, etc., but most stay in their own homes, being daughters of merchants, manufacturers, etc.

Teachers must have a certificate from the school, or an equivalent, plus at least 6 months in an industrial establishment. The teachers in this school, and those prepared in it, get the following salaries:—begin at 1,168 marks per year during probationary period, increasing, after 3 years, to 1,340 marks, and then to 1,640 marks, and when permanently appointed, 2,220 marks per annum. The usual pension system applies without any deduction from the teacher's salary.

In the Women's Work School the classes are small—14 to 16 in each.

A great deal of attention is paid to drawing, especially in relation to drafting patterns and embroidery work. In embroidery design, they first made a charcoal or crayon drawing of a natural object, then a water-colour adaptation, which could be accomplished with the materials to be used in the embroidery.

At Frankfurt.

A series of educational institutions are conducted by the Women's Society for the benefit of the women and girls of the district. Their object is to impart theoretical and practical instruction in all matters relating to housewifery, to girls and young women over 18 years of age. The various departments of the work are as follows:—

A. A Continuation School.
B. Special Industrial Art Classes.
C. Various Normal Classes.
D. Homes for Girls.
E. A Kindergarten.

In A, girls are taught German, English, French, Drawing, Dressmaking, Millinery, Art Embroidery, Machine and Hand Sewing, Cooking, Ironing, etc.

In B, girls receive instruction for 3 years of 24 hours a week in the following subjects:—Freehand Drawing, Perspective Drawing, Designing, Modeling, Wood and Linoleum Carving, Drawing from Life, Plastic Anatomy, etc.

In C, teachers are trained for the Kindergarten only, as children's nurses, etc., teachers of female handiwork, cooking and housewifery, as well as gymnastics.

D. These Homes are intended for girls taking a whole year's instruction in the Continuation Classes. Board and lodging ranges from 900 to1,200 marks per year. The attendance is:—Kindergarten, 104; Seminary, 30; Housewifery, 20; other classes, 200.

There is sharp supervision from Berlin, especially in regard to the qualifications of teachers.

The School in Housewifery was in a nice neighbourhood and the building well adapted for the work, although it had originally been meant for another purpose. The girls live in the school and do all the work of the house. Fees are 30 marks per month.

The Cooking School gives thorough theoretical and practical instruction in plain and high-class Cookery by qualified teachers. Previous to practical work, a lesson is given in which recipes are discussed and taken down, buying of materials is explained and correct measurements shown. The pupils, two together, prepare all dishes, learn carving, decorating of dishes, baking and preserving, special stress being laid upon cleanliness, care and economy. The course covers three months, the fee being 70 marks for each cooking course, 15 marks for the preserving course. Classes for Invalid Cookery are arranged if sufficient numbers apply. Waitresses' course of 1 year costs 250 marks. There is a special course in House- work, Cleaning, etc.

CHAPTER LIII: AGRICULTURAL INSTRUCTION.

General Classification.

The provisions for special instruction in Agriculture, Horticulture and industries belonging to them, may be roughly classified as,—Elementary, Secondary and Advanced.

Elementary: In addition to the instruction given at Rural Continuation Classes there are, (1) Farming Schools; (2) Agricultural Winter Schools; (3) Special Courses of Lectures.

Secondary Agricultural Schools.

Advanced: (1) Agricultural High Schools corresponding to the Technical High Schools; (2) Agricultural Institutes or Departments at Universities; (3) Other Higher Agricultural Institutes; (4) Lecture Courses for owners, managers and farmers of large estates.

The foregoing classification represents only in a general way the character of the schools.

In addition to the general agricultural schools, there are others for special branches. Such are the Schools for Meadow Cultivation, Dairying, Beekeeping, Farriers, etc. These special schools are partly independent institutions, in some cases connected with a general agricultural school. In Prussia they are attended by about 10,000 pupils. They are maintained by grants from the State, from provincial, district and communal funds, from societies, endowments, etc. No uniform policy or plan as to the proportion of contribution from these sources appears to be followed. For example in the case of five Schools for Meadow Cultivation the State contributes about one-fifth of the cost of maintenance, for 64 for Dairying about one half, for 2 for Beekeeping about two-thirds and for 3 Pomological Institutions and Schools for Gardeners the State pays practically the whole cost.

Lessons for Canada.

Since it is not considered that details of the organization of the courses in Agricultural Schools would be useful in Canada, only an outline is presented. The features of importance are the general adhesion of the rural population to the belief that education is advantageous to agriculture, and the working out of their salvation by making that belief vital in the affairs of the locality.

As a rule, except in Saxony, the farmers live in villages and not on isolated farm steadings as in Canada, and almost every village has its Agricultural Club or Association in touch with a Provincial Chamber of Agriculture.

There is a lesson in those matters for Canada. The policy of village settlements rather than isolated homesteads is well worth considering, and recommending for the unsettled districts; and even where surveys have been made, and settlement effected, the question need not be looked upon as finally settled. Contented women, good chances for the education of the children, and a reasonably richly developed social life are in the long run of immensely more consequence than conveniences for growing crops. The place of the latter is to minister to the former. What shall it profit a country to be called, or to be, the Granary of the Empire if it loses the soul of happy rural life?

The particular lessons for Canada, from the advanced agricultural instruction for the training of teachers, are discussed in Chapter IX of Part II on Education for Rural Communities.

SECTION 1: ELEMENTARY INSTRUCTION.

Continuation Schools.

The Agricultural Continuation Schools are intended chiefly to strengthen and extend the elementary education of the rural population, but in some of them technical agricultural instruction is given. They are conducted usually in winter during two or three evenings of each week and on Sunday afternoons. In Prussia there are over 1,500 of these Rural Continuation Schools. In some of the other States there are larger numbers in proportion to the population.

In Saxony the Continuation School, in the country districts, is for one hundred hours per year. The classes are held in the evening in the Winter time. The instruction is of a general nature in German, arithmetic, etc., with as much application to the industry of agriculture as the teacher can impart. Two teachers who were seen said the boys were very keen to get the education offered in the Continuation Classes. Although the attendance in Saxony was compulsory they never had a case where a boy had had to be compelled to attend. In one of these cases the school was in a village of about 950 population. The salary of the teacher was paid, as is usual, by both parish and State. These payments are equal in amount up to a point where each gives 1,500 marks per year. From that point the parish may give more salary, and often does, but the State does not give more than 1,500 marks. This refers to the ordinary Elementary School work. The school-master had a wholesome pride in his school-house and in the work he was doing in educating the young people of the community.

Farming Schools.

In the Farming Schools, in addition to the theoretical instruction, the pupils are largely occupied with practical farm work. In the Winter and Lower Agricultural Schools only theoretical instruction is given. The Farming Schools are intended for the directly practical training of farmers. The pupils are of the age of 15 to 20 and are mostly the sons of farm owners or tenants.

The schools are established partly by individual farmers, partly by agricultural societies, and partly by endowments. All are under State control and nearly all of them receive grants from the State or from public corporations. They are situated in connection with a small or middle sized estate or farm. The head of the estate or farm, whether owner, tenant or manager, is at the same time Director of the School. The pupils are full boarders, and, in return for this and the teaching, they have to pay boarding and school fees. Some of the Farming Schools admit pupils without payment or with half payment. The instruction is both practical and theoretical, the former chiefly in Summer and the latter in Winter. The practical teaching extends to all kinds of agricultural labor, which every pupil must learn to perform by continued personal application. Theoretical teaching is given in the elementary subjects in Rural Economy, in Nature Science, in Horticulture and Fruit-growing and in Veterinary Science, frequently also in portions of National Economy and Agricultural Law. The complete course lasts two years. Admission is conditional on previous elementary education and a knowledge of simple agricultural practice.

Practically all the German States provide schools or instruction through special courses with reference to the particular needs of each State and district. An illustration is presented of the organization and the aims of the Farming Schools and Lower Agricultural Winter Schools existing in Württemberg. In considering them it should be remembered that the Kingdom of Wurttemberg contains about 3·9 per cent of the total German population and about 3.6 per cent of the total area of the German Empire.

*The Württemberg Agricultural Winter Schools, of which there are eight, are only open, as their names imply, during the winter months, the course of instruction commencing in November and terminating about the end of March. They are intended for peasants' sons who have left school and wish to become farm workmen or for small farmers, and the various courses are carefully framed with a view to consolidating and extending the education acquired at school, and to instructing them so far in agricultural work as to enable them to understand the principal agricultural processes on small peasant farms.

Intending pupils must have attained their fifteenth year, and show a satisfactory degree of educational ability.

Two courses are held annually, and it is desirable that both should be attended; should this, however, not be feasible, the first course is so arranged as to give a certain amount of complete agricultural elementary instruction. The fees are moderate, amounting to about £1 5s. per course, for which instruction is given in the following subjects: German language; Caligraphy; Arithmetic; Geometry and Surveying; Drawing; Physics; Elementary Veterinary Surgery; Agriculture; Breeding of Domestic Animals; Farm Management and Bookkeeping. The schools are under the supervision of the Ministry of Education and Royal Bureau of Trade and Commerce; the expenditure is borne principally by the State, but the communities in which the schools exist are required to stock them with furniture and to light and heat the schoolrooms.

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In concluding this brief account of the Wurttemberg Agricultural Schools, the work done by travelling lecturers and experts must be taken into consideration. At the instigation of the Royal Bureau of Trade and Commerce courses of lectures were held in various places on the following subjects: Cultivation of fruit, vines and tobacco; breeding of domestic animals, poultry and fish; field, meadow and garden products; drainage and artificial manures.

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*Note—For the extracts which appear in small type the Commission is indebted to a report by Dr. Frederick Rose, British Consul at Stuttgart, and published as number 594 of Diplomatic and Consular Reports (1903). The Commission was indebted to other reports by Dr. Rose which proved very helpful in planning and carrying out investigations in Germany.

These travelling lecturers are of course not only to be found in Wurttemberg but in the whole of Germany. In many cases they are the masters of lower agricultural winter schools, who are employed in this manner during the summer months, in other cases they are appointed by agricultural associations for certain fixed branches of agricultural knowledge. It is their duty to disseminate useful agricultural knowledge in all directions, even in the most inaccessible quarters, to induce the peasants and small farmers to make agricultural experiments on a small scale, and to assist them in doing so in every manner. Some of the travelling lecturers are delegates or officials of the Chambers of Agriculture or of the larger agricultural societies, from which quarters their remuneration is drawn.

SECTION 2: SECONDARY INSTRUCTION.

Secondary agricultural instruction in Germany is given in the agricultural schools, of which Prussia possesses the largest number. The organization of the Prussian schools was determined by the law of 1875, and has been followed to a more or less greater extent by the agricultural schools of the other German States. The course of instruction is arranged for a period of six years, and the leaving certificate entitles the holder to the one year military service; in all respects these agricultural schools rank with public State schools, with the same number of classes and duration of instruction. They are principally intended for the sons of farmers, managers and owners of estates who wish to acquire at the same time the qualification for the one year military service and a knowledge of practical agriculture. The schools are managed by a "curatorium," and are under the supervision of the Ministers for Agriculture and for Education. They are not State but semi-private schools, which receive pecuniary support from the State and various public and private sources, and the masters occupy exactly the same position as those at the public State schools with six classes. The agricultural instruction is given in the upper classes according to a certain normal plan, whilst the instruction in the lower classes is similar to that of the corresponding classes of the "real" schools.

To the subjects of the Realschule is added as a special subject Rural Economy, to which from four to six hours weekly are devoted. Natural Science occupies a comparatively important position—from eight to ten hours weekly. This restricts the teaching in other subjects in the Realschule such as German, foreign languages, history, geography, and mathematics.

Among the ordinary teachers there is at least one who has passed the State examination for teachers of Agriculture in Agricultural Schools and who is consequently in possession of the leaving certificate of a Gymnasium, Realgymnasium or higher Realschule. These schools frequently have the use of experimental fields and fruit and vegetable gardens; moreoever excursions are made to neighbouring estates and to agricultural exhibitions. These Agricultural Schools in Prussia are attended by about 2,000 pupils.

A School at Wurzen.

A visit was paid to one of these Agricultural Schools at Wurzen, in the Kingdom of Saxony. Wurzen is a manufacturing town of about 20,000 population, in the midst of an agricultural district. The District Agricultural School is one of twelve such schools in the Kingdom of Saxony. This one is reputed to be of the highest standard because it gives a full two years' course of instruction, Winter and Summer. At the other schools the regular course consists of two terms of six months each in Winter. The town of Wurzen provided the School Building and Experimental field. The school is under the control of an Agricultural Association. The town and State both give grants towards its support. Out of the fifty students who finished the year's course at the time of the visit, forty were going directly back to the farms and the other ten were going into places as managers or country bailiffs.

Number of Schools.

Exact statistics of the Farming Schools, Winter Schools, Lower and Secondary Agricultural Schools and Special Schools for the whole of Germany were not found. However there are, altogether, over 500 which provide secondary agricultural education as already indicated. A careful English authority, the late Mr. T. G. Rooper, one of H. M. Inspectors of Schools, who aided Canada very materially in the starting of the School Gardens under the Macdonald Rural Schools Fund, reported in 1901, that "In Prussia, as in other States, local Agricultural Societies exist in many villages by whose means instruction in agriculture and horticulture is provided and maintained in some 1,620 schools of various descriptions."

SECTION 3: INSTRUCTION OF COLLEGE GRADE.

The principal objects aimed at by the Agricultural High Schools and institutes are as follows: (1) The instruction of future owners, tenants, farmers, or managers of large or small estates in all branches of theoretical and practical agricultural science; (2) the theoretical and practical instruction of future professors, lecturers and teachers of agricultural subjects; (3) theoretical and practical instruction in surveying and agricultural civil engineering; (4) the training of future officials of the land administrative departments; (5) scientific research for the furtherance of agricultural progress and knowledge.

For the study of agricultural-technical science in Germany, from four to six terms of one-half year each are generally considered necessary. Students who only study a few terms receive certificates showing that they have passed the simple examinations held at the conclusion of each term, and students who have passed through the full course of three years' instruction may enter for the examination for the diploma of agricultural-technical science. A further and more difficult examination is considered necessary for those who wish to qualify for positions on the staff of agricultural schools.

As a rule the standard of preliminary educational qualification exacted from students of agriculture is lower than that for students at technical and veterinary high schools and at mining and forestry academies. This may be explained by the fact that students from rural districts have either not had the time or opportunity of acquiring a high standard of preliminary education. It is feared that if a higher standard of preliminary education were exacted, students would remain longer at school and thus shorten the valuable period of practical agricultural work which is necessary before commencing to study.

For the majority of students the educational qualifications necessary for the one year military service are considered to be the lowest necessary minimum.

In several Universities (Breslau, Gottingen, Halle, Konigsberg, Leipzig, Jena, Giessen) there are Agricultural Institutes, the aims of which are the same as those of the Agricultural High Schools. In the Technical High School of Munich there is a special Department for Agriculture.

Agricultural High School at Berlin.

The Berlin Agricultural High School was founded in 1860 as an agricultural institute, and was raised in 1881 to the rank of an Agricultural High School. As regards scope of instruction, number of professorial staff and students, it is the largest and most important in Germany.

The facilities afforded provide for scientific and practical instruction and investigation in agriculture, geodetics and agricultural civil engineering, as well as in all industries intimately connected with agriculture and their allied branches of scientific instruction.

It is under the direct supervision of the Minister of Agriculture, State Domains and Forests and is managed by a rector, assisted by a curatorium, and the upper and lower professorial councils. The rector is elected for a period of two years by the upper professorial council, and his election is sanctioned by the King. The members of the "curatorium," generally two, are charged with the supervision of the scientific interests of the school and are nominated by the Minister of Agriculture. The upper professorial council consists of all fully qualified professors, and a certain number of other not fully qualified professors, specially nominated by the Minister for this purpose. It serves as a general advisory board to the rector, and assists him in general matters of management. The lower professorial council consists of all professors, lecturers and assistants, and takes part in the determination of the courses of instruction for each half year; it is also empowered to propose general resolutions concerning the present condition, aims and future of the school.

There are, further, three departmental councils for each of the three principal departments for agriculture, for geodetics and agricultural civil engineering, and for agricultural-technical industries. They are composed of the principal professors of each department, and their duty is to foster the development of their special departments to the best of their ability, and to apply to the rector or upper council for any further facilities they may deem necessary in the interests of instruction.

The usual agricultural course lasts from four to six terms (two to three years) and generally commences in the autumn. The course in geodetics lasts from four to five terms (two to two and a half years) and commences after Easter; students of this latter course must produce leaving certificates of a nine-class higher preparatory school (classical or "real" gymnasium, upper "real" school), and proof of at least one year's practical work.

A special advantage afforded by the Berlin agricultural high school, and one which materially broadens the scope of instruction, consists in its intimate relations to other high schools situated in Berlin. Thus, for example, students of the agricultural high school may attend lectures and practical work at the university, technical and veterinary high schools and mining academy, without any further entrance formalities; they can also take a degree in the philosophical faculty of the university in agricultural science, with philosophy and two other natural or State science branches as subordinate subjects.

The full plan of instruction, which is arranged for a period of six terms (three years), is also intended for students who take the shorter course of two years (four terms). The considerations which have been instrumental in inducing the management of the school to arrange the plan of instruction are interesting, and show how careful the authorities are to impress upon the students the necessity of commencing their studies with a definite object in view and of terminating them with the acquisition of a certain definite amount of sound theoretical and practical knowledge. It is urged that success in the pursuit of agriculture at the present day requires not only great circumspection and practical talent, but an equal measure of theoretical knowledge, and that the latter requirement is increasing in proportion as agricultural undertakings are becoming more extensive and complicated. That, therefore, a complete course of instruction upon a broad and liberal basis requires the full period of three years. As, however, the majority of agricultural students possess neither the time nor means for the completion of the longer course, the shorter course has been so arranged as to include the most necessary subjects, but it does not and cannot give the thorough finish afforded by the three-year course.

A shorter period of study than two years is discouraged as productive of imperfect and faulty results, and is only permissible with the intention of refreshing or increasing the knowledge of certain special subjects hitherto neglected or imperfectly acquired. Students are especially warned not to attempt to acquire in the course of two or three terms a smattering of all the subjects taught in the six, as such superficial knowledge can only produce disastrous results later when applied to practical purposes.

The Agricultural High Schools form no exception to the general rule in Germany that higher schools require substantial aid from the State which is liberally and ungrudgingly afforded. The proportion of professorial staff to students is necessarily high in institutions of this grade. At the Agricultural High School, at Berlin, with 636 students it was one professor to ten students; at Hohenheim, with 105 students, it was one to four; at Poppelsdorf, with 233 students, it was one to seven.

Teachers for Agricultural Schools.

Those students who wish to qualify for positions on the staff of agricultural schools and, further, students of surveying and agricultural civil engineering, must produce certificates showing that they have passed through the full courses of a classical gymnasium, a semi-classical (real) gymnasium, or an upper "real" (modern) school. Persons not possessing the necessary preliminary educational qualifications for fully qualified students may enter as extraordinary, or not fully qualified, students; they are, as a rule, not admitted to the diploma and other examinations for positions in the State service or as future lecturers on agricultural subjects.

Intending students must further be at least 18 years old and prove that they have been engaged for at least one or two years in practical agricultural or surveying work. A longer period of practical agricultural work is considered highly desirable.

Masters for agricultural science at Prussian agricultural schools at which the normal plan of agricultural instruction is in force, must produce proof of the following qualifications:—(1) that they have completed the full courses of a gymnasium or upper "real" school; (2) that they have studied agriculture at an agricultural high school or university institute for a period of not less than three years; (3) that they have been engaged in practical agriculture for a period of not less than two years; (4) that they have completed a probationary period of one year as master of agricultural science at an agricultural school with favourable results.

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The above examination only applies to masters of agricultural science at agricultural schools and not to professors, extraordinary professors, lecturers, etc., at agricultural high schools and university institutes. The latter are mostly university graduates, in some cases eminent agriculturists, who have commenced their careers by being assistant to some professor and have gradually risen by means of special pedagogic ability and scientific agricultural research to the higher academic positions.

SWITZERLAND.

CHAPTER LIV: OUTLINE OF THE EDUCATIONAL SYSTEMS.

INTRODUCTORY.

The Republic of Switzerland, with a population of 3,741,971, in 1910, is made up of 25 Cantons organized into a Federal State. The Federal Legislature has two chambers, the Standesrath (State Council) with a membership of 44; and the Nationalrath (National Council) with 167 representatives elected for 3 years. The executive authority is deputed to the Bundesrath (Federal Council) with 7 members elected by the Assembly for 3 years. In respect to the administration of Government, the Cantons have somewhat similar relations to each other, and to the Federal Authority, to those which obtain in the case of the several provinces of Canada.

The language of the people is German to the extent of 71 per cent of the population; French of 21 per cent; Italian of 7 per cent. The Cantonal divisions do not coincide with those of language.

The area of the country is 15,976 square miles, of which about fifty per cent is under cultivation and twenty per cent under forest. The remainder is unproductive.

The occupations of the people have changed during the last thirty or forty years from being mainly agricultural to being predominantly manufacturing. The chief industries are the making of iron and wood-working machinery; water power and electric machinery; textiles in silk, cotton and embroideries; clocks and watches. The tourist trade is one of immense magnitude, entitling Switzerland to renown as the playground of Europe. The qualities of diligence, intelligence, frugality and sturdy independence were the characteristics of the people which were most obvious.

ELEMENTARY EDUCATION.

Under the Constitution of 1874, Elementary Education is obligatory, free and under the supervision of the Canton. Each Canton has its own educational system and its own separate organization for the administration of education. The supreme educational authority is the Canton, and the Local Authority for the administration is the Commune.

Attendance is required from about the age of 6 to 14; but the requirements as to age vary in the different Cantons and Communes to suit the conditions and occupations of the people.

Much attention is given to handwork in the elementary courses. Cardboard instruction, sewing and drawing are taken from 9 to 12 years of age.

There are Higher Elementary Schools with the pupils from 12 to 14 years of age. In these manual work for boys consists of wood-working, modeling and drawing, and occupies about 6 hours per week. The hand-work for girls is in sewing, mending, darning, crochetting and drawing.

There are also Vocational (Intermediate) Schools with a course of 2 years. These prepare pupils for occupations and for admission to the Secondary Vocational Schools. They receive pupils of 13 years of age and upwards who have completed 6 years of the Primary School.

Housekeeping Subjects.

Elementary Housewifery, Hygiene and Domestic Economy for girls are taught in the Primary, Supplementary and Rural Secondary Schools. The object is to train girls for their future duties. The Supplementary School begins after the age of 12.

In looking over the specimens of syllabuses one finds a wide range of subjects covered. In one of them the list includes the following: Duty—the duties of a girl at home, at school, as apprentice; idleness, conscientiousness, deportment, manners, expression, order, neatness, economy of time, etc. Others deal with the details of the home; others with plants; others with food stuffs; still others with hygiene and the care of children—physical, moral and intellectual.

Sewing is taught in all the Elementary Schools and, with the exception of only parts of the Forest Cantons, it is everywhere a compulsory subject. The course includes all kinds of knitting, stitching, mending and cutting out. The time given to it varies from a minimum of 2 hours to a maximum of 8 hours per week. Usually it occupies from 3 to 5 hours per week during six years.

Continuation Schools and Secondary Schools.

Elementary Education is followed by Continuation or Improvement Schools. In some Cantons attendance at these is compulsory and in others it is optional. The classes are usually held in the winter months and provide about 6 hours of instruction per week. Sometimes they are held in the evenings and sometimes during the day hours.

For pupils who desire a more thorough education, and can afford the longer period of attendance, there are Secondary Schools somewhat similar to the Secondary Schools of Germany. In some cases these schools take in pupils who have the qualification gained by only four years at the Elementary School. In the Gymnasia—the literary department for classics and modern subjects—pupils who have the qualification of six years of the Elementary School are accepted.

The Secondary Schools also accept pupils of the age of 14 from the Elementary and Higher Elementary Schools, but the courses of the latter are arranged to serve those who intend to go to work at about 14 years of age and not to prepare for admission to the Secondary Schools.

Those who enter the Secondary School at 10, after four years at the Elementary School, are expected to continue during 6½ years, and those who enter at 12 go on with the courses during 4½ years. Some of the Secondary Schools have further courses of 2 years which prepare pupils for admission to the Universities and the Polytechnic School.

Rural Secondary Schools.

The Rural Secondary Schools receive pupils after 6 years of the Primary Schools. Attendance is obligatory from 13 to 16 years of age, unless equivalent instruction is being received. The character of these schools is essentially practical and directly related to agriculture. The course is two years, but a third year may be taken provided sufficient pupils offer themselves. The subjects include fruit culture, vegetable gardening, viticulture, animals and bees. These schools and their courses are prominently advertised on posters.

In connection with many of the larger Secondary Schools the Cantonal or Local Authorities provide what are called "Scholars' Homes." These provide good board and lodging for pupils whose homes are at a distance from the school, and the cost is so moderate that practically no suitable pupils are prevented from attending by the circumstances of their parents.

In the Elementary and Secondary Schools of the Canton of Zurich, which in this respect may be taken as representative, there were 84 per cent of male teachers to 16 per cent of female teachers.

The Universities and Polytechnic School.

The Universities, for general education of the highest grades, are maintained by the Cantons. The exception is the Federal Polytechnic School at Zurich, which carries on work in scientific and technical departments up to the highest standards.

The recognition of the value and importance of theoretical scientific knowledge prevails throughout the whole of all the systems of Industrial Training and Technical Education. The courses are arranged to lead to the formation of habits of scientific orderly thinking, to impart sufficient knowledge to enable the students to have clear concepts as to the laws of the physical sciences and to train them in mathematics and geometry.

SOURCES OF FINANCIAL SUPPORT.

The support for education comes from four sources:—

The Communes;

The District (that is the combination of all Communes within a certain area);

The Canton;

The Federation or Bund.

The latter is taking an increasing share of the burdens of educational expenditure, but usually without exercising any direct control. The very highest form of scientific and technical professional training, which always is the most costly form of instruction, is provided wholly by the Federation or Bund.

One point, in which all agree, is in making the main portion of the State grants-in-aid take the form of payment to the Local Authorities of a proportion of the teachers' salaries.

The methods of calculating central grants-in-aid are different in the several Cantons. In some of the Cantons, the main factor in determining the proportion of expense to be borne by the Canton comes from the degree of local necessitousness.

The plan whereby the local community bears a share of the financial burden and has the direct management and responsibility for the school tends to an increase of economy without lowering the general standard of excellence. The Cantonal Authority has power, by means of its grants and otherwise, to insist upon a high level of work in every locality.

The Federal grants to Industrial and Technical Schools amount, on the average, to one third of the total cost of maintenance. These grants are separate from, and in addition to, the maintenance of the Federal Polytechnic School at Zurich.

Variable Contributions At First.

After the Bund began to assist the Cantons and the Communes to maintain vocational education, and before the present law providing for grants to the extent of one third of the cost of maintenance was enacted, the relative amounts spent by the Communes, the Canton and the Bund upon technical education varied very much. In 1895 for the whole of Switzerland, whereas the Communes and Cantons spent altogether upon technical education $257,145 the Bund contributed $464,899. That included industrial, technical, agricultural and commercial education, the Federal Polytechnic School at Zurich, and various miscellaneous disbursements.

As examples of the variation in the relative amount spent in three of the Cantons on technical education of all grades it may be mentioned that in 1895, in the Canton of Berne, the amount by Communes and Canton was $108,979, and the amount by the Bund was $23,587. In the Canton of Zurich these figures were respectively $71,500 by the Communes and Canton, and $28,790 by the Bund. In the Canton of Geneva the sums were $21,412 by the Communes and Canton, and $14,616 by the Bund.

School Buildings.

From the appearance of the school buildings and from what was learnt from various sources, it was apparent that during the last 7 or 8 years there had been great activity in providing new school buildings and keen rivalry between different communities as to which could have the best. The buildings were admirably arranged for light, with spacious corridors and reception halls. All the

Elementary School, Zurich.

Elementary Schools, Zurich.

schools visited had fine gymnasiums for physical culture, in some cases large separate gymnasiums for boys and girls. Frequently children were observed at athletic drill in the open air on the school grounds.

RELATION OF THE FEDERAL AUTHORITY.

Since 1903, subventions have been given to the Cantons to help them to fulfil their obligations concerning elementary education. The Canton decides to what particular object the Federal subvention shall be applied, and if it hands over all or part of the amount to a Commune it (the Canton) determines how it shall be spent. The Canton is responsible to the Federal Government for the legal spending of the money by the Commune.

By Federal law instruction in military drill and exercises is made a part of the compulsory school programme for all youths between 10 and 15 years of age, and a Federal contribution is made towards the expense of its provision.

The Federal Government exercises an influence upon general education by means of its legislation dealing with the employment of children. That stipulates that children shall not be employed in factories under 15 years of age, and that children under 16 years of age shall not be employed in factory and school work combined more than eleven hours per day.

Federal Grants are Conditional.

When the Federal Authority decided that it was desirable to give assistance to the development and maintenance of Industrial and Technical Education, and Commercial Education in the higher grades, it resolved that it could best render assistance by simply granting financial aid without adding as a condition of the aid any control of the classes, courses, or standards. No establishment of schools was undertaken by the Bund.

These Federal grants for the development of Industrial and Technical Education may, subject to the decision of the Federal Council, reach a maximum of one-half of the total annual expenditure for those purposes by the Canton, Communes, Corporations and private individuals. Thus the Federal grants to the Industrial and Technical Schools amount, on the average, to a third of the total cost of maintenance. These grants are separate from and in addition to the maintenance of the Polytechnic School at Zurich, which is wholly maintained by the Federal Government. The grants to the schools maintained by the Communes and Cantons are "conditional on suitable premises and class rooms, satisfactory organization and results, satisfactory programme of study, submission of financial statements to the Federal Government, and both Cantonal and Federal inspection." (Seath).

THE FEATURES REPORTED UPON.

Switzerland has been called the educational laboratory of Europe. The political constitutions allow great freedom in local action; and in the absence of absorbing external interests, the administrative talents of the able men and women have been given to education.

The features which appeared to the Commission to shed most light on the problems of Canada are the only ones which are dealt with in this Report. These have been arranged as follows:—

Chapter LV: Information from Three Authorities—Dr. Fr. Fritschi, Sir Robert L. Morant, and Dr. John Seath.

Chapter LVI: Elementary Education for Industrial Purposes.
- Section 1. Primary School Course in the Canton of Vaud.
- Section 2. Manual Training in Switzerland.
- Section 3. A Typical Vocational School at Geneva.
- Section 4. Continuation Schools.
- Section 5. Schools for Teaching Trades to Apprentices.

Chapter LVII: Regarding Apprenticeship.
- Section 1. Apprenticeship Law of the Canton of Zurich.
- Section 2. Copy of Apprenticeship Agreement.
- Section 3. Programme of Examination for Carpenters and Joiners.
- Section 4. Programme of Course and Apprenticeship Examination for Milliners.

Chapter LVIII: Secondary Education for Industrial Purposes.
- Section 1. A Typical Cantonal Secondary School at Zurich.
- Section 2. Industrial Art School at Zurich.
- Section 3. Industrial Art School at Geneva.
- Section 4. Technikum at Winterthur.
- Section 5. Technikum at Bienne.
- Section 6. Federal Polytechnic School at Zurich.

CHAPTER LV: INFORMATION FROM THREE AUTHORITIES.

SECTION I: FROM "CONVERSATIONS" WITH DR. FR. FRITSCHI.

The Commission had the advantage of "Conversations" with Dr. Fr. Fritschi, who is a member of the National Parliament. He has won for himself more than national renown through his interest in and knowledge of Education.

Among other questions upon which Dr. Fritschi gave the Commission information, of immediate value in helping the members to understand the educational situation in Switzerland, were the following.

More Practical Training.

During the past three or four years there has been a marked improvement in favor of more handwork in the Primary Schools. Formerly the boys had optional handwork on Saturday afternoons. During the past 10 years, any Commune that wished to do so could make Manual Training compulsory for the 7th and 8th years in the Elementary Schools. More and more the teachers are endeavoring to put this handwork into correlation with the ordinary subjects of instruction from the very beginning of the school experiences.

In Dr. Fritschi's opinion the chief further need in Switzerland, in the matter of education, is that of better Continuation Schools.

Health and Welfare.

The school authorities take care that the eyes and teeth of the children are looked after. Every child attending school is examined by a medical officer. Any who are found to have defective hearing or sight are examined by a specialist, who then indicates how the child should be treated. In the case of a family being too poor to provide the treatment recommended, that is provided by the school authorities. When asked whether there was any tendency on the part of the people to impose on the school authorities on account of this, Dr. Fritschi said that perhaps one or two in a hundred might abuse the opportunity and privilege, but as a rule they did not.

Supervision and Inspection by Federal Authorities.

The Federal Government grants considerable sums to the Communes to assist them in the provision and maintenance of Primary Education. The only supervision it exercises in that respect is to examine the accounts to make sure that the money was spent for the purpose for which it was granted.

In connection with the Federal grants to Commercial, Industrial and Technical Schools, the Federal authorities go further. They send an inspector to examine the school and the quality of the work which is being done. If they are not then satisfied, they send a communication to he Local Authority, and if there be occasion to send a second communication, it practically says, "If yo do not show some improvement in the matter reported upon, we shall be compelled to withhold the grant."

They do not exercise any control in the appointment of the staff, and do not set any standard of qualifications for the teachers. They consider that the Local Authorities, who engage the teachers for vocational work, will do their best to obtain the best men. However, if any instructor is found to be inferior, the Federal Inspector would doubtless say to the Local Authority "If there is not improvement you must change your instructor, or your standard, or your regulations."

Conditions of Living.

Dr. Fritschi attaches a good deal of importance to the advantages to the State, as well as to the individuals, from having workmen live where they can have gardens and places of their own for suitable recreation and rest. The best conditions prevail in those parts of Switzerland where the workingmen live in their own homes and have gardens to look after and care for. The nearer the conditions of town life can approach to those of the agricultural people, the better, in his opinion, would it be for the State as well as for the individual citizens. In that way the development of small industrial towns, and the provision of easy and cheap transportation to suburbs would minister to permanent industrial success.

SECTION 2: FROM SIR ROBERT L. MORANT'S REPORT.

The following extracts are quoted from the report by Sir Robert L. Morant, formerly Secretary of the Board of Education in England, on "The Complete Organization of National Education of all Grades as Practised in Switzerland":—

Service of the Best Men.

Thus it has happened under these Swiss conditions that for some half a century every Canton has kept its best men engaged in thinking out on the spot and working out, for his own benefit as much as for his neighbors', a Cantonal supply of schools *of every grade* forming an organized scheme of public education, complete in every stage, adequate for the needs of the whole Canton, and within the reach of every corner of the Canton—a scheme which shall be really complete and really organic in every point of structure, material and design, and of a character and a scope directly suitable to and complete in itself for the requirements of his Canton.

Local Freedom and Central Control.

Two points then have specially to be realized in the Swiss system of authorities, (a) *the complete freedom of every locality*, even of every parish and commune, to rate itself and to spend *its own money* as freely as it pleases on educational provision of all kinds (an arrangement which is only what one would expect in a thoroughly democratic country, where the commune has for so long been the centre, the energy point, of all social development), but at the same time (b) *the absolute control by the Central Authority* as regards the general educational lines which every State-aided School (and practically every school is State-aided) shall follow. This control is considered in Switzerland to be of the very essence of rational democratic government; it is recognized as a political and social axiom in every Canton, and finds expression in the general conditions as to curriculum, age limits, etc., which attach to all Central grants (other than Federal). As these grants are made in varying proportions to each and every grade of the public schools, and alone render their prosperity, sometimes their very existence, possible, they at once provide an absolutely effectual leverage for Central control, and for securing the due observance of those general conditions under which the school is established, maintained and recognized.

Control by Knowledge.

The Swiss, in fact, feel very strongly that this Central control is the very first essential to the permanent existence of a democratic state in competition with the highly organized and skilfully directed forces of the more despotically governed countries; and that, without this 'control by knowledge' in the sphere of public education *of all grades* just as in other spheres of national life, a democratic state must inevitably be beaten in the international struggle for existence, conquered from without by the force of the concentrated directing brain power of competing nations, and shattered from within by the centrifugal forces of her own people's unrestrained individualism.

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In every respect, in fact, both local initiative and central guidance and control are alike preserved, and one certainly feels in every part of the Canton how the educational experience of the whole as concentrated in the Central Authority, and the needs of the whole as therein interpreted and safeguarded continually permeate through every portion of the system as locally administered.

SECTION 3: FROM DR. JOHN SEATH'S REPORT.

The following information is quoted from the Report on *Education for Industrial Purposes* by Dr. John Seath:—

LOCAL CONTROL.

The committees in charge of the trade schools are composed of the chairman or some other member of the local school committee and representatives of the various trades—employers and workmen—and of those who understand and take an interest in trade education.

ATTITUDE OF LABOR ORGANIZATIONS.

The labor organizations generally look with great favor upon the trade schools. They are continually asking for them, and desire that they shall be free. Indeed, so well disposed have they been that, recognizing the effects of unskilled competition with the skilled workmen of France and Germany, some of the trade unions have established such schools themselves, and maintain them out of their own funds, with the aid of a cantonal grant.

QUALIFICATION OF TEACHERS.

More and more the expert (the engineer, the architect, the gardener, the painter, etc.), has charge of the industrial subjects. In the smaller centres of population where no trade teachers are available, the elementary or secondary school teachers still go on teaching arithmetic, technical drawing, mechanics, physics, etc.; but such teachers are fast being replaced by experts. At present also the State is endeavoring to give the men with practical experience some training in pedagogical method. In 1885, the Department of Industry and Agriculture established special classes for teachers in the Technicum at Winterthur to prepare them to teach technical work, especially drawing. Diplomas are granted each year on an examination. One-third of the expenditure is defrayed by the Federal Government and the classes receive encouragement in other ways. The professional training is of two kinds: practical men (engineers, architects, etc.) are trained as teachers, and teachers are taught the practical work of the various trades.

CLASSES OF SCHOOLS.

The special provision for industrial and technical education is as follows:

Industrial Drawing Schools, Industrial Continuation Schools, Handicraft Schools and Trade Courses, Housekeeping and Domestic Science Schools, Trade and Apprentice Schools, Industrial Art Schools, Secondary Technical Schools, Technical Colleges, Industrial Museums.

Industrial Drawing Schools.—The Industrial Drawing Schools provide, for the smaller towns, classes in freehand and mechanical drawing, and in color-work and designing.

Industrial Continuation Schools.—Of the Industrial Continuation Schools about 200 are for both men and women; they are a special class of the continuation schools already described. They provide for the different handicrafts and trades, and are compulsory in some cantons, optional in others. At first they were held in the evenings; but, since the new law for apprentices, they have been held generally in the daytime.

Handicraft Schools and Trade Courses.—The Handicraft Schools and Trade Courses are of a higher grade than the preceding, and aim at extending the knowledge of those engaged in trade. The courses, which include work-shop training, cover from two to three years. The Arts and Crafts Schools at Zurich and Berne are examples.

Housekeeping and Domestic Science Schools.—The Domestic Science Schools provide instruction for domestic servants as well as for future house mistresses. For the purpose of training teachers for these courses the Federal Government assists with grants three schools with courses of from six to eighteen months.

Trade and Apprentice Schools.—The Trade and Apprentice Schools provide a thorough training in trades for ambitious workmen, and are of a higher class than the Handicraft Schools and Trade Courses. The Silk Weaving School at Zurich and the Watch-making School at Bienne are examples.

Industrial Art Schools.—The object of the Industrial Art Schools, which are of a higher type than the Industrial Drawing Courses of the smaller towns, is to improve industrial workers, and especially designers on the art side of their crafts. Of these there are only a few special schools—at Zurich, Berne, Geneva, and Bâle. Instruction in Applied Art is also a regular part of the course in the other industrial schools.

Secondary Technical Schools.—The Secondary Technical Schools are of a higher grade than any of the preceding and are intermediate between the ordinary trade school and the polytechnic. They are often called Technicums and correspond to the German institutions of the same name. The first Technicum in Switzerland was founded at Winterthur, near Berne. There are also Technicums at Geneva, Bienne, Burgdorf, and Fribourg, and a movement is on foot to establish one at Lucerne. The Technicum I saw was at Bienne.

Technical Colleges.—The chief of the Technical Colleges, and a famous college it is, is the Polytechnic at Zurich, maintained by the Federal Government.

Industrial Museums.—Industrial Museums are provided in a few of the larger towns; as, for example, in Berne and Zurich. Such museums appear to me to be a most commendable feature of the system. They are intended to acquaint the teacher and general public with the suggestive features of the progress of industry and industrial education. They contain plans for school buildings, specimens of school furniture and other equipment, samples of industrial work, and a large collection of educational literature.

Entrance tests.—The minimum age for admission to the industrial schools is fourteen. In some schools no examination is required, but the applicant must show that he possesses at least an elementary education, and that, after a period of trial, he is able to go on with the work. For admission to a Technicum two years' or more previous practical trade work is usually required.

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ATTENDANCE AT INDUSTRIAL SCHOOLS.

Besides 2,470 compulsory and 237 voluntary Continuation Schools, providing for a general education and attended by both boys and girls, there were in 1908 special vocational schools, as follows:

I. For Primary Education—
328 Industrial and Drawing Schools, with 19,884 boys and 4,829 girls.
95 Commercial Schools, with 10,981 boys and 2,195 girls.
11 Agricultural Schools, with 221 pupils.
496 Schools for Domestic Science, with 12,704 girls.

II. For Secondary Education—
5 Technical Schools, with 2,010 pupils.
17 Industrial Schools, with 4,952 pupils.
16 Watchmakers' and Mechanicians' Schools, with 1,236 pupils.
9 Textile Schools, with 546 pupils.
6 Woodworkers' and allied trade schools, with 155 pupils.
32 Commercial High Schools, with 4,610 pupils.
13 Agricultural Schools, with 1,131 pupils.
47 Domestic Science Schools for women, with 7,466 students.

III. For Higher Education—
The Polytechnicum at Zurich has 2,519 students, 515 of whom are foreigners.
Five Cantonal Universities, three with four academic faculties and two with three.

CHAPTER LVI: ELEMENTARY EDUCATION FOR INDUSTRIAL PURPOSES.

SECTION 1: INSTRUCTIONS TO TEACHERS REGARDING PRIMARY SCHOOL COURSE IN CANTON VAUD.

The principle of concentration is to be followed in primary teaching, and lessons related to each other should be so taught. Thus, if history has been taught to the children through local geography, this branch can easily be begun in the intermediate grade. If geometry has been prepared for by drawing, civics by history, these subjects will not prove so difficult. Whilst the unity of each branch is to be preserved, that of the entire programme is not to be overlooked. The Committee is of opinion that this is the best means of counteracting the accumulation of subjects and the overcrowding of programmes.

Starting from the principle that the knowledge of *things* precedes the knowledge of words, natural groups have been formed of the subjects. First come the branches which study *Nature*, such as geography, object lessons and natural science. Man lives in an environment of phenomena and natural things which meet his eye every day; thus he should study and understand this Nature which surrounds him everywhere. Then he should be interested in his own existence and that of his fellows; history and civics teach him to know *man* in all ages. After this, arithmetic, geometry, drawing and manual training acquaint him with *form* and *number*. His mother tongue teaches him by writing, the *names* of things; he learns to speak, to read and to write. Then follow the *artistic* branches, singing and gymnastics, and finally, Bible history, which speaks to the child of God. Thus are the different groups formed among the subjects deemed indispensable.

Now, all these branches can be correlated; all that have any re'ation among themselves should be mutually helpful. Thus arithmetic will take many of its problems from history, geography and natural science; drawing models can be chosen from Nature; the mother tongue will be related to all branches. This method is the most successful for attaining the end aimed at.

The order of the lesson is on psychological lines, from the concrete to the abstract. The primary school, in fact, should be purely educative, that is to say, it must not consider the communication of knowledge as its first duty. Instruction is only a part of education, an essential part, no doubt, but not the whole. The teacher should aim at the formation of character and sterling moral qualities. He should also be careful to adapt his lesson to the capacities of his pupils, so that they may derive the greatest benefit from it.

INFANT SCHOOLS.

The aim of the infant school is to prepare the children for the primary school course, and not to give it to them prematurely. The child should be taught to observe, compare, judge, to love work and neatness, to cultivate good habits, to open his heart to all good feelings; this is the true programme and sole *raison d'être* o: the infant school.

As to *method*, the only suitable method is the intuitive one, and lessons must be in the form of talks or games. The infant school should be a gentle transition from the family to the school.

Object Lessons are given to develop the sense and spirit of observation, and should be designed to attract the child's attention to the world about him, animals, plants, natural phenomena, common objects, etc. The *manual exercises* of Frœbel take a large place in the course, and serve to train the hand and eye.

Drawing.—This subject, carefully prepared for by most of the foregoing exercises, especially those with sticks, consists in combinations of straight lines on lined paper, producing either small ornamental motifs, ordinary objects, or even attempts to draw from nature. These efforts will often be very immature; but the aim of the infant school is to not produce artists but rather to teach the child to appreciate the significance and value of lines, and enable him to recognize them in the object, and to exert himself to reproduce what he sees. Thus the inclusion of *inventive drawing* on the programme is not so pretentious or impossible as some suppose. This comprises ornamental subjects—borders, rosettes, stars, etc.—carried out with the sticks, square, triangle, etc., or directly on paper with pencil. In all the Frœbel exercises the child is left free, for he can early be taught, and should be so taught, to realise his own ideas and use his own initiative. All that the teacher has to do is to guide the children's imaginations and initiate them gradually into the law of symmetry and harmonious combinations. Here we have the means of educating the senses, of exercising the power of observation and reasoning, both subjects which have been too much neglected. The modern infant school does not exclude the old subjects of reading and arithmetic, but they are not its principal subjects, and are only i troduced as a *means of development*.

Language.—In the lower division, the teaching of language cannot be a set subject, but all the lessons should aim at helping the child to express itself clearly. Reading should not be begun until the child has learnt to distinguish *words* in speech, and that each represents a particular idea; then to dissect these words into their phonetic elements—syllables, sounds and articulation. The teacher must miss no chance of making this study attractive, for she is dealing here with abstract things and conventional signs which have in themselves no interest for the child. It is wiser to delay this instruction until the child has developed sufficiently to allow him to find some pleasure in this kind of mental gymnastics.

Writing, prepared for by drawing, should run parallel with reading as far as possible.

Arithmetic does not offer as many difficulties as reading. The child has an innate tendency to count objects. Also, number plays a great part in the Frœbelian exercises, and these exercises can easily be combined so as to teach the first six numbers. When a child *knows* a number, he can be made to do exercises—with objects in front of him—in dividing and reconstituting, and finally calculations of the four first rules with these numbers. Here, as with reading, it is necessary to go slowly. Written work will never be anything but the reproduction of oral arithmetic, and figures should not be written till nearly the end of the second year.

FIRST GROUP—GENERAL PRINCIPLES.

The three Rs, together with religious instruction, long comprised the whole primary programme, but as social needs increased, new branches were added—such as geography, history and natural science, and the artistic branches were included. Undoubtedly the mother tongue and arithmetic are subjects of which no one could dispute the value, but there are things even more important, viz., the formation of mind and heart, habits, intelligence and morality, which every child must acquire, and which every good teacher should give him. With the growth of this conviction, education has displaced instruction; instead of furnishing the mind, it aims to form it. Thus the change of aim has involved a change of means; memory no longer is the first faculty, because observation, reasoning, personal activity, are needed. The mind of the child is rather to be transformed by personal work than formed by carefully arranged instruction.

In order to have personal work on the part of the pupil, he must be impelled to it by some interest; without interest there is no free activity, no self-education, no development of will. Thus the things presented to the chi d must awaken in him an interest sufficient to impel him to work himself, without compulsion, and all teachers know well enough that it is not letters or figures which interest the child at first; it is what he sees around him—animals and people. He likes to talk and think about what he sees at school, at home, in the town or village where he lives, of what he has noticed in his walks or travels, of the actions of people amongst whom he lives or whom he has learnt to know through stories. All that teaching has to do is to develop these tendencies, to guide his first observations, to excite comparisons, to present historical or fictitious stories by means of which the child can become acquainted with characters and actions which he afterwards has to judge.

It is not language or arithmetic which should occupy the first place in elementary teaching, but rather the branches which aim to give the child ideas about the people amongst whom he lives; geography (local and general), natural science, national and Bible history. This does not mean, however, that these subjects are to be taken to the exclusion or detriment of the other, more difficult ones, whose acquisition is equally valuable, as language, drawing and arithmetic. It merely means that those subjects which furnish the ideas should come before those which only serve to give expression to those ideas; that is to say, that in reading, composition, arithmetic, drawing, the notions already acquired by the child are put in action.

Geography.

This is above all a concrete science, the processes of which are based entirely on intuition; that is why it is the first which we present to the child. From the moment he begins to observe objects around him, he begins to learn local geography. This is made the basis for the first two years, and furnishes the subjects of object lessons, language exercises and arithmetic and drawing models. But in order to do this it must be physical geography, not political. Geography must work outwards, from the near to the distant, from the village to the canton, to Switzerland, and finally in the 3rd year to the surrounding countries. In a primary school, emphasis should be given to home geography, and there will not be time to give more than a general outline of other countries.

Object Lessons and Natural Science.

This should be placed along with geography, and include simple object lessons and elementary chemistry and physics. These two subjects both aim to show nature to the child, and therefore should not be separated. This lesson should keep within the scope of the child's home, and teach him to know and love the people and places among which he lives. The study of nature develops observation and judgment and encourages the growth of moral sentiment, besides giving the child a certain amount of practical knowledge which will be useful to him later on, either as a means of preserving health, choosing a vocation, or directing his conduct on given occasions. Further, it excites keen interest, so that all this development is quite painless, through the free and happy activity of the pupil. Few subjects have a greater educative value, and yet they have been very much neglected, being always considered as accessories, and it has been suggested to omit them or combine them with the language lesson.

Whilst on the one hand the natural science lessons were curtailed, object lessons were brought to the front, which are nothing but elementary natural history lessons, and agriculture and manual training were demanded for country schools, in order, it was said, to better prepare the children for their future occupations, to give them more practical science, to bring the school and home into closer relation. But these two branches are nothing but a form of natural science, and better still would be an elementary form of nature study, rationally organized, to give children the knowledge of ordinary things which they now lack. As a matter of fact, natural history had not been banished from the programme as it appeared, and the time had come to extend the scope of this subject.

In the 2nd half of the 19th century science made wonderful progress. Teachers of zoology and botany had to revise their methods, and the results have been such that the human spirit has had to readjust itself. The discoveries in physics and chemistry, whilst completely changing industrial processes, had a similar result. The naturalists of last century and the beginning of this aimed above all at a rational classification of creatures according to their morphological characteristics; nowadays, we strive to find the laws of life. Classification takes the second place today, and gives way to the influence of environment, nourishment and heredity. It is not possible to take an individual and study him separately; he must be studied in connection with his environment and development.

The present programme is for groups, not for individual subjects, and the study-plan must take this into account. Thus it gives for each year a certain number of general subjects—the field, forest, etc., which are to be studied by the pupils in excursions and subsequently discussed in class. From these general subjects, types will be selected for more detailed treatment, to complete the general idea in the child's mind from his personal observations. Subjects may be selected to suit local requirements, the important point being not the subject, but the method of study.

The subjects named will do for lower and middle grades. In the higher grade the subject should be treated in a more utilitarian manner, for the child will soon go into active life, and we do not want him to feel too strange; thus the same subjects are taken over again from an essentially agricultural standpoint with country pupils, and in an elementary manner.

During this period, town children will take up the subjects that concern them most, viz., industries. The lessons will consist of visits to workshops, and talks on what has been seen, rather than in abstract dissertations on the industries. Some subjects, such as physiology, hygiene and ordinary chemistry, are given to both classes of children, and only the most elementary notions, such as are required in everyday life, are to be touched upon in an elementary course. In the third year, a certain number of subjects are arranged; such as food, drink, clothing, etc., which have more bearing on domestic economy than on natural history, but from the hygienic point of view they are important for all boys and girls, and must be treated by the teacher as he thinks best for local requirements.

History and Civics.

Whilst geography and science essentially consist in the knowledge of *things*, history deals with *people*. In a primary course there is not time for more than an outline sketch, and the more important events. The history lessons should be the school of civics, and the child should learn from his own observation, and reasoning from past to present.

SECOND GROUP—ARITHMETIC, GEOMETRY AND ACCOUNTING.

Aim and Importance.—Arithmetic is valuable for everyday life, but also as an *educative factor*, developing attention, judgment, reasoning, habits of order and precision. One has said:—"By good teaching in arithmetic one learns prompt observation, principles judiciously ordered, punctuality, order and accuracy. The pupil's will is strengthened, for he learns to base his activity on well-defined rules, and must use energy and perseverance to find the solution of problems. The teaching of arithmetic therefore has a high moral influence."

Arrangement.—The programme of the lower grade is based on the importance of the numbers from 1 to 10. Some may think the first year's work too restricted and not varied enough, but those who know that it takes time to give young children clear and definite notions of the first numbers will not agree with that. They must become so familiar with the elements that their replies are always prompt and correct. Once a pupil is sure of 1 to 10, and then 10 to 20, future work becomes easy. But this basis will not be safe unless it is founded on intuition. We must distinguish between what is comprised in the child's knowledge and the material adopted to facilitate the transition from concrete to abstract. Every lesson must begin with something familiar to the child; pens, pencil, boxes, books, etc. Calculations made on these concrete subjects are reproduced with the aid of the balls or similar apparatus. At first, the written work will consist in representing the quantities studied by easy signs, such as dots, crosses, circles, etc. Not until the child has attained a certain degree of facility in writing should he be taught the figures.

The first exercises can be done with the material to hand, ruler, box, pencils, books. Then we take the school furniture. It is as well to prepare sticks of various lengths from ½ to 2½ decimetres, which can be used for a great many exercises and contribute largely to the development of the eye.

Multiplication and division are not taken till the second year, and it is here that the multiplication table is learnt. This is done by making the series in the order indicated on the programme, and always beginning with concrete numbers. For division, in this year, we confine ourselves to measuring.

Written work is but a reproduction of the oral work in this grade, and simply means that the child has acquired the habit of arranging the numbers belonging to each problem on the same line. Not until the intermediate grade do we begin special processes of written arithmetic. The pupil should be taught to use simplifications as soon as he is sufficiently familiar with each new rule. Above all, sums must not be worked with numbers of which the pupil does not know the meaning. His own environment is an inexhaustible mine for elementary quantities. It suffices to mention:—objects belonging to the child, distance walked, distance between two points, dimensions of familiar houses and places, price of goods used daily, etc. It is important to remember that a perfect knowledge of the four first rules within the numbers 1 to 100 is absolutely necessary in teaching arithmetic, for it is thus that a familiar knowledge of the properties of numbers is gained; besides which, the products of these numbers are the most commonly met with.

The first lessons on decimal fractions present few difficulties if taught on the basis of the litre, decilitre, franc and centime, metre and millimetre, etc., for numbers of one to three decimals. Elementary fractions are begun from the first year of the intermediate grade. As arithmetic should bear only on ordinary fractions, pupils can soon be taught these same quantities, a knowledge which will be most useful in helping them on with other problems.

Geometry and Accounting.—These are to be incorporated with arithmetic. They are the branches to which the trunk supplies strength and life. Their extension must depend on local conditions and the organization of the class. In mixed schools, for example, the boys will have more difficult problems while the girls do needlework. The chief aim should be to increase their skill and aptitude for careful work. Not until the higher grade will special problems be given, such as calculation of cubes, levels, and practical exercises. But the distinction must not be carried too far, for some knowledge of geometry is very useful to girls also.

Method.—From the concrete to the abstract. Begin with oral work, followed naturally by written. When the child has arrived at the first stage, when he can use common numbers with certainty and rapidity, our arithmetic lesson will have fulfilled its object. For it may be truly said that while a child easily learns arithmetic, our people are not arithmeticians. Above all, exercises must be practical, according to local conditions, and correlated with the home life, and with other lessons. This does not mean—as has been supposed—that arithmetic is to be considered as a means to instil into the child's mind certain information on domestic economy, agriculture or industry, but rather to impress on the memory useful applications.

Directions and general principles.

1. Every lesson based on intuition.
2. Rules not given by teacher, but found by pupils with the help of concrete and abstract graded exercises.
3. Oral arithmetic to prepare for written. Not until the intermediate grade should special processes of written arithmetic be begun.
4. In all grades, arithmetic is to be an exercise of intelligence and not of mechanical application of rules or principles. Pupils are to be practised in rapidly finding simplifications which can be used, according to the nature of the numbers to be related.
5. As far as possible, arithmetic is to be correlated with the other subjects of the curriculum.

Drawing.

It is admitted to-day that Drawing is the oldest manifestation of human thought and expression. Humanity expressed itself in Drawing before evolving the marvellous and complicated procedure of writing. The child obeys the same instinct; his drawing is but a kind of language by means of which he tries to make his impressions known by schematic lines having all the characteristics of symbol. It is thus a necessity common to all. Man finds manifold advantages in translating his impressions thus; not only does he preserve the picture of what strikes him and communicate it to others, but he develops in himself by the use of Drawing the most noble faculties of art and taste. Drawing should thus be considered a kind of sixth sense, which must not be atrophied, in view of the place held in the labors of humanity by the professions of Drawing and Arts. Unfortunately the methods in use do not always take sufficiently into account child psychology; they do not develop taste or initiative, and do not impress upon the general public, indifferent or hostile, the immense importance of Drawing, the universality of its applications, and its important part in the general work of education.

Drawing Method in Infant Schools.—

The real scientific teaching of Drawing cannot be begun till 10 or 12 years of age, when a certain maturity of mind permits the child to grasp the abstractions of geometry and measurement; but it often happens that at this stage of its school life the child loses interest in this lesson, and *endures* it rather than profits from it. Therefore the previous preparation is most important, as it assumes responsibility for the future. It is important that the tiniest children should preserve their joy in what they do; the education of this period should stimulate growth and develop the graphic power of the child. Finally, it is most important that the child, having retained all his love of Drawing, should embark resolutely, eager for novelty and knowledge, on the more serious lessons of the primary school. From the very beginning children should be given artistic culture, elementary and proper to their age, but integral. This develops all the essential qualities at the same time. It is in the infant school that the child's mind and taste are formed; it is the nursery from which we gather young plants ready to develop and bear fruit in the hands of understanding and observant teachers. The infant school should let the child speak its natural idiom, freely, without constraint, in all its naïveté. Pedagogy only intervenes to guide discreetly, by appropriate but always varied and attractive exercises, the education of hand and eye. Models must be taken direct from nature, from things and sights familiar to the child—in fact, anything that excites initiative and spontaneous activity. If the sphere of the child is play, as the old philosopher said, let us guide nature to science by instruction which amuses, interests and makes him love Drawing. It is by taking the child as he is, not as we would like him to be, that we can build up a rational education, fruitful in its result.

Drawing in Primary Schools.—

Bring the child in contact with nature, teach him early to know and love the beautiful flower world, where so many simple forms are within his capacity; put familiar objects before him which can, if logically executed, furnish him with fascinating models—that is the first aim of the teacher, and that also is the synthesis of the programme of the primary school, so that the child's Drawing may "reflect in its effects the world in which we live". Flowers and vegetables in themselves can furnish a whole course, and the smaller and humbler ones are by no means the worst models. To these can be added insects indigenous to our country, and then all animate and inanimate nature. In all these exercises the pupil is to seek the physiognomy and measure of things, which is the basis of all copying from nature. We do not go much into the æsthetic side in primary schools. It is not necessary to state that Drawing does not only lead to becoming an artist. Do not let us go back to our grandfathers' ideas that Drawing is an *accomplishment*, whereas it is really the surest means and prime process for teaching observation, inspiring reflection and exercising the analytic spirit.

About the middle of the higher grade, perspective should be introduced. This new study, also based on observation, should be accessible to all. The study of angles previously made will help towards the appreciation of the receding lines of a geometrical solid or simple box. The proportions of the object-model do the rest. But some elementary laws are necessary for the means of control to strengthen the work of the pupil and make it easier for him.

Do not let us forget *color* or *memory drawing*, or *decorative composition*, and let us give a place to *muscular exercises*. Finally, the utilitarian side of geometry and linear Drawing takes its place towards the end of the primary school. A pupil destined for a trade where he absolutely needs to trace plans or elevations or rough sketches, makes his first attempts in that line with scale drawings of familiar objects in the school room, and scientific drawing is allied with plastic design, but without excluding the former. General education requires both modes of teaching.

General Directions for Teaching Drawing.—

In the primary school the teaching of Drawing should be collective in all grades, as regards the instructions given by the teacher. The models can be varied to suit individual cases. The same model can be used for a whole class, to be treated individually according to capacity. There should be no restriction of materials, and no compulsion in nature-copying; convention does not really exist, and is only required for geometrical Drawing. Higher grade pupils should do sketches. Drawing requires a sure eye, and this is not acquired quickly, but can be attained by truthfulness of analysis. Dividing lines by means of strips of paper should be forbidden. On the other hand, in *decorative composition*, which is primarily an exercise of *taste*, the processes used in the industrial arts may be employed, e.g. geometrical aids to accuracy such as compasses, square, etc. The aim being to obtain a satisfactory arrangement, this should be helped by every possible means.

Manual Work.

The law of public instruction includes manual work, and orders it to be taught by the regular teacher. It cannot therefore be classified in a syllabus. In spite of opposition, manual work continues to make progress, and wherever it has been introduced, the results have been excellent. It fulfils a double aim;—(*a*) to give scope in a rational manner to the love of movement; (*b*) to furnish a concrete foundation for certain subjects. Up to the present, the book has monopolized the school and instruction has been too theoretical. The social questions of our times are different to those of half a century ago, and those who make up the time tables of today have to think more than their predecessors of the future of the child. For the prosperity of a country does not only depend on those who are able to clearly and correctly express their views, or on those who are able to buy and sell successfully, but rather on those who convert raw materials into produce of all kinds. Now, it is most important that the intelligence of the workman should not be annihilated by mechanical work. Even better organised apprenticeship will not achieve an adequate result if the school, by its educative influence, does not lead the child not only by words, but by actions, to appreciate the beauty, the joy and the salutary effect of manual labor.

Complaint is made of the number of hours given to gymnastics, and rightly so. Well, manual work is gymnastics. It even corresponds perfectly with the modern idea regarding the teaching of the latter, that the child must not resemble an automaton, but preserve a liberty of movement within the limits of necessary order. To alternate physical and mental work can only have a favorable effect upon the latter; besides which, if we really want to travel from the concrete to the abstract, manual work furnishes the most useful material, for example, for arithmetic and drawing. The pupil who has constructed a cube —which does not take very long—will have a better idea of the measurement of volume; he will speak of it with more assurance than if he just had to look at the same geometrical body with the whole class. And in holding it and turning it round he will acquire an elementary idea of perspective, and will be better able to make a good job of copying the larger model in the drawing lesson. The eye is developed, the use of technical terms becomes easier, the hand, as the old philosopher has it, is really put at the service of the mind.

It is feared that manual work will encroach on the other subjects, and no doubt this is a real danger, and the teacher must be careful to keep it within proper bounds. One thing must be kept in mind, even in the cities, and that is, that manual work cannot be really profitable at school unless taught by the same man as the other branches. Otherwise, it becomes a preliminary apprenticeship training, and in such case should be excluded from the programme of the primary school.

In the country, the establishment of a school garden is of great importance, not so much to initiate pupils into agricultural work which, is already familiar to them, but rather to make them understand the phenomena of vegetation, which they so often regard indifferently, and to have within reach of the school a source of useful information for all the pupils.

Reading.

In the lower grade, intuition is the basis of language lessons. The Reading course does not begin until a preparatory study has been gone through which exercises the child in distinguishing rapidly and correctly the phonetic elements of words and terms. With the Reading is combined Writing, which here is pure imitation. It is important that the child should read nothing which he does not understand nor write anything which he cannot read. Composition is so complicated that we cannot demand it of young children. In the lower grade, it should be of a very simple character, beginning with lists of words from a previous lesson. Later on, exercises should be based on analogy rather than reasoning.

The Reading lesson aims not only at accustoming the child to correct and good diction, but above all at teaching him to think of what he is reading. He will learn to look for the leading idea of a subject, and to develop it. He is also to be asked to express opinions, which may be written down. Pieces for recitation should be short. Not until the intermediate grade do we begin the methodical study of the sentence. From this point on, intuition becomes less prominent and the book takes a larger place. The foregoing is the progressive and natural method, by which the language is really taught.

Writing.

Although the vertical style is now approved by doctors, the result of experiments has been that it was found best to return to the slanting style, but with due regard to health. For the two lower classes we approve the vertical style, because it makes children form the letters more clearly and legibly. After that, it is left to the individual child.

Singing.

This can be correlated with other lessons—language, science, national history and religious instruction. The ideas most easily assimilated by the children are just those which are found in a song which they know, and the song can be used to refresh and vivify the lesson.

Needlework.

Collective and intuitive method. All the pupils of one class are to do the same work. General preliminary explanation of materials, dimensions, proportions, etc., by means of blackboard sketches, work done by the teachers before the class, patterns cut by children, large needles and coarse wool for knitting, knitted articles to show darning, etc., etc.

A model of the object to be made should always be before the pupils. Theory will be applied to useful objects, simply and tastefully made. After a while pupils may prepare their own work. Their power of observation is to be developed, also order, neatness, economy, dexterity and taste. Pupils must learn to find and repair their own mistakes, only accidents being adjusted by the teacher. In three-grade classes, groups may be formed, working in rotation. For the cutting-out lesson of the final year, the teacher will take one of the girls, take her measure, and draw the pattern on the blackboard, for the girls to reproduce on their paper—this is the pattern from which the garment is cut, and is to be copied into a book, with notes of measurements, etc. Each girl is to have a second piece of work for odd moments, which may be recreative as well as instructive, and easy enough not to require the teacher's help. In the lower grade it can be a piece of stuff on which the girls can practise stitches learnt, button-holes, etc.; in the upper classes pieces for trimmings, lace crochet, etc., or stocking-knitting.

Domestic Economy.

This course only includes the subjects specially related to women's activities, the others being included in the natural science lesson. It must be taught by a lady, either a special teacher or the needlework teacher, but not combined with the needlework lesson, so that it must have a special place on the time-table.

SECTION 2: MANUAL TRAINING IN SWITZERLAND.*

Need and Value of Manual Training.

Manual Training is the oldest means of education—for centuries it was the only means. It is recognised that all children under school age get training by means of play and occupations, but as soon as they go to school their physical

*Translated from "Guide to Manual Training Teachers", published by Zurich Society for Boys' Handwork.

development is surbordinated to mental. 2 hours drill a week is not enough outlet for the child's innate love of movement, and only the introduction of Manual Training in the curriculum of primary schools provides a natural method. Clay modeling, folding and cutting paper and cardboard, working wood and metal, are exercises which appeal to the child's inmost self, and not until these exercises are introduced into the school will the education of youth be harmonious in method.

The special value of Manual Training is its influence on the formation of character. Educative Manual Training for boys has no connection with any intention of preparing for a trade; hence no machinery is used; only the ordinary tools of the manual worker may be employed. The mere fact of learning to use the tools which are found in every household gives a certainty of hand which is useful to everybody, whatever his occupation. The handling of the principal raw materials such as wood, iron, clay and paper, leads to a number of technical and verbal conceptions. The combinations of colored paper, the decoration of simple objects, and the adaptation of form to purpose, cultivate the sense of *beauty*. Such work in itself is a training in *order* and *exactness*, and careful observation; and these are acquirements which are of the greatest value.

Development of Power.

The crown of the work, however, is the inner satisfaction, a pure, moral joy, known to every boy who takes Manual Training. The conciousness: "I made that, and can make it again" gives him moral force; for he notices that there is a power in his hand which is useful to him and which will help him through life. Purely mental development can never call out this power; in fact, it leads to the conception that mental work only is worthy of man; it takes no account of manual work. That is wrong. Technical work should be put on the same plane with mental, and receive the same recognition. Manual work, as well as mental work, ennobles the soul, and each supplements the other and deserves equal honor.

The Key to Children's Souls.

But further—though it may seem strange to some that handwork develops the mind, this is so. It may even be said that only handwork is the key to some children's souls. As long as the child's body is growing, purely abstract thinking is hard for it, indeed, for many it is impossible; so that these children are not 'stupid' as is supposed, but are only being overtaxed or wrongly managed. As soon as they are put to work, they show from a new side. Many of the elementary subjects are useful to some children all through life; others, whose strong point is a good memory, lose it all. But if the instruction were based on handwork, if abstract truths in arithmetic, geometry and science subjects were learnt through practical work, the appeal to the mind would be far stronger than by words and explanations. Thus, for example, the comprehension of a scale or a right angle is far more easily acquired through practical work than through explanations.

Completes the Curriculum.

In another direction Manual Training is a completion of the school curriculum. To-day we teach arithmetic, geometry, drawing, but we leave the boy in ignorance as to the use of these things. Handwork shows him how a knowledge of these subjects helps the success of the work, indeed, how necessary it is to it. Incorrect drawings, false calculations, result in bad work. Thus the work is correlated with the lesson and with practical life, pupils being encouraged to apply the knowledge acquired in school by making useful articles, and the practical sense is exercised. Their interest in school work itself is increased, as well as in the manual work. The youth learns that he is gaining knowledge not for the school, but for life, and that what is learnt in school must be applied in life for the good of the community.

To sum up, it is evident that neither more nor less must be demanded for boys than is already given to girls. The old idea that a boy's hand needs less training than a girl's, must go. Communities must see to it when school houses are built, that rooms are provided for boys' handwork, teachers prepared for it, and means for its general introduction encouraged.

The whole aim of handwork demands that it shall have a beneficial effect on health. Therefore all precautions must be taken to ensure this.

The Departments of Manual Training are Cardboard, Carpentering, Metal work, Modeling and Carving, in methodical order and adapted to the pupil's strength.

Cardboard, Carpentering and Iron Work.

Undoubtedly those departments of handwork are to be emphasized in which the pupil has to actually work on the raw material, *e.g.*, where the raw material offers a real resistance to his physical strength, and has to be formed into a particular shape with the aid of tools. These conditions are fulfilled by paper and cardboard work in the lower, and carpentering and iron work in the upper classes.

In all these departments, the neat and exact model should be the beginning of the lesson. This is discussed as regards its form, object and material, instructions being given as to how the shape can be adapted to its purpose. From this model a *working drawing* is made, the necessary measurements being indicated. Where this is omitted, the main object of Manual Training is missed, viz., the correlation of school learning with practical life, or the translation of knowing into doing. The sketch as a rule should only take up a short time, and it is enough if it is sufficiently clear to enable the pupil to construct the article from it. Where time allows, it is recommended to have the object drawn in natural size or to scale on a drawing board, and use this as a working drawing.

Now comes the actual work. First the material must be prepared—then the drawing, which must be exact and careful, if correct work is to result. The teacher should therefore check the drawing and make any suggestions for correction. Incorrect drawings are to be returned, thus accustoming the boys to correct work. Above all things, the use of stencils is to be forbidden. In the first place, the drawing is incorrect; in the second, it prevents the boy from learning the use of certain tools, and instead of exercising his hand and eye, he becomes the slave of the stencil.

The actual work should be taken in short sections, each one being *shown* by the teacher separately. Mere words or suggestions are not sufficient—let him show a little at a time, so that he can keep a check on the work. The work will advance slowly, but the result will be all the better. It is also a good thing to let the pupils repeat the directions given by the teacher, and thus any errors can be explained at once. The pupils will thus learn to set their own work, and execute it satisfactorily. The final aim is not the article as such, but the careful, thoughtful execution of the work which its construction requires.

The Use of Tools.

Tools are an important factor in satisfactory results. Pupils are to be taught their uses and importance, and constantly enjoined to handle them carefully. Especial emphasis is to be laid on the use of the tools and the proper position for holding them, etc. But all this is no use unless the tools are kept in full working order during the whole time, so that good work becomes possible.

Where there are some pupils who get on faster than the rest, the teacher is to insist upon better work, rather than let them do more than the others; and in large classes the teacher may even let them help him in inspecting the work of the other pupils.

Programme of Manual Training Instruction.

A. Cardboard.

Grade 1. Age 10.

1. Sewing books.
2. Folding—hat, bag, envelope.
3. Folding and cutting—envelopes and bookmarks.
4. Cutting with knife—flat models, square basket, hexagonal ditto.
5. Cardboard work—label, plain and covered, map, calendar or picture, frame for picture.

Grade 2. Age 11.

1. Paper work—folder, envelope.
2. Half-cardboard—flat models.
3. Cardboard—time-table, portfolio, prismatic box, box and lid, wall-basket, bag, letter-case, frame for postcards.

Grade 3. Age 12.

1. Paper work—free cutting (picture).
2. Cardboard work—writing pad, book, arms, portfolio, frames.

B. Carpenter's Bench.

Grade 1 Age 13

1. Plain cutting with saw, planing wood, prismatic and round stave, boring, clothes-hanger, key-holder, bench for flowers, washing board, garden stool, bookshelf, simple box.

Grade 2 Age 14.

Table, food-house, cross slats, tool box, key-box, tray.

C. Metal Work.

Grade 1. Age 14.

1. Filing—prism, pointed staff.
2. Boring.
3. Riveting—cross, square, key-holder, photograph holder.
4. Bending—right and obtuse angle; hammer-holder. iron-holder, clothes-horse or hanger.

Grade 2. Age 15.

1. Square in sheet-iron. Key-shield; practice in punching, riveted box, shove fire-irons, tin circle, chased shell, candle-stick.

D. CARVING.

Grade 1. Age 13.

1. Trace-cutting; practice board (both sides), block-holder, mat, towel-holder, block pad, card stand, cabinet frame.
2. Flat cutting—key-holder, hat-holder, pen-tray, dress-hanger.

Grade 2. Age 14.

1. Flat carving—brush-board, frame, box, letter-holder.
2. Relief carving (flat)—letter weight, frame, etc.
3. Chip-carving (straight line)—various articles.

THE PRINCIFLE OF TEACHING.

Lower Grade.

Articles must be taken from familiar objects, either already known or learnt in class. In discussing the kitchen, show a pot, then dwell on various kinds of pots (flower, milk, etc.).

The sense of number, *i.e.* arithmetic, is combined in the first school year with Manual Training, by the use of counters, buttons, rings, etc.

For cultivating technical dexterity of hand and æsthetic sense for form and color, special exercises must be given, especially with colored paper and flat forms.

Middle Grade.

4th to 6th school year (age 8-10)—the scope of activity and the field of observation for the perception of new forms are extended. Here a School Garden is introduced, excursions are made, collections are brought, and handwork in the narrower sense is practised. The School Garden is a class one, consisting of a bed about 1 metre square. Plants are chosen which will be treated in the course of the year (four). The children watch the plants in development and fruition, and give their observations verbally. The educational excursion introduces the child to his home, from the natural history and geographical point of view. The result is seen in pictures exhibited, as "Home Science", "Excursion in the Woods", etc. After the elements of graphic representation have been grasped, relief maps may be made. The innate love of collecting things is utilised by making the children cut out pictures at home, mount them, and then write a few explanatory sentences or impressions on them. The didactic use of handwork is shown in squares, triangles, the æsthetic use in color and form studies; the picture in Manual Training by collections. As to Manual Training and Drawing, only the Manual Training school can show the use of systematized Drawing, for only this gives the opportunity to apply what has been learnt. The pedagogical truth that a child is always asking the why and wherefore can be met to some extent in this work.

Upper Grade.

The same method continued. The experimental garden is dropped; the collections go on, and the excursions include industrial establishments. The actual handwork is extended to wood and iron. A feature is added in the explanatory letters written by the boys. They illustrate their visits to a glass-factory, pottery works, (Swiss minerals), illustrating the course of their development by colored bands (action of water); showing how the Swiss central country grew out of the washing of the Alps, and how the men who lived there learnt to make use of the material in the ground by burning to utilise it (cement, clay, glass, chalk, aluminum, etc.). The boys want to learn about the raw materials and their manufacture, hence the picture, "Iron, its Origin and Manufacture". Further, the cardboard, wood and metal work has been closely correlated with technical drawing; also with geometry, and lastly with freehand drawing, showing how the knowledge acquired in the drawing lesson can be applied in the Manual Training lesson.

SECTION 3: A TYPICAL VOCATIONAL SCHOOL. (Geneva).

ORGANIZATION.

The school is intended for pupils of 13 years of age and upward who have completed the 6th year of the primary school, and wish to take up industrial or commercial pursuits. It prepares particularly for the technical and pedagogic departments of College, the Technikum, the School of Mechanics, the School of Industrial Arts, the School of Watchmaking and the School of Commerce.

The course covers two years and includes:—French and German—composition and correspondence; commercial arithmetic and accounting; elementary mathematics; physical and natural sciences, which are frequently required in industrial work; commercial geography; history and civics; drawing and manual work.

The school year covers 40 to 46 weeks, of 30 to 35 hours weekly.

The school is under the control of the Director of Vocational Instruction.

Staff.

Each class is in charge of a class-master, who takes part of the classes, others being taken by special teachers.

The staff of the school have periodical conferences, presided over by the Director. Attendance is compulsory. The subjects discussed are proposed by the Department, the Director, or one of the members of the staff. Programmes, text-books and rules are discussed before being put into force, decisions made regarding admission by examination, promotions, etc.; and the Director forwards to the Department as soon as possible a copy of the minutes of each meeting.

Methods of Instruction.

Teachers are expected to conform to the programme laid down by the Department, and all instructions annexed thereto. They may not use or introduce any other books than those stated on the programme. During class-hours, the teachers must take an active part in the lesson, instruction as a rule being oral. In parallel classes, teachers taking the same subjects must agree as to the order of the subjects taught. Teachers are to meet at least once a year to discuss their methods and the subjects already treated. Different teachers taking the same class are to so arrange that home work is not more than one hour a day for average pupils. Written or oral examinations, comprising general revision of subjects studied, are to be held every two months, and teachers are to take care that pupils do not have to prepare simultaneously for several examinations. At the end of each term, the teachers will submit to the Director a report of work done during the term, and at the end of the year a more detailed report on progress, order of merit, promotions, certificates, etc.

Entrance Examinations.

Pupils desiring to enter the 1st year of the School must be at least 13 years of age. Exceptions may only be made by the Department of Public Instruction, on the recommendation of the Director. Examinations are held twice a year, and pupils are not admitted at other times, except in special cases. Candidates for the 1st year must show that they are up to the standard of the 6th year of a primary school, and are especially examined in French, German, geometry, arithmetic and drawing.

To be admitted to the 2nd year, pupils have to pass an examination on the subjects covered in the 1st year. Pupils leaving the elementary school at the close of the 6th year are admitted on presentation of certificate covering the specified subjects, signed by a Primary Inspector.

Promotion Examinations.

Examinations are held not less than twice a year, and promotions made on the results of these, combined with class work. Examinations may be written or oral. A committee is appointed for each subject, the master teaching this subject being on the committee. Oral examinations may be conducted by the teacher and the committee, by arrangement. Questions are drawn by lot, and a second draw may be permitted, but marks are lost if this is done. In order to be promoted, pupils must obtain two-thirds of possible marks on the year's work, and one-third on the examination, at least. Pupils not passing in all subjects, but whose general average is good, may take the single subjects later.

Pupils graduating from the 2nd year with a promotion certificate are admitted to the 4th class of the Technical and Pedagogical sections of the College, on presentation of the certificate. Those wishing to enter the Classical Section or Real Section must take a supplementary examination in Latin.

SECTION 4: CONTINUATION SCHOOLS.

(1) IN THE CANTON OF ZURICH.

In the Canton of Zurich, with a population of 459,269 in 1905, there are 247 Continuation Schools having 23,832 pupils in attendance, or more than 5 per cent of the total population. These schools may be classed as (a) General Continuation Schools; (b) Industrial Continuation Schools and (c) Commercial Continuation Schools. 14 schools have apprentice departments for girls; and 16 schools have school kitchens for Domestic Science Classes. The Federal Government gives grants for Domestic Science Classes in both Primary and Continuation Schools.

Of the 247 Continuation Schools only 38 are compulsory Industrial Continuation Schools for Apprentices. Many of these 38 Industrial Schools were started by Guilds or Labor Unions, which had an interest in raising the technical skill of their youthful members, especially in drawing and sketching; in fact the whole system of Industrial Schools in Switzerland is morally supported and substantially aided by the trades—that is, by the manufacturers and their employees. Hence it is that skilled workmen are elected by the people or appointed by the civil authorities as members of the local boards governing this class of schools.

Compulsory Attendance.

In the Canton of Zurich the law making attendance at Continuation Classes obligatory on all industrial and commercial apprentices came into force in 1896-7

From that time the number of students in attendance grew rapidly. During the first year after the passage of the law the number of students increased from 4,644 to 5,116, or 10 per cent; but while the increase among the boys was 13·8 per cent, it was only 2·3 per cent among the girls between 14 and 17 years of age. The customary apprentice examinations soon revealed the families that had neglected attendance at schools for apprentices, and fines were inflicted. In consequence of this the total attendance rose to 6,361, an increase of 23·4 per cent, or 24·3 among the boys and 26·7 among the girls. In 1909 the increase was only 121 students, or 1·9 per cent, showing that the law was generally obeyed.

In the Continuation Classes visited in Winterthur, youths from the factories were gathered from 4-30 to 7 p.m. It is compulsory on the employer to let the pupils go as well as on the pupils to attend. They go twice a week. No practical manipulative work was done by the pupils in these Continuation Classes.

In one class of 10 boys, eight occupations were represented. In another class of 11 boys, when asked how many would attend voluntarily if the compulsory requirement were removed, all of them indicated that they would attend voluntarily. In still another class of 31 pupils who had attended during two years, the teacher was requested to ask the pupils to vote on the proposition: "The law requires apprentices to attend Continuation Classes; if the compulsory law were now withdrawn, would you continue to attend voluntarily?" Thirty voted that they would attend. An inquiry was made from the teachers as to how many of the 31 pupils would likely have attended the Continuation School if there had been no compulsory law. The teachers said in their opinion only about one-third of those who were then present.

Lessons, Teachers and Appropriations.

The number of lesson hours to be provided for in these schools grew with the attendance in almost the same proportion, so that a large number of parallel classes had to be arranged for. But while years ago the number of hours in summer was greatly reduced, there is now, according to the report, no appreciable difference between winter and summer sessions. The number of teachers has increased from 275 to 381, or 37 per cent in four years.

The teaching staff consists of elementary school teachers (men and women), technical teachers for vocational instruction, and teachers for women's hand work and other domestic work. The proportion of teachers for general culture studies and for technical branches is 2 to 1.

The most important point in connection with Industrial Schools in Zurich, as elsewhere at present, is the necessity of preparing suitable teachers, especially teachers for vocational studies. Not every skilled workman is also a successful teacher, nor can every skilful teacher be also a teacher of technical branches with the same success with which he teaches the ordinary school subjects.

The Cantonal government appropriated $16,400 exclusively for these apprentices' schools in 1909; the local school districts aided by Federal subsidies paid the remainder of the costs, the exact amount not being ascertainable owing to the fact that in the general accounting the various kinds of Continuation Schools are not separated.

(2) IN THE CANTON OF ZUG.

Elementary Continuation Schools.

The scope of the general elementary Continuation School is shown by the following programme of work issued by the Canton of Zug:—

Reading and Writing, one hour per week. The subjects are chosen from patriotic literature, natural history, and reports on agriculture or industry. The object is to ensure a clear understanding of the text. Questions on the context and reproduction of the subject matter, orally and on paper, are freely employed. The pupils are given essays and letters to write, and are taught how to make out receipts and invoices. Patriotic songs are taught.

Arithmetic and Simple Book-keeping, one hour per week. The syllabus includes vulgar and decimal fractions, simple proportion, interest and elementary mensuration. Book-keeping deals with the day-book, ledger and balance-sheet.

Knowledge of the Constitution, one hour per week. The political and physical condition of Switzerland; history of the Federation; the political organization of parish, canton and Federation.

The civil and commercial relations of the cantons (speech, commerce, religion, climate and trade routes).

The State:—poor-law, registration, mortgage law, finance, agriculture, the licensing acts, taxes.

The Citizen:—liberty of the subject, protection of property, the franchise, the "law of association" (Vereinsrecht), freedom of religion, of thought and of the press, military duties and obedience.

(3) IN THE CANTON OF NEUCHATEL.

The Neuchâtel schools are a good illustration of Cantonal organization. The population of Neuchâtel in 1904 was 131,304. The Canton has an area of 312 square miles. About 2½ per cent of the total population attend the vocational classes, without reckoning the attendance at the compulsory Supplementary Courses.

(I.) Improvement Schools.

(Ecoles de perfectionnement.)

(*a*) Supplementary Courses (Ecoles complémentaires): recruits' school. Compulsory attendance for four months in winter for two sessions from 7.30 to 9.30 p.m. twice a week.

(*b*) Vocational Schools (Ecoles professionnelles): held from 7.30 to 9.30 p.m. for boys and girls. Five schools, 750 pupils.

(*c*) Domestic Economy Schools: day courses of 13 weeks' duration. Two schools, 410 pupils.

(II.) APPRENTICES' SCHOOLS.

(Ecoles d'apprentissage.)

Three Commercial Schools at Neuchâtel, Le Locle and La Chaux de Fonds; 480 boys, 100 girls.
Holiday Commercial Course at Neuchâtel; 280 boys, 60 girls.
Two Watchmaking Schools, 72 pupils.
Three Technical Schools, 133 pupils.
Instrument Makers' Schools, 80 pupils.
School of Industrial Art, 235 boys, 40 girls.
Agricultural School, 32 pupils.
Viticultural School, 9 pupils.
Courses for adults at Le Locle, 30 courses, 520 pupils.

SECTION 5: SCHOOLS FOR TEACHING TRADES TO APPRENTICES.

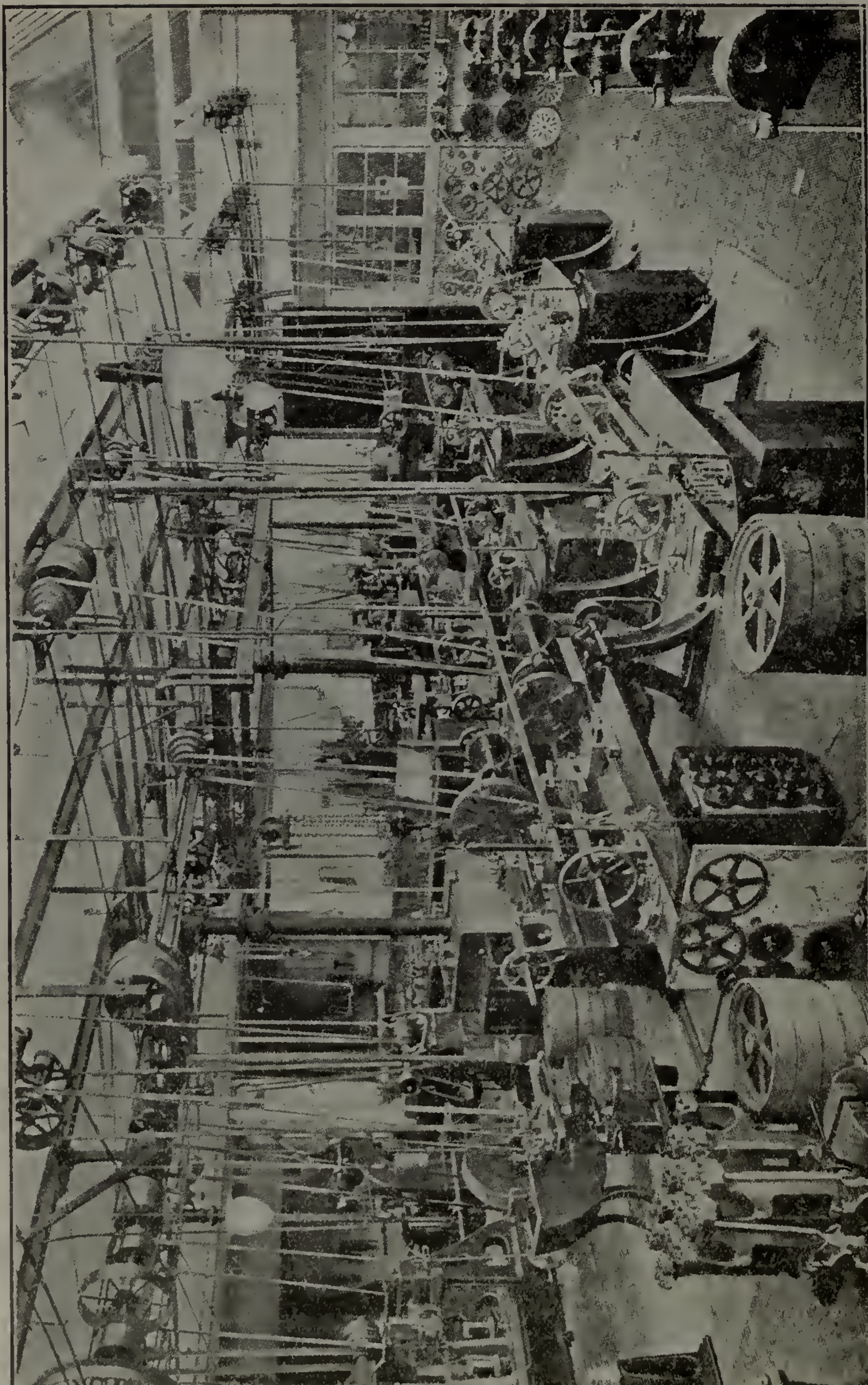
Several schools were found, maintained generally by the Commune and Canton, at which trades were fully taught to apprentices. Three typical institutions are reported upon briefly: the Metal-working School at Winterthur, the Carpenters' and Joiners' School at Zurich, and the Trade School for Ladies' Tailoring and Whitewear, Zurich. The Industrial Art School at Geneva also teaches trades fully and provides Secondary Technical Instruction. It is reported upon in Section 3 of Chapter LVIII.

A—METAL WORKERS' SCHOOL AT WINTERTHUR.

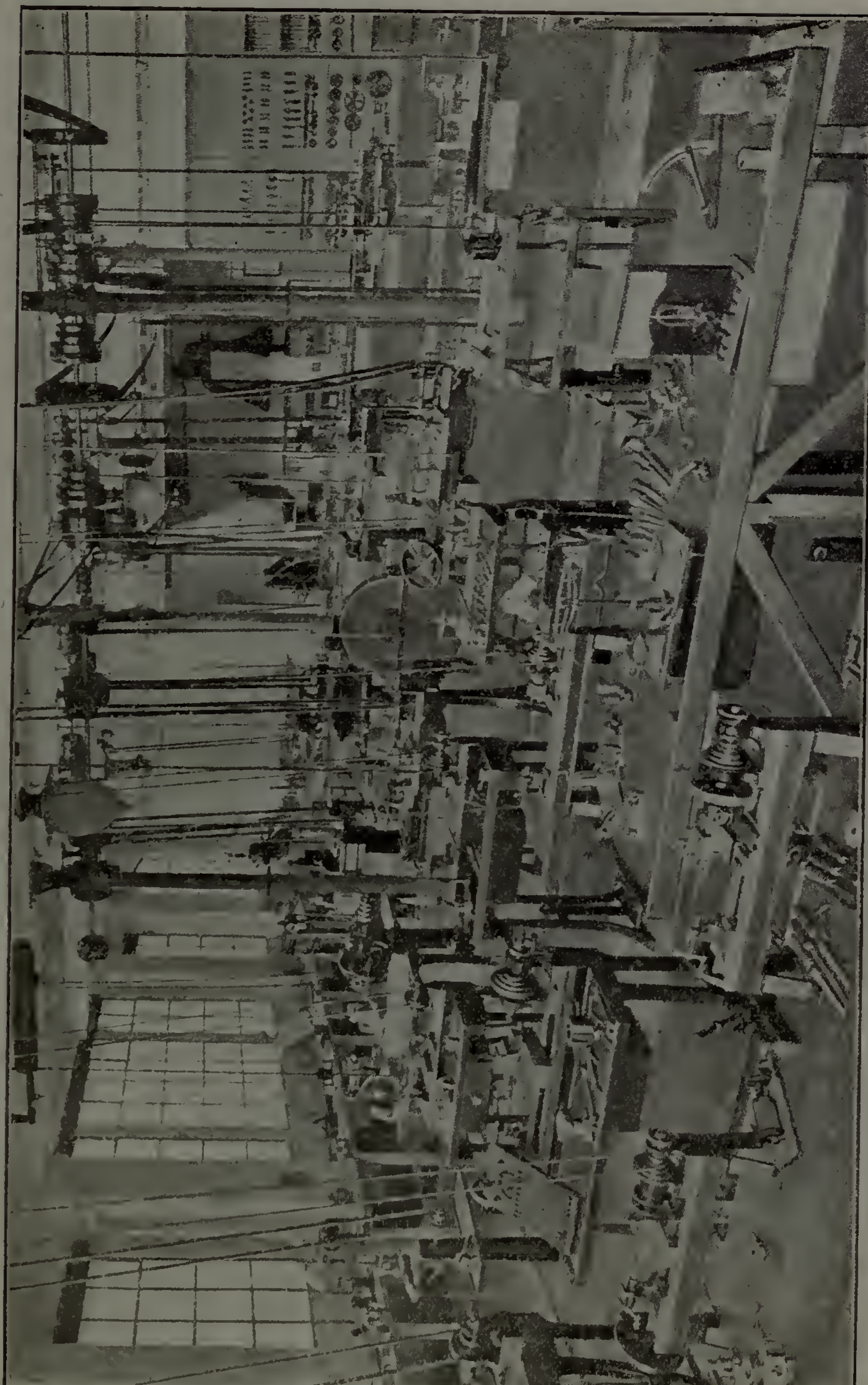
The courses are of 2½ or 3 years. They take the place of apprenticeship, and the students are taught their respective trades thoroughly. Workmen who have been trained at this school are regarded as among the best in the country, and are in great demand.

There are six departments, as follows:—Locksmiths, Mechanics, Fine Mechanics and Electro-technicians, Metal Casters, Special Pupils, Continuation Course for locksmiths and machinists. The first three cover 3 years of theoretical and practical work. The course for Special Pupils is intended for those who have had or who intend to take a Technical Middle or High School Course, and only require practical work here. The Continuation Course is for metal workers who have qualified as masters, and want further training in theory and practice. The course covers from 20 weeks to one year.

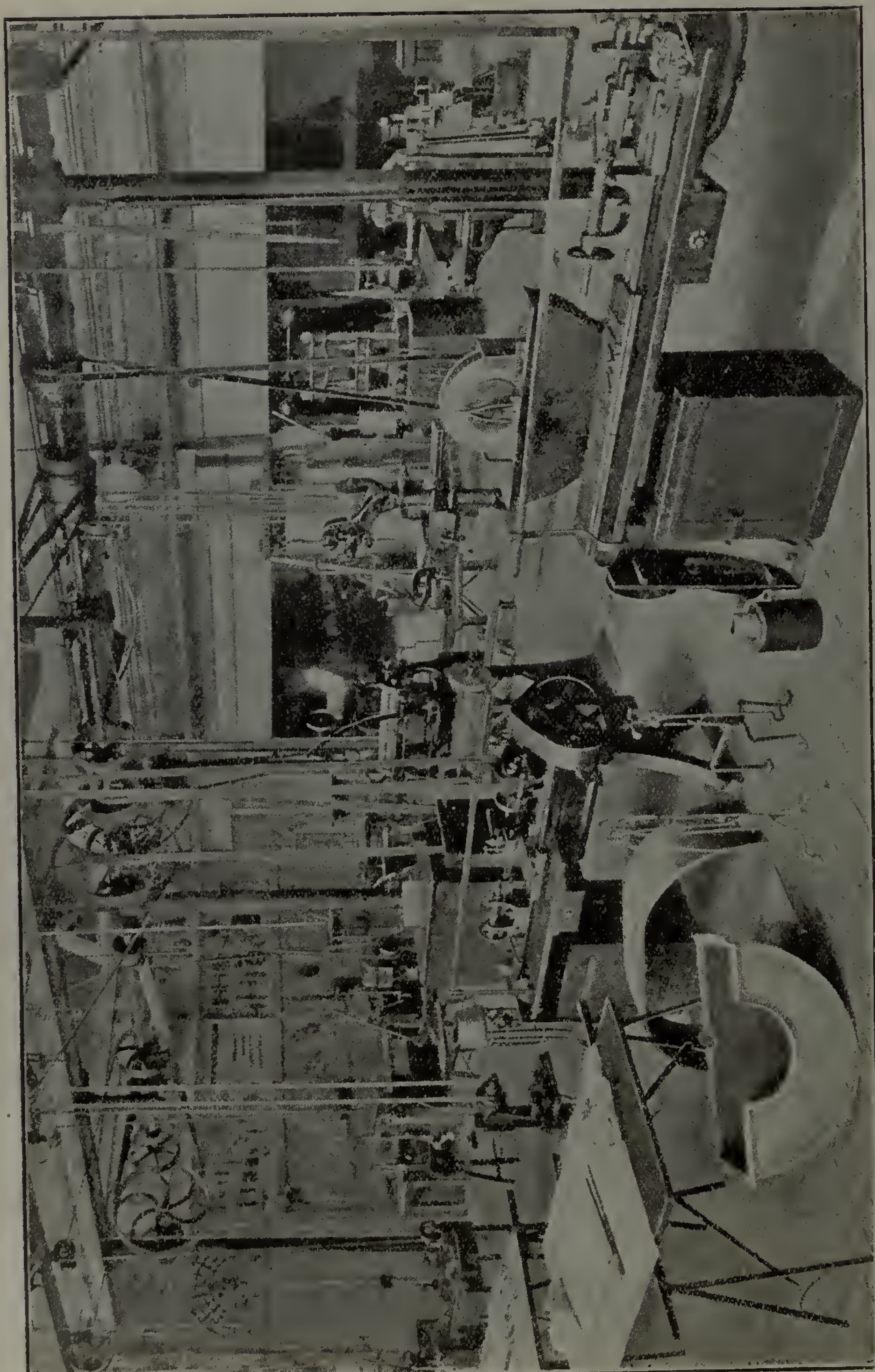
Pupils must be 15 years of age, and have had three years at a Secondary School, besides being physically fit for the work. Foreigners are accepted only if there is room for them after applicants from Switzerland have been accommodated.



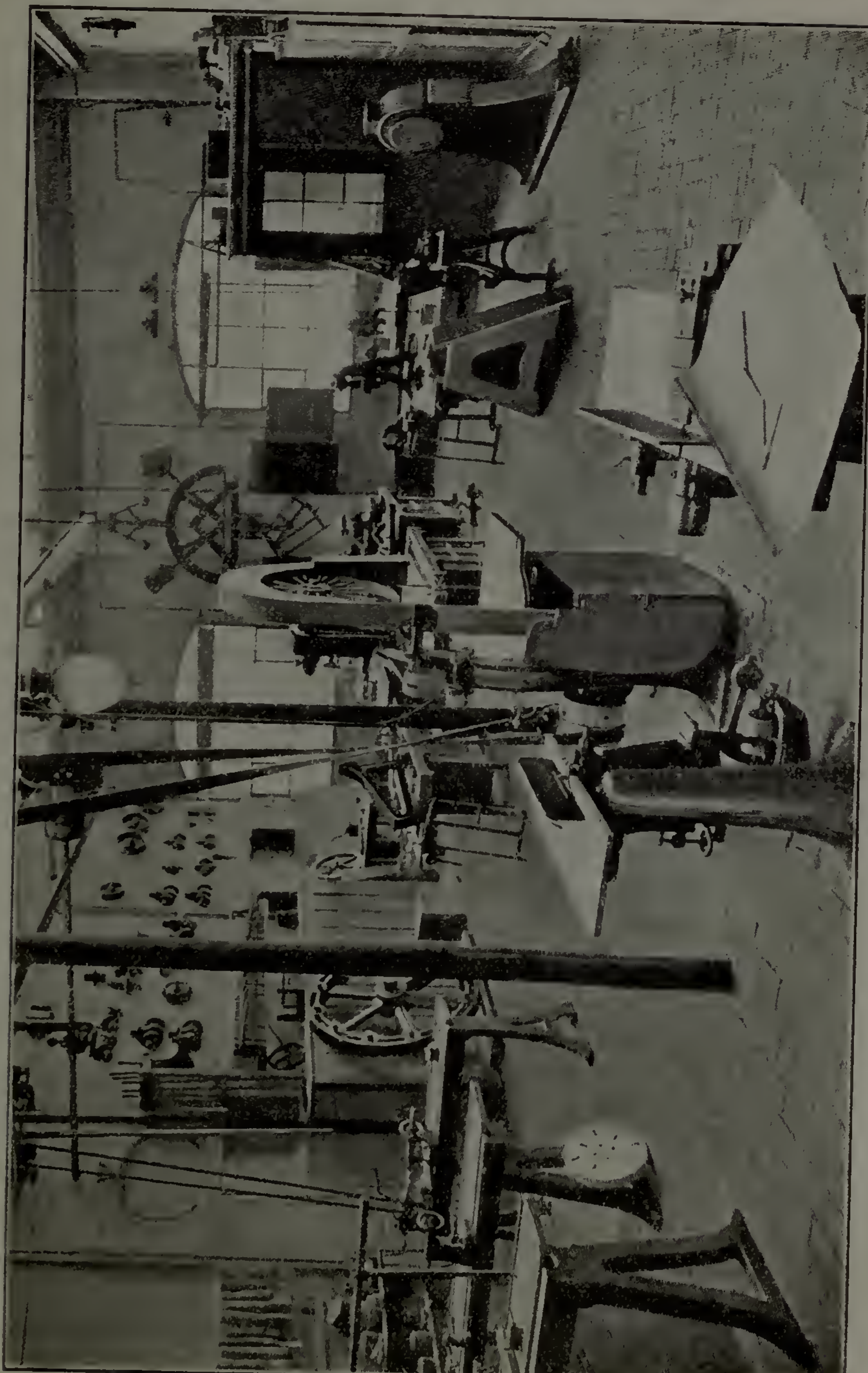
MECHANICS DEPARTMENT: METAL WORKERS' SCHOOL AT WINTERTHUR.



FINE MECHANICS AND ELECTRO-TECNICS DEPARTMENT: METAL WORKERS' SCHOOL AT WINTERTHUR.



Iron Workers and Locksmiths Department: Metal Workers' School at Winterthur.



CASTERS AND WHEELWRIGHTS DEPARTMENT: METAL WORKERS' SCHOOL AT WINTERTHUR.

The fees are as follows:—Ordinary 3-year course \$10 per year, (foreigners double.). Special Pupils:—Locksmiths, Mechanics and Electro-technicians, 1st year \$60, 2nd year \$20; Metal Casters, \$30. (foreigners from 1½ times to twice as much). Continuation Course, ½ year \$12, 1 year \$20, Machinists' course, 10 weeks, \$6.

STUDY PLAN.

1st year.—	*Hours per week.* Theory.	Workshop.
Locksmiths	18	34
Mechanics	18	34
Fine mechanics	18	34
Metal casters	16	36

The subjects are German, arithmetic, algebra, geometry, projections, sketching, physics, freehand drawing and workshop practice.

2nd year.—	*Hours per week.* Theory.	Workshop.
Locksmiths	19	33
Mechanics	17	35
Fine mechanics	17	35
Casters	15	37

The subjects are the same as in the 1st year, with the addition of technical drawing and strength of materials.

3rd year.—	*Hours per week.* Theory.	Workshop.
Locksmiths	13	39
Mechanics	13	39
Fine Mechanics	13	39
Casters	2	50

The subjects are the same as 1st and 2nd years, plus construction, statics and modeling for locksmiths, electro-technics for the electro-technical section, with book-keeping, drawing and workshop practice for all students.

Special pupils take 52 hours per week in the workshop.

Continuation Courses.

Locksmiths.—The course covers 6 or 12 months, and 9½ hours a day. Pupils must have served 3 years' apprenticeship and attended an Industrial Continuation School. The subjects are book-keeping, statics, drawing, modeling and workshop practice. The fees are \$12 per half year, \$20 per year, double rates being charged to foreigners.

Machinists.—Two courses of 10 weeks each, 9½ hours per day. Pupils must have been 3 years at a Secondary School or Industrial School, and have served 3 years' apprenticeship, besides having 3 years' practical experience. The fee is \$6 a course, foreigners paying double.

In the first course the subjects taken comprise construction, materials, electro-technics, projection drawing, technical drawing, workshop practice. 14 hours weekly are given to theory, and 38 to workshop practice.

In the second course the subjects are construction, tools, division of labor, time and estimating, technical drawing and workshop practice. The same proportion of time as before is given to theory and practice.

Work is According to Commercial Standards.

Power machines as well as hand machines are used, for the combined purpose of training the pupils and turning out products which can be sold to advantage. Articles and products which have been made are sold, and no trouble with labor unions or other manufacturers has been created by this practice. A rather higher price is charged than that of other manufacturers for the same things. The guide said that was due to the fact that a better finish was given to the work of the school, because the time of the students was not grudged on the work. The work is all done under the supervision of competent foremen, and is inspected according to commercial standards. Orders for work come to the school from all parts of Switzerland.

When pupils have finished the 3 years' course at the school they are in great request, and are accepted as fully qualified workmen without any further apprenticeship. At the close of the school course they pass the State examination for apprentices.

B—CARPENTERS' AND JOINERS' SCHOOL AT ZURICH.

This is a comparatively small school for the training of carpenters and joiners. Its courses of work take the place of apprenticeship. The course continues three years. 7 hours per week are given to theoretical instruction out of the working hours. In addition to that the pupils have 4 hours a week in the Continuation Schools, where they take German, arithmetic and bookkeeping. The remainder of the time is given to practical training in the use of tools and materials, and in the making of products which are sold in the open market. The furniture which is made in the school is usually ordered by customers. In 1909 the school sold $4,000 worth of furniture, the work of 16 pupils. The school has always plenty of orders to keep the pupils in full work.

The pupils receive no remuneration during the first six months. In the following 6 months they receive $1 per month, in the 3rd half-year $2 per month, in the 4th $3 per month, in the 5th $4 per month, and in the 6th half-year $5 per month. At the end of the course pupils go up for the State examination for apprentices.

The trades unions are reported as being favorable to the school and its work. The pupils of the school may join the union if and when they please. When the pupils leave the school, they do not at once claim the full wages which the trades unions appoint. A reason given for the maintenance of the school by public funds was that the students have much better opportunities for being well trained as good all-round mechanics than they would have if they were apprenticed in big shops. In the latter case they would likely be given special work to do without opportunities for all-round training.

SCHOOL OF LADIES' TAILORING AND WHITEWEAR AT ZURICH.

This school is administered jointly by the Canton and City of Zurich through a Committee appointed by the cantonal and municipal authorities. Its aim is to train competent workers for the ladies' clothing branch, and to afford women who are already engaged in this work an opportunity of improving themselves in cutting out and making up garments. Since 1909 there has also been a department for training teachers of these subjects. Special courses are also held for those who wish to take up this work for home use, or to prepare for the Cantonal Needlework Teachers' diploma.

The courses are as follows:—

A. Vocational Training:
 (1) Ladies' Tailoring and Dressmaking,
 (2) Whitewear.
B. Training of Vocational Teachers.
C. Courses for Home Use:
 (1) Whitewear,
 (2) Dressmaking,
 (3) Mending and Patching.
D. Needlework Teachers' Course.

In all the courses the class limit for one teacher is 16 pupils.

A. Vocational Training.

Girls entering this department must be at least 14 years of age, and are usually 15. Older girls of good education may be admitted to higher classes by special arrangement.

I. Ladies' Tailoring and Dressmaking.—

(a) Workshop and custom practice. Period of training 3 years; wages paid in the last half year. 44 hours weekly, of which 4 to 6 hours are devoted to German, French, book-keeping, drawing and physical training. No fees to Swiss subjects.

(b) Pattern Drawing for Dressmakers. Course of 5 weeks, 38 hours weekly. Courses are held three times yearly. Fee $6 (foreigners $10). The subjects taken include construction of patterns for normal and abnormal figures, for children's clothing, for coats, jackets, etc., and for "Reform" and sport costumes, and making up models with trimmings from fashion papers.

If enough names are sent in, an evening course in these subjects will be arranged, covering 10 to 12 weeks, 2 evenings weekly of 2 hours each, the fee being $1.75.

(c) Special Course for Dressmakers in drawing and making up jackets, mantles, tailored dresses, etc. This is a day course of 4 weeks, 44 hours weekly, held twice yearly. An evening course of about 20 weeks is also held twice yearly. Fee $3 for Swiss, $5 for foreigners.

II. Whitewear.—

(a) Workshop with custom work. Time of training 2½ years; wages paid in the last half year. 44 hours weekly, of which 4 to 6 are devoted to German, French, drawing, book-keeping and physical training. No fee to Swiss girls.

(b) Cutting-out for Whitewear sewing. 12 weeks of 36 hours, held twice yearly. In the first 6 weeks ladies' underwear is studied, in the second 6 weeks men's underwear. Either half of the course may be taken separately, if desired. Fees $20 for the whole course or $12 for half course (foreigners $30 and $18). Students draft patterns in normal sizes and to special measurements for all kinds of underwear for ladies and gentlemen. Patterns are designed for fashion papers, designs for trimming are worked out, and models made up.

If there are sufficient applications, evening courses will be arranged, covering 10 to 12 weeks, 2 evenings weekly of 2 hours each. Fees $1.75. Courses may be held three times yearly.

B. Training of Vocational Teachers.

I. Teachers already in Teaching Service.—

These attend at the workshops, or classes as required. Technique as well as method is considered. Those teachers who remain 3 months may take an examination and receive a certificate. Admission and fees by arrangement.

II. Training of Dressmakers and Whitewear Workers as Vocational Teachers.—

This course covers 1 year. Candidates must be 19 years of age, have served an apprenticeship and have had practical experience, as well as an adequate education. Fees are $20 for Swiss subjects, $40 for foreigners. An examination for diplomas is held at the end of the course. The subjects taken are practical sewing, pattern drafting, pedagogics, method, hygiene, German, book-keeping, drawing and study of materials. Students work in the shop, in class, and attend the courses for Needlework Teachers, or take private classes if required.

C. Course for Home Use.

These classes are arranged according to requirements. Pupils work for themselves or their friends, and their wishes are considered as far as possible in regard to the articles made.

I. White sewing.—

A 15 weeks' course is held 4 times yearly.

(a) All-day course, 7 hours daily, except Wednesday and Saturday. Fee $9 (foreigners $13).

(b) Morning course, 4 hours daily. Fee $7 (foreigners $10). On taking the course a second time, fees are $6 and $8 respectively.

(c) Afternoon course, 4 times a week, 4 hours each session. Fee $6 for Swiss pupils and $9 for foreigners. If taking the course a second time, fees are $5 and $7 respectively.

The half-day courses are less complete, and two courses should be attended consecutively in order to cover the ground. The subjects taken are practice in hand and machine sewing, cutting out and making up aprons, chemises, drawers, men's shirts, measuring; construction and drafting of patterns for the articles named; and freehand drawing.

II. Dressmaking.—

This course covers 11 weeks, and is held 4 times yearly.

(a) All-day course, 7 to 8 hours daily, except Wednesday and Saturday afternoons. Fee $10 for Swiss pupils, $15 for foreigners.

(b) Morning course, 4 hours daily. Fee $7 for Swiss pupils and $10 for foreigners.

(c) Afternoon course, 4 afternoons a week, 4 hours each session. Fee $5 for Swiss pupils and $8 for foreigners.

The subjects include cutting out and making up of underskirt, underwaist, skirt, blouse, dress, child's dress; mending and making over garments, measuring and drafting patterns for articles to be made, and freehand drawing. The half-day courses are not so varied, but include pattern drafting, making up and mending, as well as drawing.

III. Mending and Patching.—

Course of 10 weeks, 2 half-days weekly. Fee $3, or $2 if the course is taken a second time. The aim of this course is to teach repairing of every kind of linen or knitted article, with especial attention to fine mending. As a rule, two courses should be taken to cover the whole ground.

D. Course for Needlework Teachers.

These courses are arranged as required, and last 15 months. The Zurich Educational Committee decides when they shall be held, and makes all arrangements as may be necessary from time to time.

Bursaries and free places are available in all departments to needy and deserving pupils.

The Products are Sold.

A good dressmaker earns $1.25 a day, but ordinary apprentices get no pay for 2½ years. Girls taking their training in the school have a great advantage, as there is not time in a workshop to teach them all that they learn in the school. The instructress in the school at the time of the Commission's visit was a practical dressmaker, who had been there only one month, but said that she could see the advantage of the school training for the trade. Public opinion is very favorable to the school, and there is no objection from dressmakers and shopkeepers. Everything that is made is sold, and orders are taken from customers. The prices are about the same as outside, but customers have to wait longer for their goods than if ordered in a commercial dressmaking establishment. Material may be furnished by the customer or by the school. A drawing is made for each article before it is cut out. Most of the work done in the school is of medium grade, but sometimes they make evening dresses and more elaborate garments.

The Girls Learn from Each Other.

About 100 girls are received for the full course of instruction for 3 years, and about 100 girls are accepted for each of the Short Courses of 11 weeks. These short courses are held four times a year.

In this school, after several years of experience, it was found desirable to have some of the pupils from each of the three years working in the same room. After the pupils have been about 6 weeks in the school, it is observed that they learn a great deal incidentally and indirectly from observing what the girls in the more advanced parts of the course are doing. This arrangement of having part of the pupils of all three years in one room was made after the school had experimented in both ways—(*a*) mixing the pupils from the several years and (*b*) keeping them in separate rooms according to the year they were taking.

CHAPTER LVII: REGARDING APPRENTICESHIP.

The laws and customs in respect to apprenticeship have a direct and continuous bearing upon the elementary industrial and technical instruction which is provided in the several Cantons.

Examinations, Diplomas and Employers.

The following information was obtained in "Conversation" with Dr. Fr. Fritschi.

All boys who enter apprenticeship for joinery or mechanics, or any other skilled trade, and girls who enter apprenticeship for millinery or dressmaking, are required to pass an examination, theoretical and practical, at the end of their apprenticeship. To prepare for this examination they are required to attend Continuation Classes at least 4 hours a week. Most of them attend 6 hours a week. The employer is required by law to give the boy at least 4 hours a week during the ordinary working hours to attend these classes.

All apprentices must take the examination at the end of their period of service. Nearly all obtain their diplomas. Whenever a boy goes to a new place the employer asks, "Let me see your diploma; let me see how you worked."

In case an employer should seek to evade the obligation to let the young worker free for 4 hours a week, he might do so by taking him into his office or workshop and not making an agreement with him as an apprentice. However, the employers in their unions think it a point of honor to have the young people who work for them engaged as regular apprentices. If anyone fails to treat them in that way, he loses respect among his fellow tradesmen.

Matters Reported Upon.

An understanding of the situation and practice can perhaps best be obtained from summaries of four official documents which constitute the remainder of the Chapter, viz.:—

1. Apprenticeship Law of the Canton of Zurich;
2. Copy of Apprenticeship Agreement;
3. Programme of Examination for Carpenters and Joiners;
4. Programme of Course and Apprenticeship Examination for Milliners.

Similar Programmes are published officially for apprentices to all the important trades.

SECTION 1: APPRENTICESHIP LAW OF THE CANTON OF ZURICH.

(April 22, 1906)

The word "apprentice" in this Act comprises every minor of either sex who is desirous of learning any manual or industrial occupation in a workshop, a vocational school or a commercial business.

Apprentices may enter upon their apprenticeship in manual or industrial occupations on the completion of their elementary school attendance. Apprentices in commercial houses however, must be fully 15 years of age before entering upon their apprenticeship.

Every apprenticeship contract must be drawn up in triplicate, signed by the employer, the parent or guardian, and the apprentice personally. Copies are to be retained by the contracting parties, and one copy to be sent to the Welfare Committee, who are also to be informed of any alteration that may be made in the same from time to time.

The contract must specify the occupation to be taught, or any special branch of it, the length of training, the obligations on both sides, and the duration of the probationary period, during which the contract may be dissolved by either party at three days' notice.

The employer is bound to care for the apprentice's physical and moral welfare, and to teach him or her the specified business in a regular and consecutive manner, either personally or by a duly qualified deputy. Other than vocational duties may not be demanded of the apprentice, unless this is specifically mentioned and provided that the training of the apprentice does not suffer thereby. If the apprentice lives with the employer, a proper bedroom and separate bed must be provided for him or her. If the apprentice receives any remuneration, this must be paid directly to such apprentice at the specified time.

The apprentice is under the direct control of his or her employer, and owes him respect and obedience, being pledged to carry out instructions conscientiously and diligently, and to observe strict secrecy as to the employer's affairs.

Should an apprentice leave before the expiration of his or her term, the employer can obtain redress through the courts.

No apprentice may be employed more than 10 hours per day. This does not apply to the federal law regarding work in factories. Overtime may only be worked at exceptional times, such as stock-taking, etc., or in making up time after a breakdown, or other unforeseen circumstances, where it is necessary in order to avoid serious damage or loss or to protect other workers from loss of employment. Only apprentices over 16 may be employed at overtime work, and the day may only be extended by 2 hours at a time, or 75 hours per year. Apprentices may not be called upon to work on Sundays and holidays, or at night, i.e., between 8 p.m. and 6 a.m. Special regulations may be issued from time to time regarding the occupations in which apprentices may be employed at night and on holidays, and only in such cases where the business cannot be carried on without such an arrangement. Regular Sunday work must not exceed 6 hours, and the same applies to night work. In any case the apprentice must be allowed 10 hours' uninterrupted rest.

Apprentices may not be given work to do at home after business hours.

Where there is a vocational, general or commercial Continuation School within reasonable distance of the employer's place of business, the latter must see that the apprentice attends those classes which apply to his occupation, and allow him the necessary time, including not less than 4 hours weekly in working hours, such time to be counted in working time. The apprentice must also be allowed time for religious instruction.

On the termination of the apprenticeship, the employer must give the apprentice a certificate as to the nature and duration of the apprenticeship, and also, if asked for it, a certificate regarding diligence and good conduct.

Any agreement limiting the employment of the apprentice, after the conclusion of his apprenticeship, is illegal.

The apprenticeship contract may be broken by either party only in the most exceptional and urgent cases, such cases to be settled in the courts, and the party in default to pay damages as directed by the judge.

In case it should seem advisable to either party to terminate the arrangement, appeal may be made to the Welfare Committee and Cantonal authorities, who will decide the matter. Causes for which appeal may be made are:—(*a*) physical or mental deficiency of the apprentice, continued disobedience and idleness, ill-behavior towards his employer or the latter's family, deliberate injury to his employer, or a criminal offence for which he is punished by the courts of law; (*b*) incapacity or neglect on the part of the employer in teaching the apprentice his business, or neglect to fulfil his obligations towards the apprentice.

Persons who have repeatedly failed in their duties towards apprentices entrusted to their care, or who are known to be immoral or otherwise unsuited for the training of young people, may be prohibited from keeping apprentices for a period of 5 years. If it is found in the course of an apprenticeship that the employer is undesirable, the Welfare Committee may terminate the apprenticeship in the interests of the apprentice, should they see fit.

All disputes between employers and apprentices are to be adjusted by the Welfare Committee, the law courts, or the Cantonal authority.

Apprenticeship Examinations.

Every apprentice is compelled to take an examination, at the close of his or her apprenticeship, to prove efficiency; and the employer has to enter his or her name for this purpose. The costs are borne by the State, and regulations are issued from time to time as may be necessary. The Welfare Committee directs these examinations, but their organization and conduct may be entrusted to the Guilds and Trade associations, as also the selection of experts. Experts must accept office when called upon, unless prevented by unavoidable causes.

Every candidate for examination, if successful, will be awarded a certificate to that effect on the conclusion of his apprenticeship. Apprentices who are not successful may take the examination again six months later.

All laws relating to apprenticeship are enacted by the Government, who advise with the Guilds and other organizations regarding details. The Welfare Committee has the supreme control of apprenticeship and vocational training. Special vocational Inspectors and Inspectresses are appointed to look after the vocational schools. They are selected by the Welfare Committee and appointed by Government. The Government also selects the Committee for Factories and Industries and that for Commerce on the recommendation of the Guilds, care being taken to have the interests of employers and employees equally represented. These Committees have to deal with all the more important questions regarding industrial and commercial training.

The fine for contravention of this law is from $1.25 to $40.

SECTION 2: COPY OF APPRENTICESHIP AGREEMENT.

The Apprenticeship Law in the Canton of Vaud is practically the same as in Zurich, the regulations for examination being almost identical. A specimen Apprenticeship Agreement is given below:

Apprenticeship Agreement.

Between (Employer's name and occupation), domiciled at (place, street and number), of the one part, and (Name of Representative of Apprentice), domiciled at (place, street and number),acting for (Name of Apprentice, date and place of his or her birth, present residence, and name of parents,) of the other part.

It is agreed as follows:—

1. The employer will teach or cause to be taught to the apprentice, in a thorough manner, the business of................in the period of............years................months, viz. between..................19.... and................19....

Further, the employer will initiate the apprentice into the requirements of his business, in the use of tools and ordinary merchandise, and will not employ him for work outside of his business.

The apprenticeship shall be under the control of the supervising authority for apprenticeship.

2. The first...... days of apprenticeship shall be a probationary period. During this period either party may cancel the agreement. Notice of cancellation to be given by the employer to the representative of the apprentice, or by the latter to the employer.

In case of the agreement being broken off, if the employer has boarded and lodged the apprentice, he shall be paid an indemnity of..........per day.

3. The employer shall receive as the premium of apprenticeship the sum of.........francs, payable in........instalments, that is to say (times of payment).

4. The apprentice shall receive from the employer, from date..........19....remuneration at the rate of ....per..........

In those occupations where insurance is compulsory, the apprentice shall be insured against accidents at the rate of.......... per day in the..........Insurance Society. The premiums to be paid by..............

5, 6, 7. The employer is to treat the apprentice as his own son (or daughter), to give him (or her) sufficient and wholesome food, healthy and comfortable lodging, light and heat, in order that he (or she) may be able to study outside of business hours subjects pertaining to the occupation followed. Laundry and repairs to be paid for by..............

8. The employer is to see that the apprentice takes the examination at the conclusion of apprenticeship, and if a specimen of work is required, to give the time and materials necessary for its production, and to superintend its execution by the apprentice. If the latter wishes to keep the article, he is to pay the employer the cost price of the materials.

9. The apprentice is to be obedient and respectful, and to work zealously and conscientiously. He is not to divulge his employer's business secrets, or processes of manufacture, or to give any information about customers or the business of the firm.

10. If the apprentice loses more than......days during his (or her) apprenticeship, through illness or other causes, the time is to be made up at the expiration of the agreement. Only a loss of more than........consecutive days is to be counted.

11. The apprentice may not join any society without the permission of the employer and the Apprenticeship Committee. Such permission will not be given if it in any way interferes with the apprenticeship or attendance at vocational instruction.

12. The representative of the apprentice will be surety for the latter's obligations.

13. Any disputes regarding the present agreement are to be submitted to the Apprenticeship Committee.

Any other conditions. (Penalty for inserting conditions contrary to the law, apprenticeship acts and regulations, is $40).

Executed in good faith and prepared in triplicate in accordance with the law,.

At........................this........day of........................19....

Employer. *Representative of Apprentice.*

....

Apprentice.

....

The agreement must be signed by the father or guardian. The 3 copies must be forwarded within 30 days to the guild or municipal attorney, to be entered by the Apprenticeship Committee of the district.

SECTION 3: PROGRAMME OF EXAMINATION FOR CARPENTERS AND JOINERS.

The following relates to the examination of apprentices and the encouragement of apprenticeship.

The Cantonal Apprenticeship Offices of French Switzerland issued a pamphlet intended to inform parents, guardians and apprentices of the conditions of various trades and also masters regarding the training which they are to give to their apprentices. This pamphlet, based on information obtained from persons practising the industries named, was submitted to them for criticism, and their suggestions were followed as far as possible.

The following is a summary of the information given therein relating to the trade of carpentry.

Young men wishing to enter this business are recommended to study this pamphlet carefully, and to acquire such vocational training as may be necessary to enable them to become efficient workmen.

Apprenticeship—Conditions, Progress, Etc.

The duration of apprenticeship is three years.

The conditions must be arranged in writing at the commencement of the apprenticeship between the parties concerned. A written agreement is required by law.

A carpenter apprentice should have a good elementary education, some familiarity with drawing and geometry, must be healthy, and active and intelligent.

Although it is not possible to state with absolute definiteness the exact arrangement of work during apprenticeship, the following division of time is given as a general guide, and it must be left to the employer to arrange the details.

1st period.—Knowledge and use of tools and materials, elementary wood work.

2nd period.—Continuation of same, and more advanced work.

3rd period.—Moulding, cupboard doors, windows and French windows, large pieces of furniture, glass doors, benches, etc.

The employer is recommended to teach the apprentice from the beginning, as fully as possible, how to plan the execution of work, estimate expenses, the various kinds of wood required, the buying of wood, its qualities and defects for different requirements, etc.

Every apprentice who has completed five-sixths of his term should be able to carry out from general directions all ordinary work in his trade, and the last period of his apprenticeship should be devoted to improving his knowledge of the various branches.

Vocational Courses to be Attended.

The theoretical instruction which the apprentice is required to attend extends over the whole period of his apprenticeship. Provided that it is available within a reasonable distance, the following course should be taken:—vocational drawing, elementary geometry, elementary descriptive geometry, elements of construction, arithmetic, measuring, accounting specially related to costs, special carpenters' course.

Examinations.

At the close of the apprenticeship period, an examination is held on the subjects absolutely essential to the trade of carpentry. This examination covers 2 or 3 days.

Specimen of Work.

If a specimen of work is required, it will be selected from the different articles used in ordinary buildings. The test will consist of the execution of a piece of furniture in miniature (no cabinet-making allowed) complete enough to enable the judges to estimate the candidate's proficiency. The piece of work must be accompanied by (1) the drawings used in its execution; (2) description of the tools used; and (3) a certificate stating that the drawings and article are the work of the apprentice, and mentioning the time spent thereon; (4) an invoice showing cost price of the work.

Practical Workshop Examination.

The test piece will be a specimen of various kinds of carpentry, as follows:—(1) plan to scale of a piece of carpentry from drawing to scale; (2) execution of the same; (3) wood-work, assembling and finishing.

Theoretical Examination.

This comprises (1) drawing; (2) composition in candidate's native language; (3) one or more problems (written); (4) oral examination on the subjects essential to the trade of a carpenter.

(1) Drawing examination includes the geometrical drawing of a piece of carpentry in plan, section and elevation; all the calculations must be shown thereon.

(2, 3) The written examination comprises a composition on a trade subject, also one or more problems on surface, development, cubes, industrial accounting, cost price, etc.

The questions for the oral Vocational Examination may be selected from among the following subjects:—materials used, hard and soft woods, origin and use of same, measurement, special technical knowledge; various kinds of carpentry, assembling materials. In these oral examinations special attention will be paid to general knowledge of the trade, and also to names and uses of the tools; treatment of wood for different purposes; glues, oils, essences and dyes used, etc. Other questions may be set, but they must be related to the trade.

FOR MECHANIC APPRENTICES.

The programme for Mechanic Apprentices is only slightly different from that of Carpenter Apprentices. The term of apprenticeship is 3 or 4 years, according to the branch taken up. It is advisable not to enter upon apprenticeship before attaining the age of 15.

Instruction.

The vocational instruction to be followed comprises:

In the 1st year of apprenticeship:—arithmetic, geometry, technology, drawing. 6 to 8 hours weekly.

In the 2nd year of apprenticeship:—algebra, geometry, physics and chemistry, technical drawing. Algebra and geometry are taught especially in relation to technical work, and problems are taken from practical work. 6 to 8 hours weekly.

In the 3rd year of apprenticeship:—physics (industrial electricity), mechanics, machines and tools, with industrial drawing; industrial accounting. 6 to 8 hours weekly.

Examinations.

The final examination, extending over two or three days, is held on the conclusion of apprenticeship. Candidates have to bring their tool outfit, and any other appliances required by the committee. If a test piece is submitted, it is generally left to the choice of the candidate. It consists of a simple piece of mechanical work, sufficient to show the judges what degree of proficiency has been attained, and must be accompanied by drawings, castings, tools and certificate as in the case of carpenters. The practical examination is held in the workshops, and the written and oral examination follows the same lines as that for carpenters, being adapted to the special needs of mechanics.

SECTION 4: PROGRAMME OF COURSE AND APPRENTICESHIP EXAMINATION FOR MILLINERS.

The period of apprenticeship is 2 years as a rule, and covers the complete study of all branches of the business, together with practice in adapting the work to changes of style.

A contract in writing must be drawn up, giving all particulars of the terms and conditions.

An apprentice should be able, on the completion of two-thirds of her term, to undertake any branch of her business, and the latter part of the time can then be devoted to cultivating skill and acquiring experience. Owing to the nature of the work, no definite programme can be laid down, and it is left to the employer to teach the apprentice all that she needs to know, as opportunity arises. The branches taught must include:—making up and trimming ladies' and children's hats; a knowledge of all the appliances used, the appreciation of their uses and qualities for ordinary and decorative purposes; estimates of cost; study of change in fashion, and harmony of colors. The following suggestions are given:—

First period.—The apprentice should learn to prepare hats, to construct simple shapes in various materials, to sew and finish the crowns, stitch the material and trimmings, and hem velvet and silk; to iron trimmings—velvet, lace, crêpe, etc. The theoretical teaching will deal with materials in silk, half-silk and cotton, with trimmings and other articles used in the trade.

Second period.—In this period the apprentice should learn to shape hats out of various materials, and to do more advanced work, in the course of which she will become familiar with the various goods used, such as ribbon, velvet, silk and half-silk, cotton, etc., and will learn to recognize their qualities and suitable use.

Third period.—The apprentice should now be able to construct a shape in buckram in any desired form, to make alterations and re-curl feathers.

She should be able to alter or make a hat in silk, velvet or crêpe.

Fourth period.—At this stage she should trim felt and cloth hats, make children's hats, bonnets and toques. She should also make up various trimmings, bows, knots, etc. and place them on the hat. She must be perfectly familiar with all the materials used in millinery.

Continuation Courses.

Apprentices must attend the classes held for their trade provided there are any within a reasonable distance. If no special course is available, they are recommended to take French, arithmetic and drawing. The time for attending classes is to be included in working hours.

Programme of Examination for Diploma.

This examination covers one or two days, and comprises theoretical and practical tests on the work done during apprenticeship.

SPECIMEN ARTICLE.

If the examining committee demands a specimen of work, to be made before the practical examination, it may be selected from among the following:—(1) a bonnet and bonnet shape made by hand by the apprentice; (2) a hat for a girl or lady; (3) a child's hat; all to be made entirely by the apprentice, certified by the employer. Flower trimmings are not to be used.

PRACTICAL EXAMINATION.

The practical examination includes the making up of various kinds of hats to the satisfaction of the committee, one of the following being selected: (1) a hat shape to model chosen by the committee; (2) trimming a hat; (3) trimming a child's bonnet.

THEORETICAL EXAMINATION.

This covers the following subjects:—

A. Theory of the different parts of a hat: (1) lining; (2) cutting and placing of bias; (3) ditto of wings; (4) arrangement of trimmings; (5) distribution of flowers, feathers and accessories; (6) different styles of hat to suit different ages.

B. Enumeration of the various styles of headdress.

C. Qualities of trimmings, such as stuff, muslins, ribbons, etc., and the quantities required.

D. Small accessories—buckles, pins, etc.

E. Precautions to be taken to keep customers' goods fresh and clean while working.

F. Estimating the cost price of a hat; various items to be taken into consideration.

Other questions may be set, but they must relate to the subject in hand. Practical work is to be demanded wherever possible, and credit is to be given for economy in the use of materials.

CHAPTER LVIII: SECONDARY EDUCATION FOR INDUSTRIAL PURPOSES.

SECTION 1: A TYPICAL CANTONAL SECONDARY SCHOOL AT ZURICH.

This school has three Departments—'Gymnasium,' Industrial School and Commercial School. The Gymnasium has a Classical and Modern side, and prepares especially for admission to the Hochschule and University. The Industrial Department or 'Ober-Realschule' prepares especially for admission to the Polytechnic School. The Commercial Department prepares officials for the Transport services, for the commercial section of the Universities and for Commercial High Schools (Handelshochschulen).

The entrance age is 12 for the 'Gymnasium' and 14 for the other two Departments. Pupils having higher qualifications are admitted to higher classes.

The building was well appointed and equipped for the training of pupils and imparting the general as well as particular knowledge regarding the products and processes of the different trades. As for example, one room was specially devoted to illustrations of the materials and products in connection with the silk industry. Specimens of the raw silk from different countries were arranged and graded. There were also splendid patterns of silk tapestry made by machinery, as well as made by hand. In the operating room each student weaves with a small loom from his own pattern. By this means the students learn to know the place and use of the different parts of each machine. The students prepare dyeing extracts, and specimens of all sorts of dyeing materials are explained and handled.

Similarly complete equipment and opportunity for training are provided for the textile industries in cotton and wool. The teaching of chemistry is made to bear directly on the process of dyeing.

Patterns of various fabrics are examined microscopically, analysed, then copies are made in drawing, and these are afterwards produced in the actual fabrics.

Two large rooms are specially arranged for freehand drawing and one large room for geometrical drawing.

Subjects of Study.

In the 'Gymnasium,' Classical Section:—

Compulsory: German, Latin, Greek, French, History, Geography, Natural History, Physics, Chemistry, Mathematics, Singing, Penmanship, Drawing, Physical Culture.

Optional: Religion, Hebrew, Italian or English, Choral Singing and Stenography.

In the Modern Section:—

Compulsory: German, Latin, French, English, History, Geography, Nature Study, Physics and laboratory work, Chemistry and laboratory work, Mathematics, Geometrical Drawing and Descriptive Geometry, Singing, Penmanship, Drawing and Physical Training.

Optional: Religion, Italian, Book-keeping, Choral Singing, Stenography and Advanced Geometry.

In the Industrial Section (formerly the technical department of the 'Ober-Realschule'):—

Compulsory: German, History, French, English, Mathematics, Geometrical Drawing, Descriptive Geometry, Book-keeping, Physics, Chemistry, Natural History, Geography, Freehand Drawing, Penmanship, Stenography and Physical Training.

Optional: Religion, Italian and Singing.

In the Commercial Section:—

Compulsory: German, French (with commercial correspondence), English (with commercial correspondence), Italian, Arithmetic, Book-keeping, Commercial Correspondence (German), Office Work, Commercial Law and Political Economy, History, Composition, Geography, Natural History, Chemistry, Physics, Geometry and Algebra, Writing and Stenography, Physical and Military Training.

Optional: Religion, Spanish, Technology, French Stenography, Drawing and Choral Singing.

Commercial Geography is given a prominent place in the course. Special commercial and industrial maps are used, showing the lines of communication and location of industries and mineral deposits.

Other Features of the School.

Emphasis is laid upon the instruction in English and French. Picture postcards of English and Scotch places of interest and of eminent men and women are used a great deal. Students have a great deal of practice in making out bills for goods in English and French, and also practice in business correspondence in English, French and German.

The attendance in 1910-11 was 516 in the Gymnasium, 240 in the Industrial Section and 1034 in the Commercial Section.

Students enter the Gymnasium usually at 12 years of age and remain for 6½ years. Those who come from the ordinary Secondary Schools at about 16 years of age remain for 2 years. In the Industrial Section pupils usually take a course of 4½ years, at the end of which time they may obtain diplomas. In the Commercial Section students continue during 4 years, and at the end of that time may obtain a diploma which is accepted in lieu of other apprenticeship examinations required by the Canton.

SECTION 2: INDUSTRIAL ART SCHOOL AT ZURICH.

This School has been in existence since 1878, but was completely reorganized in 1906, workshops being added for Carpentry, Metalwork, Weaving, Decorative Painting and the Graphic Arts. Special courses are held for Apprentices, and a general class for Drawing (Nature study, Life). In the Evening Classes the needs of journeymen are especially studied.

Pupils are trained by a progressive course of study to work out their own designs, design and execution being taken simultaneously. The problems set are those of daily experience, all the work being based on practice, and the school has opportunities for working with leading manufacturing firms. Special care is taken to keep up to date, and the latest designs and methods are studied in every branch. In the Embroidery and Weaving sections attention is given to producing original and beautiful effects by modern methods. In the Metal-working department the students have to make their own tools, and thus learn the infinite possibilities of their use. In the Bookbinding department they have to cut their own stencils, and in every branch stress is laid upon variety of design and execution, harmony of colors and of arrangement, and suitability to the purpose required.

Departments of School.

The School has 4 Departments, viz.:

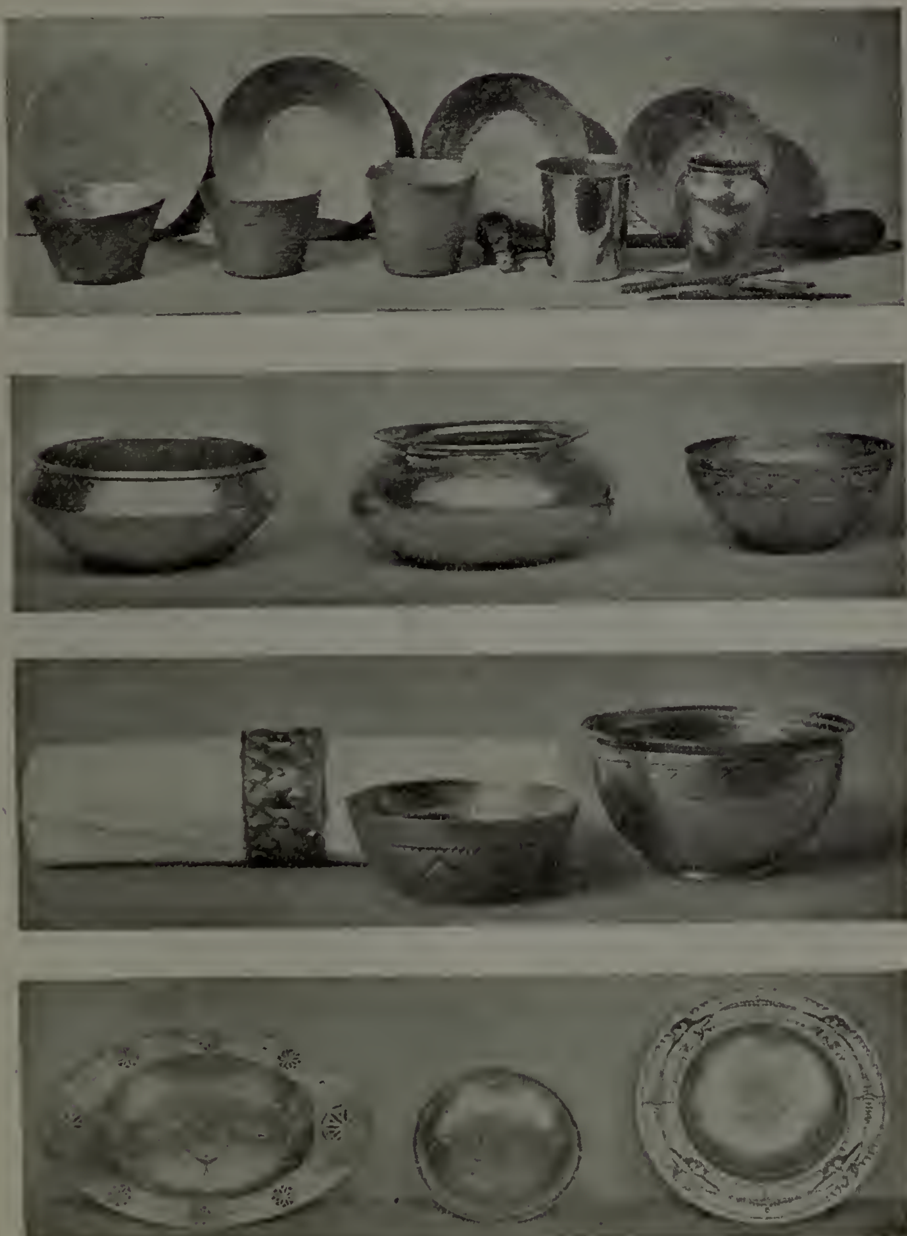
(1.) Vocational School for Graphic Arts (Typography, Lithography, Photography, Bookbinding).
(2.) Vocational School for Interior Architecture (Furniture, Metal-work, Lighting Fixtures, etc.).
(3.) Vocational School for Decorative Painting (Harmony of Colors, Decorative and Flat work, Stencil Painting, Glasspainting).
(4.) Vocational School for Textile Art (Pattern Drawing and Stencilling for Silk and Upholstery goods, Carpets, Gobelins, Weaving, Lace, Embroidery).

There is a General Class for Drawing and Modelling, Nature-Drawing, Life-class and Anatomy. The Special Classes and Workshop Classes include Nature-drawing and designing, to the completion of the article.

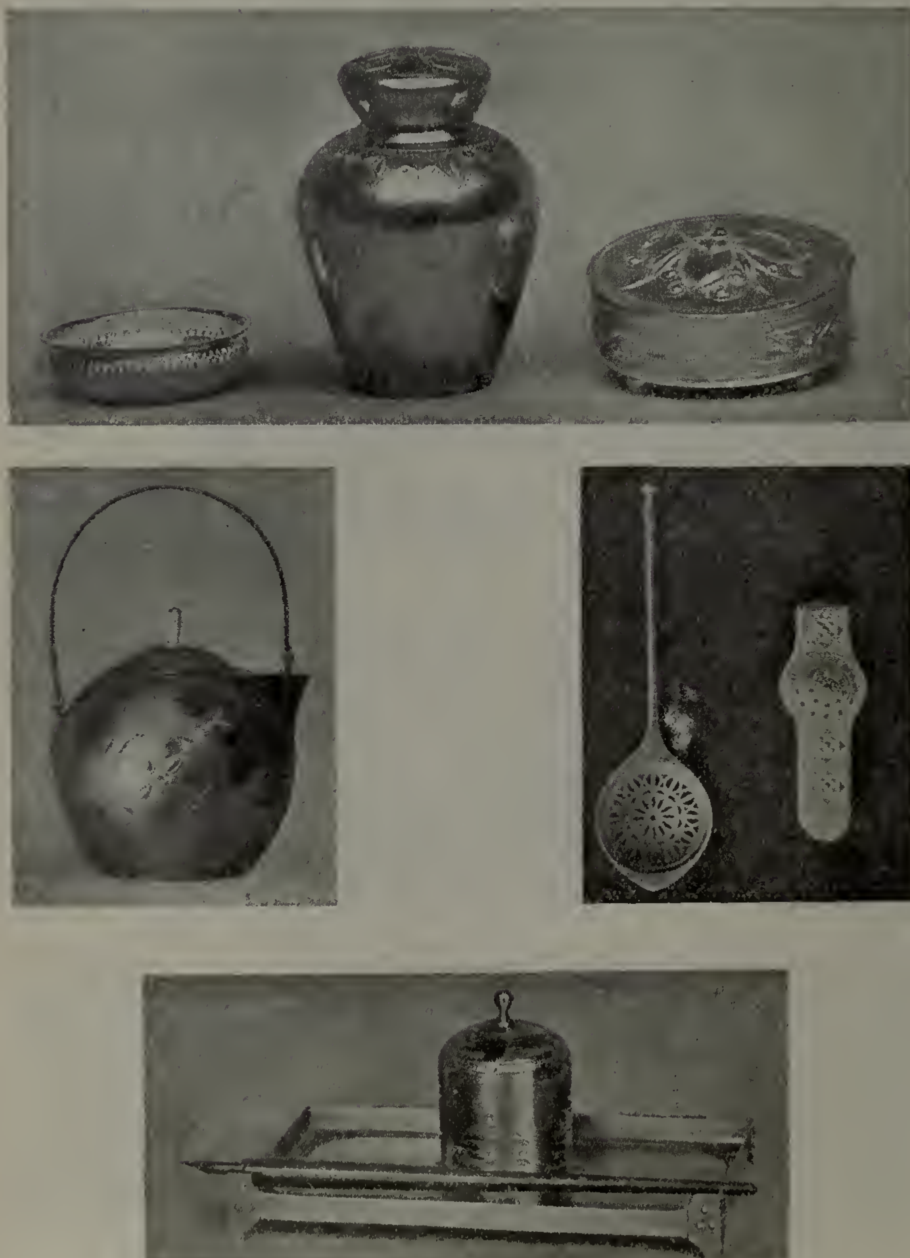
Evening Classes are held for outside pupils, combining Drawing and Vocational Instruction with practical work. Day pupils may attend Evening Classes by arrangement.

A class for Drawing Teachers is held every 3 years. Candidates must have completed attendance at one of the Sections of the School.

One or two Master Courses are held every year, dealing with general principles of instruction, and aiming to exercise an aesthetic influence on craftsmanship.

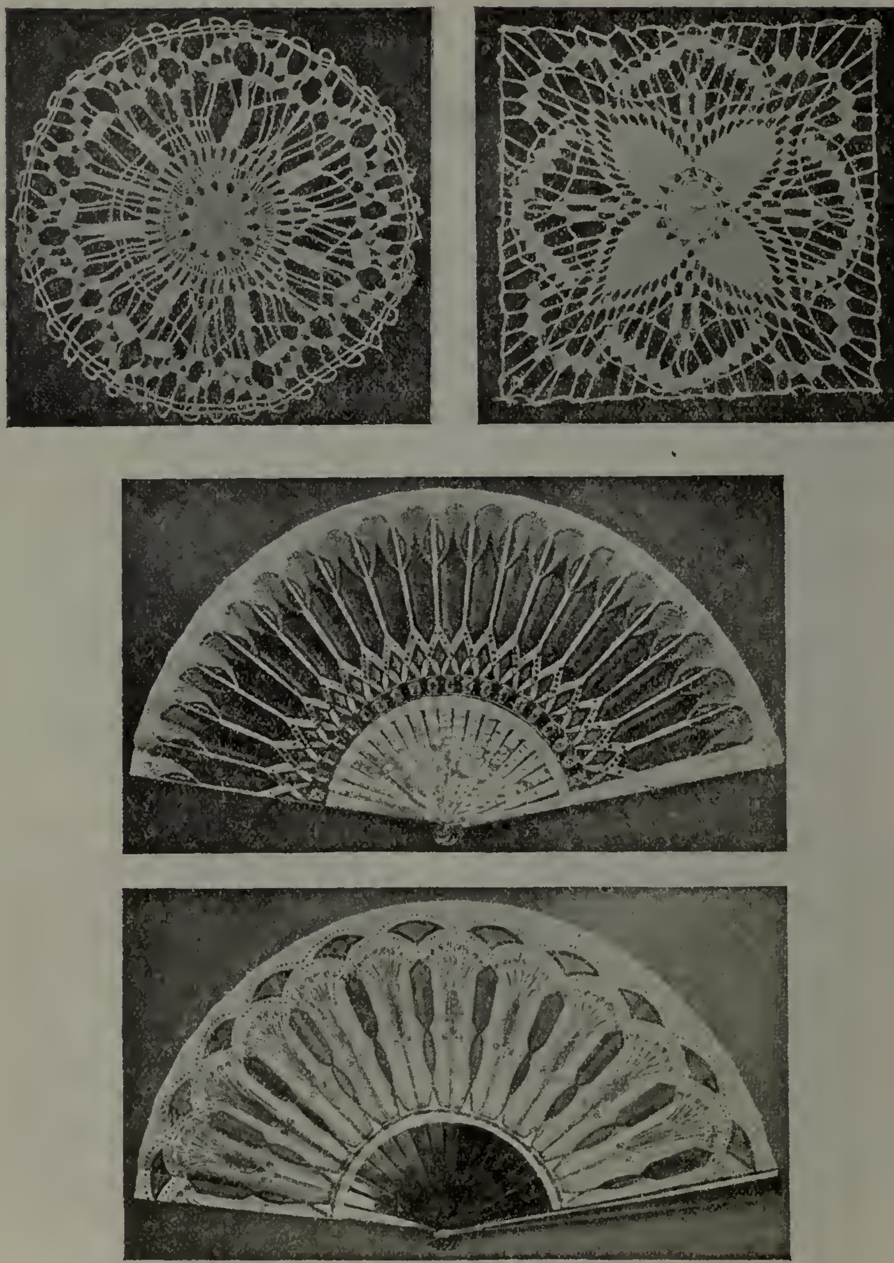


Examples of Metal Work: Industrial Art School, Zurich.

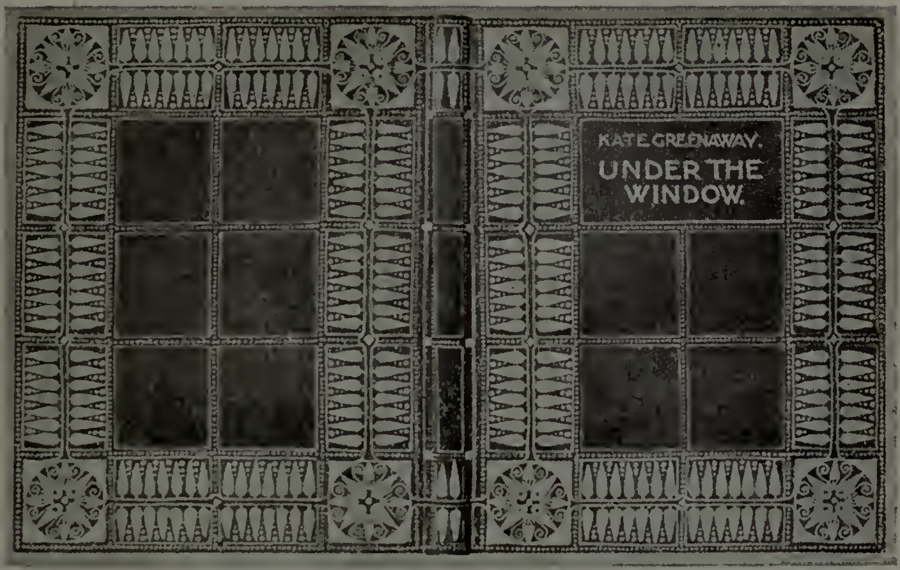


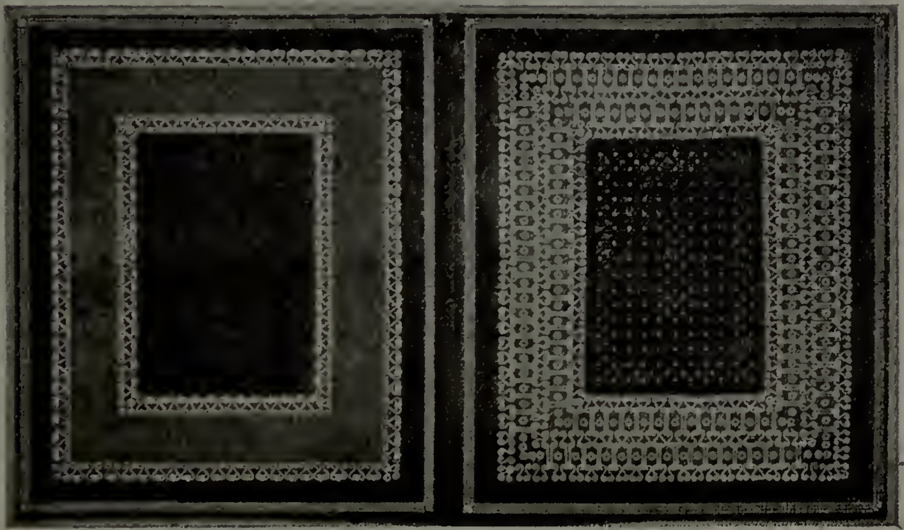
Examples of Metal Work: Industrial Art School, Zurich.

Examples of Embroidery Work: Industrial Art School, Zurich.



Examples of Work (Lace and Fan Designs): Industrial Art School, Zurich.





EXAMPLES OF WORK IN BOOK COVERS: INDUSTRIAL ART SCHOOL, ZURICH.

EXAMPLES OF WORK IN LITHOGRAPHY DEPARTMENT (POSTERS): INDUSTRIAL ART SCHOOL, ZURICH.

Conditions of Admission.

Regular pupils must have completed attendance at an 8-class Elementary School or its equivalent. Further, for Sections 1, 2 and 3, they are required to have had 2 or 3 years' experience in their selected branch, for Section 4 to have completed the Vocational School course in Composition, Business Correspondence and Book-keeping, the Evening School course in Freehand and Technical Drawing, or possess equivalent attainments. Occasional pupils are required in addition to be actually practising the occupation, Drawing Teachers must have completed a full course at the school. No entrance examination is held, but a probation of not more than 6 weeks is allowed, at the close of which it is decided whether the student is sufficiently advanced for the Vocational Courses. If not, he may be required to join the General Class for a time.

No fees are charged, but a deposit is demanded, which is returnable on satisfactory attendance.

Scholarships are available for needy students.

Courses and Equipment.

The Compulsory Apprentice Courses are as follows:—Typesetters, Book printers, Lithographers, Bookbinders, Ironworkers and Locksmiths, Gold and Silversmiths and Engravers, Chasers and Coppersmiths, Carpenters, Cabinet-makers, Hand Embroideresses, Frame Embroideresses, Decorative and House painters, Glass painters, Photographers (Drawing). Courses last for 3 years in most cases, for 4 years in the case of Typesetters, Bookprinters and Lithographers.

Apprentices attend usually 4 hours weekly for either theory or practice. They may attend either day or evening classes.

Day Courses (General Class and Vocational Courses) are provided daily from 8 to 12 and 2 to 5 except Saturday afternoons.

Evening Classes are held every evening from 7 to 9 except Saturday.

In addition to the fully equipped workshops, there are the collections and library of the Industrial Museum, the copies and models for various branches of instruction, the collection of plaster casts, and living models. Pupils also have access to the Swiss National Museum and the Botanical Garden.

Competitions are held in each Section at intervals, and at the close of the year there is an exhibition of pupils' work. Prizes of books and copies are awarded to the 3 most successful competitors.

In Close Touch with Occupations.

This school seemed to be fully imbued with the vocational spirit and aims. It does not prepare for admission to the Polytechnic School.

Great attention is paid to drawing direct from the real object, and not from copies. As an example, one of the students who was to make a drawing of a cat, was required to have the cat on the table and to draw it direct from life.

The Director expressed the opinion that in the case of some of the pupils, when they realize that they can make good drawings, they decide that they should not continue at practical manual work. Repeatedly he had found that, when the making of drawings was separated from the making of the thing which the drawing represented, the young men were disposed to get away from skilled constructive occupations and to get into the drawing office.

Courses are given for Masters and Assistants for workshops.

High-grade mechanics assemble at this school occasionally from the various trades represented in the several departments of the school, and discuss new processes applicable to their several trades. A good laboratory is provided.

The Director's opinion is that the trend of development will be in the direction of making the workshops and schools more general and less specialized for the particular industries. He thought there would be great benefit to the community if men from different occupations came together on work of a general character, rather than on work only or chiefly specializing on the occupation.

Exhibitions and Moving Pictures.

The School seeks to develop an appreciation of art and to educate the public taste, by an exhibition of work in the exhibition rooms of the school. These are changed every month. The school also has a hall specially fitted up for giving cinematograph entertainments, showing costumes, etc. They have found this to be a very effective method of developing public interest. The best features or exhibits of the monthly exhibits are shown in a room. A charge of half a franc is made to see those exhibits, and the same charge admits to the cinematograph entertainment. The Director said the hall was filled every time they had it open for entertainment and instruction by the cinematograph. The subjects of most of the films used are industrial, art, costumes, pottery, wood carving, processes of silk making, interior of factories and travel. Films are also used to give illustrations of bacteriological subjects.

Library and Museum.

The Library and Museum are specially replete with documents and specimens appropriate to the work of the school. Specimens of all kinds of drawings and of all classes of illustrations done in Switzerland and other countries are available to the students. Examples of designs for embroidery filled cases on one side of the room, probably 30 ft. long by 9 ft. high. They were filed away in a manner similar to the vertical system of filing documents. An estimate was that there would be no less than 50,000 specimens in that collection.

SECTION 3: INDUSTRIAL ART SCHOOL AT GENEVA.

This School, which was organized in 1909, is a school of apprenticeship for trades, industrial arts, construction and civil engineering, mechanical and electro-technical industries. It also admits pupils who are already apprenticed as outside pupils to classes pertaining to their occupation.

The School was formed by amalgamation of the Technikum, the School of Trades, the School of Industrial Arts, and the Mechanics' School. Instruction is theoretical and practical, the aim being to train intelligent and efficient workers for the industries and art industries named. There are 5 Departments, viz.:—

A. Industrial Department.
B. Industrial Art Department.
C. Construction and Civil Engineering Department.
D. Mechanics Department.
E. Applied Mechanics and Electro-technical Department.

A. Industrial Department.

This Department trains apprentices for the following trades: carpenters and joiners, locksmiths, tinsmiths and plumbers, masons and stone-cutters (theoretical course), cabinet-making and carriage-building. Graduates have no difficulty in finding employment, and are qualified to rise to high positions in their respective occupations. The equipment is of the best, including collections and a library well stocked with models and reference works. Pupils also visit works and industrial establishments.

The entrance qualification is age 14 and a good elementary education. No fees are charged to Swiss citizens, but foreigners pay $5 annually. Occasional pupils pay 40c. a term per hour's lesson. All apprentice pupils are insured against accident. Sons of foreigners resident in the Canton may obtain an exemption if unable to pay fees, and scholarships are available for Swiss pupils. Prizes of tools, etc., are awarded during the course, and pupils receive a diploma on completing it.

The School does its best to find positions for its graduates, by keeping in touch with industrial employers.

STUDY PLAN.

1st year.—(Same course for all trades)—Arithmetic and Geometry, Drawing and Technical Drawing, Projections, French, Gymnastics. 16 hours weekly.

Special Courses—Drawing and Construction for the respective trades. 2 to 4 hours.

During the summer term, 38 hours a week are spent in the workshop; during the winter term, 32 hours a week.

2nd year.—(Same course for all trades)—Geometry, Correspondence, Technology (part of year), Gymnastics (optional). 2 hours each.

Special Courses for the respective trades. 4 to 8 hours weekly.

During the summer term, 37 hours are spent in the workshop; during the winter term, 31.

3rd year.—(Same course for all trades)—Correspondence and Gymnastics (optional). 2 hours each.

Special Courses for the respective trades. 2 to 6 hours weekly.

Workshop 39 hours in summer and 33 in winter.

B. Industrial Art Department.

This Department aims at turning out, not artists in the usual sense of the word, but *artistic workmen* and artisans, for the decorative art industries. Pupils take the training for their chosen trade, or for general art culture. The trades prepared for are decorative painters, ceramic workers, enamel painters, jewelers, goldsmiths, engravers, stone-sculptors, wood-carvers, iron-workers, moulders.

TINSMITHS' AND PLUMBERS' WORKSHOP: INDUSTRIAL ART SCHOOL AT GENEVA.

IRON WORKING SHOP: INDUSTRIAL ART SCHOOL AT GENEVA.

JEWELERS' WORKSHOP: INDUSTRIAL ART SCHOOL AT GENEVA.

CERAMIC WORSKHOP: INDUSTRIAL SCHOOL AT GENEVA.

Mechanics' (Fitters') Workshop: Industrial Art School at Geneva.

Mechanics' Workshop: Industrial Art School at Geneva.

There are two classes of pupils, regular and extra, the former taking the complete course, the latter attending some lessons only. Regular pupils must be 14 years of age, of educational attainment equivalent to the 6th year of a primary school, and have a fair knowledge of drawing. Pupils not having the necessary qualifications are not admitted as regular students until they have acquired them.

No fees are charged to Swiss pupils; regular foreign students pay $5 per year; extra pupils pay 20c per term or 40c per year for one-hour lessons. All pupils are charged $1 per year for materials. Pupils are insured against accident. Tools and appliances for workshop and class instruction, materials and special accessories are furnished by the School, pupils paying for their small requirements and articles needed from time to time. Needv and deserving foreign pupils residing in the canton may be exempted from payment of fees, and Swiss pupils can obtain scholarships. Certificates are awarded on the completion of the course.

In connection with this Department there is a library, a botanical garden for nature-study and drawing, furnaces for enamelling and ceramic work (these being also at the disposal of the public), and a museum of plaster casts.

This collection of models is lent out at reasonable rates by the school to artists, industrialists, schools, and others, carriage paid. Lectures are held on art and industrial subjects, and students visit museums and collections in the city, industrial establishments and works of various kinds.

STUDY PLAN.

Workshops.

		Hours Weekly.
Decorative Painting	10 terms	22
Ceramics	10 "	22
Painting on Enamel and Enamelling	10 "	22
Engraving, Chasing, Jewelry, Goldsmithing	10 "	22
Sculpture in Stone	8 "	22
Wood-Carving	8 "	22
Art Iron-Work	8 "	22
Plaster Moulding	8 "	22
Imitating old metals		1 to 2.

General Courses.

Elementary Architectural Drawing	12
Ornamental and Conventional Drawing	12
Figure and Decorative Figure Drawing	12
Ornament and Composition	12
Modelling (figure and ornamental)	12
Gymnastics (optional)	2

The general courses, with the exception of gymnastics, are taken by all pupils, alternating month by month.

C. Construction and Civil Engineering Department.

This Department has a 3 years' course, and prepares technical men for the industries, building, public works, etc.

The conditions for admission are, age 15 and 2 years' attendance at a Vocational School or the 5th class of Geneva College. Entrance examinations are held, comprising French, Arithmetic and Algebra, Geometry and Technical Drawing Classes. are taught by specialists, and visits paid to museums, libraries, works, etc. Pupils not wishing to take the complete course may obtain the diploma of "Technician of the Construction and Civil Engineering Section."

No fees are charged to Swiss subjects. Foreigners pay a registration fee of $15 per term.

The regulations as to exemptions and scholarships are the same as in the other departments.

Lessons are given at engineering works and at works in process of construction, and special courses are held on industrial law and protective legislation by experts in these subjects.

STUDY PLAN.

First Year.

1st term.	*Hours Weekly.*	*2nd term.*	*Hours Weekly.*
Algebra	6	Algebra	6
Mechanics	4	Mechanics	2
Geometry	6	Geometry	6
Descriptive Geometry	4	Descriptive Geometry	6
Physics	4	Physics	4
Composition, Correspondence	2	Composition, Correspondence	2
Civil Engineering	2	Civil Engineering	4
Construction, Drawing	16	Construction, Drawing	14
Total	44	Total	44

Second Year.

3rd term.	*Hours Weekly.*	*4th term.*	*Hours Weekly.*
Algebra	3	Algebra	2
Mechanics	3	Geometry	2
Chemistry	2	Technology	4
Resistance of Materials	4	Resistance of Materials and Applied Graphic Statics	8
Elementary Graphic Statics	2	Civil Engineering	4
Civil Engineering	8	Construction, Drawing	16
Construction, Drawing	10	Workshop Practice	8
Workshop Practice	12		
Total	44	Total	44

Third year.

5th term.	*Hours Weekly.*	*6th term.*	*Hours Weekly.*
Mensuration	6	Civil Engineering and Exercises	20
Legislation	2	Construction, Drawing	24
Graphic Statics and Resistance of Materials	8		
Civil Engineering	10		
Construction, Drawing	18		
Total	44	Total	44

Gymnastics, 2 hours weekly, optional for all students.

D. Mechanics' Department.

The aim here is to train skilled workmen, who will be thoroughly familiar with their trade, and have sufficient technical knowledge to be able to take up the various branches of their work, and to rise to superior positions.

Apprenticeship lasts 3 years. The instruction is theoretical and practical, covering 54 hours a week, of which about 14 are devoted to Elementary Mathematics, Technical Drawing, Mechanics, and Elementary Physics, Electricity and Chemistry as required in the industry. The remainder of the time is given to practical work.

Attention is given not only to the manual and technical instruction of the pupils, but to the development in them of the qualities necessary in a good workman, and of healthy habits. A young man must not only be able to use his tools well, but must learn to work quickly and carefully, and to spend his time usefully, being careful as to his language and conduct.

The sub-committee of this Section, composed of well-known industrialists, examines the pupils' work each month, and sees that the instruction given is in accordance with the needs of the industry.

In addition to the annual examinations, pupils on the conclusion of their course may take the Apprenticeship Examination of the Department of Commerce and Industry.

Pupils graduating from this Section soon find good positions, and rise to comparatively high places in their occupations, which is satisfactory evidence of the efficiency of the school. The Committee spares no pains in improving and modifying the programme, or in insuring comfortable conditions for the students. The workshops are large and well ventilated, and equipped with the latest appliances, which are renewed annually, so that pupils are always up-to-date.

Students in this Section who have completed their apprenticeship may continue their course in the section of Applied Mechanics and Electro-technics, to the second year of which they are admitted without examination.

Intending students in this Section must be fully 14 years of age, and be able to pass an examination in the following subjects: French, Algebra, Geometry, Mechanics, Technical Drawing. Pupils graduating from the second year of the Vocational School or from the 5th class of the College are admitted without examination. In exceptional cases, pupils with practical experience may be admitted to higher classes, provided they pass the necessary examination.

There are no fees for Swiss pupils. Foreigners pay $3 a month, and all pupils pay $4 a year for materials and appliances. Outside pupils attending classes pay 75c a year for a one-hour lesson per week. All the more expensive materials are provided by the school, but pupils have to furnish their own exercise books, compasses, drawing board and T-square—total expense about $1.50, which suffices for the whole course. Pencils and pens, ink and drawing paper amount to not more than 10c monthly. All pupils are insured by the State against accidents.

Regulations for exemptions and scholarships are the same as in other Sections.

The pupils in the various classes make complete sets of tools of the value of about $24 a set. Pupils whose conduct is satisfactory and who complete their three years' apprenticeship, are allowed to keep a set for their own personal use. There are about 60 pieces in each set.

Second and third-year pupils are permitted to use books in the library, and under certain conditions to take them home. Third-year pupils also visit industrial establishments, central stations, or other installations.

Diplomas are awarded in each branch to pupils whose progress and conduct are satisfactory.

STUDY PLAN.

Branches.	*1st year. Hours Weekly.*	*2nd year. Hours Weekly.*	*3rd year. Hours Weekly.*
Algebra	2		
Mechanics	2	3	4
Geometry and Resistance	3	2	
Physics		2	1
Chemistry		1	1
Electricity			3
Drawing	6	6	6
Workshop Practice	41	40	39
Total	54	54	54

Gymnastics (optional) 2 hours weekly.

E. Applied Mechanics and Electro-Technics Department.

The aim of this 3 years' course is to train competent assistants to engineers and directors in the planning of projects, the direction and supervision of construction or exploitation works, and mechanical and electrical undertakings. On leaving the school they possess the knowledge necessary to enable them to become designing-constructors, head installators, managers, etc.

Intending pupils must be fully 15 years of age, and have attended the Vocational School for 2 years, or the 5th class of Geneva College, or failing these are required to take an examination. The course covers 6 terms, and the greater part of the instruction is of a general character, though 8 hours a week are taken in the workshops. Visits are paid to industries in the neighbourhood, and even further afield in the Canton and in other countries.

The course is divided into three sections, corresponding to the three years, as follows: Preparation, Development, Application. The aim is not to overload the pupil with knowledge imperfectly assimilated, but to train him to use the knowledge acquired, to work, reason and discover for himself. It requires fully 3 years for boys of 15 to be developed sufficiently before they leave the school to enable them to occupy positions which demand thorough technical training and responsibility.

On the conclusion of the third year, pupils whose attainments justify it may sit for an oral examination for the Diploma of the Section of Applied Mechanics and Electro-technics.

The pedagogical control and supervision of the instruction is undertaken by an official whose duty it is to keep in touch with the parents or guardians of the pupils and to report on the progress made.

The entrance examination comprises French, arithmetic and algebra, geometry, technical drawing. Candidates wishing to enter higher classes must pass an examination accordingly.

No fees are charged to Swiss pupils. Foreigners pay $15 a term, and all pupils contribute $10 a term for materials and appliances. Pupils are insured against accident by the State. The same arrangements for exemptions and scholarships apply as in the other Sections.

There is a Library containing 1,100 volumes attached to this Section, available for 2nd and 3rd year pupils, either at the library or at home. Visits are paid to industrial establishments and lectures on general and technical subjects are held, legislation and protective measures being dealt with by experts.

Pupils desiring to continue their technical studies in Engineering Schools or at the University can prepare for the examinations here, or may attend the College of Geneva for that purpose.

TIME TABLE.

First Year.

1st term.	*Hours Weekly.*	*2nd term.*	*Hours Weekly.*
Algebra	6	Algebra	6
General Mechanics	4	General Mechanics	2
Geometry	6	Geometry	6
" Descriptive (theory)	2	" Descriptive (theory)	4
" (application)	2	" (application)	2
Physics	4	Physics	4
Industrial Chemistry	2	Industrial Chemistry	2
Composition and Correspondence	2	Composition and Correspondence	2
Applied Mechanics:		Applied Mechanics:	
Theory, Exercises	6	Theory, Exercises	8
Workshop Practice:		Workshop Practice	
(wood)	8	(wood)	4
" (iron)	2	" (iron)	4
Total	44	Total	44

Second Year.

3rd term.	*Hours Weekly.*	*4th term.*	*Hours Weekly.*
Algebra	3	Algebra	2
Geometry	3	Geometry	2
Graphic Statics	2	Physics	2
Physics	4	Industrial Chemistry	4
Industrial Chemistry	4	Resistance of Materials	2
Resistance of Materials	4	Electro-technics:	
Electro-technics	2	Theory, Exercises	8
Applied Mechanics:		Applied Mechanics:	
Theory, Exercises	12	Theory, Exercises	16
Workshop Practice	10	Workshop	8
Total	44	Total	44

Third Year.

5th term.	*Hours Weekly.*	*6th term.*	*Hours Weekly.*
Legislation	2	Electro-technics	
Electro-technics:		Theory, Exercises	14
Theory	19		
Applied Mechanics:		Applied Mechanics:	
Theory, Exercises	17	Theory, Exercises	24
Workshop	6	Workshop	6
Total	44	Total	44

Gymnastics, 2 hours weekly, optional for all students.

EXTRACTS FROM OFFICIAL REGULATIONS.

The School Council.

The general direction and administration of the School is confided to a director who is in touch with the needs of local industries and possesses the necessary general, technical and artistic knowledge. He is assisted by a secretary-accountant.

The pedagogic control of each Section is in the hands of an official appointed for that purpose, who is responsible for the discipline and supervision of instruction. These officials are selected as far as possible from among the professors and workshop foremen.

The Director and aforementioned officials form the School Council, which meets at least once a month, and is presided over by the Councillor of State appointed by the Department of Public Instruction, or in his absence by the Director. The minutes of all meetings are to be kept by the Secretary-Accountant.

Supervising Committee.

The School is placed under the supervision of a Committee which has to advise on all questions of general interest to the establishment, submitted by the Department or one of its own members, especially on rules, programmes, methods of instruction, organization and management of workshops, scope of examinations, etc.

The Supervising Committee must include industrialists, artisans, artists and workmen. It is appointed for 3 years, and consists of 30 members, 10 being appointed by the Grand Council, 10 by the Council of State, and 10 by the Central Commission of the Board of Arbitration. The Committee must meet at least once a term, and may do so at any time that the President thinks fit, or five members demand it. It is divided into 5 sub-committees, each of which has charge of one section of the school. Each sub-committee appoints its own president and secretary, and controls the instruction given, and particularly the workshop courses, in its own section. It may call upon the Director, supervisors or heads of workshops to assist in its deliberations, and the latter may appeal to it if they wish. Members of the committee may visit the classes and workshops at any time, decide upon the courses and attend at the examinations.

The Teaching Staff.

Instruction is given by professors and workshop instructors. All are to meet periodically to discuss the affairs of their respective departments, and minutes of the meetings are to be sent to the Department of Public Instruction as soon as possible. Meetings are called by the Director when he thinks fit, or by the demand of one-third of the staff.

Work and Pay of the Students.

The courses in this school take the place of apprenticeship to an ordinary master. The products of the work of the students are sold. The Director said, "I find it better to make machines to sell to the trade than to make them for our own use, because it brings our work up to a commercial trade standard."

In the division of Joinery, as a rule during the first year the students do not receive any part of the revenue from the products of their work. In the second year they receive one-third of what comes in from the products they have made, and in the third year they receive half of what comes in from the products they have made. In this division also the students sometimes work during the third year outside the school itself with a master joiner.

When the apprentice students leave the school and go to work, the opinion is that they do not work as fast as those who have been trained in commercial workshops, but that they are so much better instructed that they soon make greater progress. After they graduate, they are accepted into the trades unions and receive journeymen's wages.

Students Trained to Observe and to Serve.

In the Industrial Art Department great care is taken to develop good taste, to make students go to Nature and Geometry for the originals of their sketches for designs. As one of the masters said, skill comes through observation and not through mechanical training. Much attention is given to Modeling in clay as well as Drawing.

In the Construction and Civil Engineering Department students are given projects to work out. Part of the final examination consists in a student, having received a certain amount of data, planning, designing, drawing and specifying all particulars, such as those for a steam engine or some other mechanical project.

In this Department also, before the students in Architecture graduate, each one is required to design and make drawings, and prepare specifications fully for a villa proposed to be erected on a site which has been assigned to the student in connection with this study.

In this Department boys of the first and second years do some routine work for the students of the third year, as for example, in coloring and tracing of plans. This experience is held to be good for both sets of students.

SECTION 4: THE TECHNIKUM AT WINTERTHUR.

The Technikum in Switzerland is an institution similar to the Middle Technical Schools of Germany. The one at Winterthur may be taken as typical of the others. The instruction is chiefly theoretical. Liberal use is made of models and apparatus and appliances to illustrate principles and their application.

Intending students are requested to do practical work for one year before entering the school. If they have not done that, they may attend the course for one year and then do practical work in a shop for one year. As a matter of fact, the students who attend have in most cases completed their apprenticeship and done two or three years' practical work. Some of the students observed were at least 30 years of age.

The Technikum does not carry students as far as the Federal Polytechnic School. Seventy-five per cent of those who take the courses enter upon occupations; 25% continue their studies at the Federal Polytechnic.

The Technikum is controlled by the Canton, and receives grants for its maintenance to the extent of about 50% of the annual cost from the Federal authorities. The Federal grants are made specially for the School of Commerce and the Railway Officials' Department. About one-fourth of the 600 pupils in attendance receive free instruction, and some of them receive maintenance allowances from Cantonal sources.

The aim of the school is to train middle-grade employees in the theory and practice pertaining to their occupation. There are eight Departments, as follows:—Building, Machinery, Electro-technics, Chemistry, Industrial Art, Geometry and Surveying, Commerce, and Railway Work The Machinery, Electro-technics, Chemistry, Geometry and Commerce courses cover 6 terms of 6 months each; the Building and Industrial Art 5 terms of 6 months each, and the Railway Class 4 terms of 6 months each. The 1st, 3rd and 5th grade of all departments is taken in the summer, the 2nd, 4th and 6th in the winter, except in the Building Department, which goes on all the year round.

The Building Department.

Students in this Department are trained in planning, calculations, execution and management of all civic buildings, and may also become architectural designers, building managers and building masters.

The Machinery Department.

The main object of this Department is to train machine technicians who can take a position between that of a mere designer and that of a managing engineer in construction offices. They learn enough theory to place them above the purely practical worker, and to enable them to rise to higher positions. Industrialists who wish to instal machines in their works can here learn how to manage them, and special courses are offered in spinning, weaving and heating.

The Electro-technical Department.

Men are trained for every branch of electro-technical work—construction, planning and managing installations, technical laboratory assistants, etc. Whilst general machine construction is studied, the men whose work will be in mixed industries are also considered.

The Chemistry Department.

Practical chemists for all branches are trained here, and after the general preliminary course necessary for all chemical industries, special courses are given for those wishing to take up bleaching, dyeing, finishing, printing, etc. Those students who will require a knowedge of machinery, as in cement, brick and paper factories, and in tanning works, are recommended to take the machinery and chemical courses consecutively.

The Industrial Art Department.

Industrial Drawing and Modeling are studied, with auxiliary departments in special subjects. Decorators, sculptors and wood-carvers come here for practical work, and a thorough preparation is given to those requiring advanced industrial art.

Department of Geometry and Surveying.

This Department is especially intended for surveyors, and prepares for the Government examinations. Theory and practice are taught on the lines laid down in the official programme, and students learn to lay out simple roads, streets, landscape architecture, drainage and water plants, and to qualify as technical agricultural surveyors.

The Commercial Department.

As this Department prepares for commercial careers, languages and arithmetic are emphasized. Political economy is taught, so that the modern merchant may understand the conditions of his business. There is a special course in merchandise, with laboratory work. Those expecting to take positions in the Post Office are recommended to attend this Department.

The Railway Department.

This Department prepares officials for the railway service, and most of the pupils who attend are employees of the State Railway Department. The course is one of two years. The general education given is more advanced than that of the ordinary Secondary School, and special instruction is offered in addition. Railway apprentices who have taken this course are exempted from examination, and their apprenticeship is shortened to one year. As railway apprentices must be 17, this course fills the gap between Secondary School and apprenticeship.

Relation of Courses to Practical Work.

As this institution does not profess to give purely practical training it is advisable for young men attending the Building, Machine and Electro-technical Departments to have had a period of apprenticeship before entering, or failing this, to take it after the first two terms. The classes are so arranged that practical work can be taken in summer and theory in winter. Students in the Machine and Electro-technic Departments are advised to take their apprenticeship first, or the following arrangement may be made:—after three years at the Secondary School, the first two classes of the Technikum may be taken, then apprenticeship in a workshop or trade school, and finally the advanced instruction in the 3rd to 6th classes of the Technikum.

The one-year course at the Metal-Workers' School in Winterthur, consisting entirely of practical work, can be taken in conjunction with the second term at the Technikum, although the two schools are not connected in any way.

Students in the Industrial Art Department should have taken one year's practical work before entering.

In the Geometry Department no practical experience is demanded, but 2 years or so should be taken after the fourth term, as students will then be better prepared for the work of the last two terms, and will have attained the necessary age of 18 for taking the examination.

Entrance Requirements and Fees.

An entrance requirement for all departments is age of 15. No examination is required of those coming from the 3rd class of a Secondary, Real or District School.

The fees are $6 a term, plus registration fee and a contribution towards the upkeep of the collections; also laboratory fees where laboratory is used. Outside students taking single courses or classes pay 40c. per lesson and 40c registration. Foreigners are charged double fees. Bursaries and free places are available.

The subjects included in the entrance examination are German, French (for commercial and railway departments), arithmetic, algebra and geometry.

Subjects.

Building Department. German, arithmetic, algebra, geometry, physics, chemistry, linear drawing, freehand drawing, modeling, building construction and drawing and ornamental drawing, mineralogy and geology, ornamental modeling, stone cutting, calculations, heating and ventilation, water installation, book-keeping.

Machinery Department. German, arithmetic, algebra, geometry, physics, chemistry, machine drawing, freehand drawing, mechanics of construction, materials, statics, elements of machinery, dynamics, graphic statics. Optional—spinning and heating.

Electro-technical Department. German, arithmetic, geometry, geometrical drawing, physics, chemistry, machine and freehand drawing, materials, statics, mechanics, construction, power machines.

Chemistry Department. German, arithmetic, algebra, geometry, linear drawing, freehand drawing, physics, inorganic chemistry, analytical chemistry, technical drawing and sketching, mineralogy and geology, technical chemistry, machinery, bleaching, dyeing and printing, microscope work, laboratory work, agricultural chemistry, book-keeping.

Industrial Art Department. German, arithmetic, linear, ornamental and plant drawing, projections, architectural drawing, figure drawing, anatomy, technical drawing, modeling, style.

Geometry and Surveying Department. German, arithmetic, mathematics, physics, chemistry, linear and freehand drawing, plant drawing, descriptive geometry, geography, mineralogy and geology, surveying, agriculture, botany, building and materials, building mechanics, construction, plans and maps, technical arithmetic, agricultural chemistry, hydraulics, water installations, canals, French.

Commercial Department. German, French, English, Italian, history of commerce and civilization, commercial geography, arithmetic, book-keeping, correspondence, algebra, physics, chemistry, writing, stenography, foreign correspondence, commerce, political economy, merchandise, commercial law. Spanish is optional.

Railway Department. German, French, Italian, arithmetic, geography, physics, merchandise, stenography, railway law, transport service, telegraphy, internal and external service, first aid, currency, and prices. English is optional.

General Notes.

Optional courses are held for students and visitors in languages, German literature, constitutional law and physical training.

In the summer term of 1910 there were 599 pupils in all Departments, in the winter term, 615.

The building and other technical department students visit various works and industrial establishments.

The school has a library, a physics collection, and extensive collections of models for the various departments.

THE INDUSTRIAL MUSEUM, WINTERTHUR.

This Museum is visited by students of the Technikum and by the general public. It consists of collections of industrial art objects, literature, reference works, etc. The value of the machinery exhibit is estimated at about $7,000 and that of the industrial art exhibit at $900.

Exhibitions are held of the work of students of the Continuation Schools and Metal Workers' School, and of apprentices' work for examination by the Cantonal authorities. Other exhibitions are held from time to time, and various courses of instruction for masters and others are arranged, for evenings and Saturdays, covering from 2 to 10 or more lessons. Objects are lent from the collections for inspection and copying, and maps are circulated among groups of students. The lending library was patronized by over 7,000 people in 1910.

SECTION 5: THE TECHNIKUM AT BIENNE.

This establishment is under the administration of the Canton. The annual budget is $50,000. There are 32 professors and 6 supplementary professors. The attendance was 340 students in the 8 sections or departments of the Technikum. It is similar in regard to its organization and courses to the Technikum at Winterthur already described. The departments are as follows: Mechanics, Electricity, Watchmaking, Architecture, Industrial Art, Engraving and Sculpture, Railways and Postal Service, and Preparatory Course.

The Railways and Postal Service Departments are equipped with all the apparatus in miniature that is used in these departments.

This Technikum is intermediate between the ordinary vocational or apprentice schools and the Federal Polytechnic School. The course covers 3 years, and is mainly theoretical, but closely connected with practical work. Men from this school take positions as foremen and superintendents.

Candidates for admission must have completed 9 years' attendance at a pro-gymnasium, or have served two years' apprenticeship. Pupils enter on probation for the first 3 months. The fees are $10 per term, except in the Watchmaking and Mechanics Department, which cost $2 per month. Foreigners pay $14 and $5 respectively. There is also a charge of $1 per term for materials. Pupils who attend for lectures only pay 40c. per term for each course of 1 hour a week, or $10 in all. Pupils may purchase articles made by them at cost price of materials.

Examinations are held at the end of each term, and diplomas awarded.

SUBJECTS OF STUDY.

The subjects in the various departments are as follows:—

I. MECHANICS.

A. Upper Division (for directors, foremen, etc.).

1st term.—French or German, English (optional), arithmetic, algebra, geometry, physics, chemistry, projection, freehand drawing, penmanship, and workshop practice.

2nd term.—French or German, English (optional), algebra, geometry, physics, chemistry, descriptive geometry, machine drafting, workshop practice.

3rd term.—Italian, algebra, geometry, descriptive geometry, physics, mechanics, theory of machines, technology, materials, machine construction.

4th term.—Italian, algebra, geometry, physics, mechanics, theory of machines, technology, graphic statics, strength of materials, construction of machines, electro-technical work, workshop practice.

5th term.—Mathematics, technical installation, (heat, motors, hydraulic, etc.).

6th term.—Mathematics, installation of heating plant, motors, theory of machines, general, estimation of cost, hygiene, factory laws, precautionary measures, etc., elevators, construction of machines, chemistry, kinematic geometry, electro-technical work, workshop practice (individual).

B. Practical Division (for metal workers).

(a) THEORY.

1st year.—German and French, arithmetic, algebra, geometry, physics, chemistry, workshop technology, technical drawing.

2nd year.—German and French, algebra, solid geometry, physics, workshop technology, machine drawing.

3rd year.—Mathematics, mechanics, technology, machine drawing, book-keeping.

(b) PRACTICAL WORK in the Apprentice workshop (3 years).

II. ELECTRICITY.

A. Upper Division.

1st, 2nd and 3rd terms the same as for Mechanics. *4th term* the same as for Mechanics, with more electro-technical work. In the *5th term* the same subjects down to chemistry, plus magnetism and electro-magnetism, laboratory work, mountings, construction of machines.

6th term.—Motors and mathematics, as for mechanics; Electro-magnetism, telegraph and telephone, laboratory work, electric railways, mounting plant, chemical laboratory.

7th term.—Mathematics, installation of works, plans for electrical outfits, machines and transformers, electrolysis, laboratory work.

B. Courses for Electric Fitters.

The same as for Mechanics and Electricians to the end of the 4th term.

5th term.—With electricians, elevators, and transportation machines (optional); applied chemistry, motors, electric technique, magnetism and electro-magnetism, installation, laboratory, fitting, theory and practice.

6th term.—With electricians, electro-dynamics, telegraphing and telephoning, dynamos, installation, motors, electric railways, electro-technical works, fitting, construction, drawing, laboratory work, alternating currents.

III. WATCHMAKING.

Two languages, arithmetic, algebra, geometry, trigonometry, mathematics, physics, chemistry, cosmography, book-keeping, theory of watchmaking, mechanics, theory of regulating, technical drawing, letter engraving, electro-technics, practical work (about one-fourth of the whole time).

IV. ARCHITECTURE.

Two languages, Italian (optional), arithmetic, algebra, geometry, trigonometry, physics, chemistry, caligraphy, geology and mineralogy, projection drawing, descriptive geometry, stone cutting, freehand drawing, architectural drawing, theory of construction, study of styles, nature of materials, mechanics, statics and strength of materials, practical work, land surveying, direction of works, legislation and hygiene, electro-technics, plans, book-keeping, perspective, modeling, wood joints, rural architecture, fire service, construction of machines, estimates, bridges and highways, embankments, hydraulic works, history of art and architecture, life-saving.

V. INDUSTRIAL ART.

(A.) Preparatory Course.

Freehand drawing, linear and projection drawing, light and shade, architectural drawing, ornaments and figures, study of styles, practical work (21 hours a week the first term and 10 the second.)

(B.) *Special Course.*

Perspective, vocational drawing, theory of ornamental forms, drawing from nature, drawing from living models, anatomy, work in chased leather (optional), modeling—plus the subjects of the Preparatory Course, except linear and projection and freehand drawing, and light and shade.

VI. ENGRAVING AND SCULPTURE.

Freehand and technical drawing, perspective, theory of ornamental forms, drawing from plaster casts, caligraphy, industrial art drawing, study of styles, modeling, chemistry, anatomy, drawing of plants, drawing from living models, work in chased leather (optional), engraving and sculpture. More than half the time each week is devoted to practical work in engraving and sculpture.

VII. RAILWAY DEPARTMENT.

Native language and one other, Italian, English (optional), geography, arithmetic, physics, chemistry, merchandise, caligraphy, stations and offices, signals, railway management, shipping, railway legislation, tariffs, service correspondence, telegraph service, practical work, practice in telegraphy, first aid, excursions in groups (about once a week).

VIII. POSTAL DEPARTMENT.

Native language and one other, political economy, arithmetic, algebra, physics, chemistry, caligraphy, service correspondence, telegraphing, other subjects allied to postal service.

IX. PREPARATORY COURSE. (1 year).

German or French, arithmetic, algebra, geometry, technical drawing, caligraphy.

SCHOOLS FOR WATCHMAKING.

Throughout Switzerland there are also other schools for watchmaking and clockmaking. One of the schools visited was at Geneva. That school is maintained two-thirds by the Commune and one-third by the grant from the Federal authorities. There is no entrance examination. The Director takes some of the most promising young workmen from the shops and gives them special training. Pupils must be at least 15 years of age. The length of the course depends upon the aptitude of the pupils. It usually lasts from 3 to 6 years, depending not only upon the kind of work for which the student is preparing himself, but also on the extent of knowledge he desires to obtain. When pupils graduate from the school, they have no difficulty in obtaining situations. At the end of each year's work of the school, a certificate is granted, and then at the close of the period of training another certificate is awarded, containing a record of what the student has done in the previous years.

The annual budget of the Geneva School is $13,000.

CHAPTER LIX: THE FEDERAL POLYTECHNIC AT ZURICH.

This institution, which is really a Technical University, is one of the most renowned Polytechnic Schools, or Technical High Schools, of the world. It was magnificiently equipped in the first place, and the equipment is constantly being added to.

Entrance Conditions.

Candidates must be fully 18 years of age, and possess the graduation certificate of a recognized Swiss Middle School, failing which an entrance examination is required. Outside students may be admitted to lectures on passing the required examination. Students of Zurich University are admitted on presentation of entrance card. Older students may be admitted by arrangement, without complying with entrance requirements.

Departments.

There are 8 Departments as follows:—

I. School of Architecture,—3½ years' course.
II. School of Civil Engineering,—3½ years' course.
III. School of Mechanical Engineering,—3½ years' course.
IV. School of Chemical Technology,—3 years' course in Technological Section,—2 years in Pharmacy course.
V. Agricultural and Forestry Division,—
(a) Agricultural School—2 years;
(b) Agricultural Engineering School—3½ years;
(c) Sylviculture—2 years.
VI. School of Special Teachers in Mathematical and Natural Science subjects,—
(a) Mathematical Section—4 years;
(b) Natural Science Section—3 years.
VII. General Philosophy and State-Economy Division,—
(a) Mathematics, Physics, Natural Science and Technical subjects;
(b) Languages and Literature;
(c) History and Political Sciences, Art.
VIII. Military Science Division,—
(a) Course for general students;
(b) Course for officers.

Affiliated Establishments.

The following establishments are affiliated with the Polytechnic, but managed and controlled apart from it:—

(a) The Federal Experimental Institute in Materials and Construction—affiliated to Sections I, II, III.

(b) The Central Experimental Forestry Station—affiliated to Sylviculture Section.

(c) The Federal Agricultural Experiment station for,—

1. Agricultural Chemistry;
2. Seed Control.

(d) The Central Metereological Station, less closely related to the school.

Aims of the School.

The titles of the various departments sufficiently indicate their scope. From its establishment, the school has always endeavored to keep its character of Higher Technical School, and to give its pupils the highest possible scientific training for practical vocations by means of theory and practice combined. Modern conditions require specialists of a high order of intelligence for the solution of practical technical problems, and the aim of this school is to train such specialists.

The fundamental courses are the obligatory ones in pure mathematics, mechanics, physics and chemistry. These courses are uniform for all courses at the beginning, specialisation following later. The aim is to stimulate pupils to work for themselves and to assimilate the subjects intelligently, through combining practice with theory.

Arrangement of Courses.

The general courses in History, History of Art, Literature, Modern Languages, Political Economy, Statistics, Swiss Constitution, Administrative and Commercial Law, Pure Mathematics and Aesthetics, are open to all students, who must attend them for at least one term, with a view to avoiding the separation of technical and cultural subjects, and insuring to all a certain standard of general education. The courses are divided into groups of related subjects, the first group consisting of Literature, History and Political Science, Philosophy and the Fine Arts; the second of Mathematics, Natural Science and their technical applications, with a wider scope than the special departments offer.

There are preparatory courses for some of the special sections, or for those students who merely wish to supplement their general education.

The Military Science Section was established and is maintained by the Federal Military Department, and its professors are separate from those in other departments. It is especially designed to train officers for the Swiss army.

Under the regulations of the school, professors may teach in either German, French or Italian. The native tongue of most of the students, and of the district in which the school is situated, being German, this is the predominant language of instruction; but as the school is national in its scope, French is largely used in addition to German, and in many of the principal branches professors of both nationalities are employed. The tendency is to combine the French with the German, each supplementing the other.

Teachers are of three classes, regular, assistant and honorary. Appointments are usually of 10 years for the regular teachers and indefinite for the other two classes. Salaries are paid partly from fees, and pensions are awarded.

UNITED STATES.

CHAPTER LX: THE ORGANIZATION AND ADMINISTRATION OF EDUCATION.

Education in the United States is so varied and diversified in organization, administration and method that nothing like a full or clear statement can be made within the limits of this Report. The Commission had the advantage of seeing representative schools and institutions for most of the several kinds of industrial training and technical education provided. A fairly complete report of the organization and courses of study in typical schools is presented.

The Commission had the advantage of "Conversations" with a number of very able men and women who have had experience in various fields of education, particularly in some form of vocational, industrial or technical instruction. In some cases the information derived from these "Conversations" has been put with the school or institution with which such person was connected. The Commission had also the advantage of "Conversations" with many other leading men and women in educational work in the United States. The choice of what to publish was made chiefly in consideration of the experience and the official position of the individual, and the appropriateness of the information given, or the opinions expressed, to the situation and conditions in Canada.

SECTION 1: FROM REPORT OF THE COMMISSIONER OF EDUCATION.

By way of introduction, and to present a general survey of the whole field, the following extracts are taken from the Report of the U. S. Commissioner of Education for 1910:—

It is generally understood that we have in this country no national system of school administration. The primary responsibility for educational control rests with the several States. No one, I am sure, would seriously propose that the States be relieved of this responsibility or of the powers which accompany it. But the nation cannot be indifferent to that which forms the character of its citizens, upon which every national hope and aspiration depends. While we have no national system of schools, we have a national program of education. This program, in the nature of the case, must grow with our national growth, and every enlargement of our national power, resources, aims, and influence calls for a re-examination of our educational establishment to see whether it is keeping pace with the new requirements.

The annual reports of the Commissioner of Education are in effect a running account of the progress made by the nation in the carrying out of this educational program. But our aims become more definite as they are brought nearer to realization. So these reports are equally a record of the progressive definition of our program. While we seem to have gone forward rapidly in both the understanding and the performance of the work we have to do, it is pretty well agreed that in many particulars we are still laggard. This annual record of movements and events should not only clarify our aims but should concentrate attention upon those points where special endeavours are most needed.

AMERICAN EDUCATIONAL ORGANIZATION.

In this introductory chapter of my report for the year 1910, accordingly, a new attempt will be made to set forth some of the main features of the American educational program and to point out some of the places at which there is need of improvement.

Our educational organization, answering as it does our federal plan of government, presents peculiar advantages as regards the making of a varied, flexible, yet inherently unified system of instruction. It is an organization not readily understood by foreigners. It offers many obstacles to the carrying out of any plans for rapid and uniform improvement. Yet the self-governing character of its several members is of itself an incalculable advantage. Whatever unity is attained must be an inner unity, an agreement through conviction. There are a thousand forces working for unity and capable of giving us all of the unity that we need. To bring those forces to their finest influence, to do generously and effectively the things which under our form of organization may rightly be done, and by so doing to maintain through all the changes of history that national character which is to make us a unit of concentrated and uplifting influence among the nations—this is, in part, the work of American education.

Stated in briefest terms, the essential elements of our educational organization are the following: first, the school and university systems of the several States; secondly, the same State systems as united in free co-operation in matters of common educational interest; thirdly, the provision made by the Federal Government for the encouragement and furtherance of education under these State systems.

Such provision by the Federal Government has taken three forms: the granting of public lands for education in the several States, beginning shortly before the adoption of the Federal constitution and culminating in the grants for agricultural and mechanical colleges in 1862; the establishment in 1867 of the Federal Education Office which aids the States by its information service and furthers their co-operation; and finally, the distribution of Federal funds, under the oversight of the Bureau of Education, in aid of agricultural and mechanical colleges in all the States, under the acts of 1890 and 1907.

Other facts necessary to the most general understanding of our national organization of education are the following: That our public systems, which form the backbone of the educational provision in all of the States, are freely supplemented by institutions privately supported and privately managed; that we have been working out a peculiarly close integration of the several grades of education, elementary, secondary and higher; and that historically our education is in the main liberal and general in its character, instruction of a technical and professional sort being an offshoot from this central trunk.

If we add that in our educational activity we have shown ourselves hospitable in a marked degree to experiments, to incidental developments, and to all manner of popular extensions of the field of education, we have a fairly comprehensive statement of what American education has been and is endeavouring to be.

Re HIGHER EDUCATION, EVENING CLASSES, AND FELLOWSHIPS.

The democratic movement in higher education has taken definite form in several important administrative changes, In October, 1909, the College of the City of New York entered upon a series of night sessions. Speaking of the character of the students, Dr. Stephen Pierce Duggan, director of the evening sessions, says: "Their experience in life gave them a conciousness of the need of education that could not be expected of the day students." Columbia University has reorganized its extension service, providing classes and laboratory work at the University during the evening and classes at various places in the adjacent country during the day. Fresno, Cal., is the first city to make provision for the two-year post-graduate high school course recently authorized by the Legislature of that State. It will aim " to carry students through the first two years of college or university work."

One of the noteworthy efforts to bring higher education into closer relations with the industries has been the establishment of ten fellowships in industrial chemistry in the University of Kansas. The latest University catalogue declares that "the University believes the best training for an industrial chemist is pure chemistry. . . It will accept from corporations or individuals of business standing and integrity, fellowships for the solution of industrial problems of public importance."

The centering of public interest upon our State universities and their relations with other educational institutions is one indication of a genuinely democratic movement in our higher instruction. Ezra Cornell proposed to establish "an institution where any person can find instruction in any study." President Van Hise has gone further in declaring that "So far as the University of Wisconsin is concerned, we propose to take up any line of educational work within the State for which the University is the best fitted instrument." And adds "It is my ideal of a State University that it should be a beneficent influence to every citizen of the State."

LAND GRANT COLLEGES.

The land grant colleges have been active during the past year in establishing and improving their facilities for the preparation of teachers of agriculture and the mechanic arts, and in establishing and developing their departments for extension work. Thirty colleges out of fifty-two are now giving special instruction in preparation of teachers of agriculture and the mechanic arts; nineteen have organized departments of agriculture or industrial education and are giving instruction in pedagogical subjects as well as in agriculture and the industries; thirty are conducting summer schools primarily for public school teachers, where they may receive instruction in agriculture and agricultural teaching; and forty have departments equipped for extension work.

The agricultural extension movement was stimulated by an action of the Association of American Agricultural Colleges and Experimental Stations at its annual meeting held in Portland, Oregon, in August 1909, when an amendment to its constitution was adopted admitting a "section on extension work" upon equality with the two sections then in existence. The experiment stations, since their establishment in 1887, have accumulated a mass of practical and scientific information concerning agriculture, which the college now propose to bring to the farming population in usable form. By movable schools and farmers' institutes, the teachers of agriculture and the experiment station investigators are coming into direct contact with these people and the contact is of mutual benefit. The new provision for travelling specialists in the States of Idaho and Georgia is a conspicuous example."

College departments of education and of agricultural extension are joined in a co-operative movement for the betterment of the rural schools. To this end, in addition to the summer schools already mentioned, the colleges in some of the States, notably, Florida, Kansas, Massachusetts and Pennsylvania are offering correspondence courses for teachers and several have established departments of rural education under the charge of an instructor who directs and gives advice in all matters relating to the teaching of agriculture and allied sciences in the schools. Such provision in the State of Florida, Kansas, Mississippi, Oklahoma and South Carolina may be mentioned.

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MORAL TRAINING, INDUSTRIAL EDUCATION AND HEALTH.

Generally speaking it may be said that moral training, industrial education and education for health are paramount concerns in the forward movement of this present time. The attention which they command is justified by immediate needs. They present intricate and difficult problems, and the contributions of any one year to the solution of those problems must be fragmentary at best.

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There are many activities closely related to education which have received a large measure of attention in recent months. Libraries and museums, apprenticeship, public playgrounds, home-and-school associations,—such interests as these are sometimes treated as lying just outside of the educational inclosure. There is, however, an unmistakable tendency to widen the inclosure and to bring these things into some relation with the regular scholastic administration.

There are moreover numerous undertakings which look to an extension of educational opportunities to those who have left school and have passed the age of compulsory schooling. Evening and other continuation schools, public lectures, correspondence courses, home studies of the Chautauqua type are all familiar examples.

Some of these things are distinctively American, and have helped to make our reputation for educational enterprise abroad. Others are better done in foreign countries than our own, and we are learning from their experience. The thing to be noted here is the way these undertakings, even if privately managed at first, keep gravitating towards the main body of our educational system.

The new attention to playgrounds and play opens up another avenue of approach to this end; for play is closely connected with the educational interests of health, of free expression, and of music, the drama, and the dance, through which we come into the field of the fine arts. Moreover, these associations of parents and teachers, which are accomplishing a great enlargement of the out of school uses of our public school buildings, bring work and play together in ways that are wholesome and interesting.

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SOME FUNDAMENTALS.

In these days the voters consent with all readiness to bear the expense and raise the taxes for a great variety of these newer activities. While this attitude is to be applauded and the most of the newer activities are to be regarded as calling for unqualified support, there is occasion for the strongest possible emphasis upon the old and basic needs of our educational establishment. There be three of those needs which occasion anxious thought; yea four of them will have the attention of wise men in our generation: the need of good teachers; of good schoolhouses; of good school attendance for full terms of school; and—equally important under modern conditions —of adequate supervision.

INDUSTRIAL EDUCATION.

By industrial education is meant here the new direction which has been given during the past decade to hand training. This new direction comprehends the training in school of youth for specific vocations in the industries. It differs from ordinary Manual Training in that it is vocational and specific, while Manual Training is cultural and general in its aim. In its broader application it is sometimes used to include every form of training for the industries, but in recent years the tendency has been to narrow the meaning to make it practically synonymous with trade training.

While it is not claimed that industrial education is distinctly a city school movement, it is true that the major part of what has been accomplished in this country for training for the industries has been in the cities. It is in the cities that industrial needs are the greatest. From a list of 142 industrial schools prepared in the Bureau of Education in 1910, 121 or 85% were found to be in cities of 25,000 population or over. This list however, did not include industrial schools for Indians and for the colored race, many of which are located in rural communities. But of the technical high schools which offer instruction more or less industrial in aim, practically all are in the larger cities.

Two agencies that have given decided impetus and direction to the new movement are the Massachusetts Commission on Industrial Education and the National Society for the Promotion of Industrial Education.

Though the new movement had an earlier origin it did not begin to take definite form in this country until about 1905. It was in Massachusetts that the first definite step was taken. Under authority of a resolve of the legislature of that State, approved May 24, 1905, the Governor appointed a Commission on Industrial Education to investigate the subject in the State of Massachusetts and as to similar educational work done by the other states, by the United States Government and by foreign governments. After several months of study the Commission made its report with recommendations, one of which was that a second commission be appointed to extend the investigation of industrial training and of local needs and to advise and aid in the introduction of industrial schools. This recommendation was embodied in the law of 1906 which created such a commission and defined its powers and duties. Under the provisions of this law, towns and cities were empowered to establish independent industrial schools and to receive state aid upon approval by the Commission. Prior to October 1st 1911, fifteen schools had been approved by the Commission and by the State Board of Education to which its functions had been transferred. On that date eight additional schools were in process of organization in anticipation of similar approval.

The appointment of the Massachusetts Commission and the publication of its reports gave great momentum to the movement for industrial education, but they have not stood alone in the exertion of such influence.

The organization of the National Society for the Promotion of Industrial Education in New York City in November, 1906, marked the beginning of a potent factor in both the development and the direction of industrial training. Its objects as stated by its founders are:

"To bring to public attention the importance of industrial education as a factor in the industrial development of the United States; to provide opportunities for the study and discussion of the various phases of the problems; to make available the results of experience in the field of industrial education both in this country and abroad, and to promote the establishment of institutions for industrial training."

The society holds annual meetings at which all phases of the subject are discussed and publishes a bulletin containing information designed to promote the objects of the organization.

In addition to this society a number of other organizations of national scope have interested themselves in industrial education. Two of the most important of these are the National Association of Manufacturers and the American Federation of Labor. By the adoption of the report of its committee on industrial education made in May 1910, the Association of Manufacturers committed itself to the policy of taking boys of 14 years of age and giving them four years of training corresponding to the high-school period—half skilled work and half suitable schooling.

At the thirteenth annual convention of the Federation of Labour held in St Louis in November 1910, the report of the special committee appointed to review the report of the committee on industrial education recommended: "That the special committee appointed by the authority of the Denver (1908) convention be continued and that committee be urged and authorized to prosecute their investigation and to lend every assistance to the accomplishment of the extension and completion of comprehensive industrial education in every field of activity." The convention concurred in the report by unanimous vote.

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RECENTLY DEVELOPED TENDENCIES.

There is no question but that the thought of all interested in the problem of industrial education is becoming measurably clearer as to the ways and means best adapted to the American conditions. While the question of methods is very far from being settled, it is evident that the experience gained from the past five or six years is being evaluated and some important deductions drawn. It is being more and more appreciated, as actual results are studied, that economic quantities are the controlling elements in the situation and that only those measures are practiacl for wide application that take full account of these quantities.

In attempting a brief summation of the experience of the past few years and the tendencies of the present the writer would offer the following: the institutions that at present occupy an important place in industrial training in this country are the intermediate industrial or preparatory trade schools, the trade school, the evening school, the part time school, and the corporation or apprenticeship school. The economic factors involved in the conduct of these institutions are of two kinds: first, the expense of plant, operation, and cost of materials; and, second, the matter of expense involved in attendance on the part of the student. Of these the second is probably the more important in determining the practical possibilities of a school type.

INTERMEDIATE INDUSTRIAL SCHOOLS.

The first mentioned school is a comparatively new type of institution, aiming to reach some of the large number of boys and girls that leave the elementary school at fourteen years of age, and to supply a training that will give them a better equipment to enter industrial life at 16. Such schools take their students at an age when the question of wages is not so generally important as later on, and when many parents are willing to support their children at school for one or two years if convinced that practical benefits will follow. There are at present in Massachusetts and New York some 10 or 12 of these schools devoted to the woodworking, electrical, bookbinding, printing and machine trades.

Taking into account the practical benefits afforded by such schools and the possibilities of attendance by a considerable number of boys and girls well fitted to become industrial wage earners, and the not prohibitive cost for large communities, it is probable that such schools will become an important factor in industrial education in towns with large manufacturing interests and over 50,000 population and that in time they will reach a considerable fraction of those boys and girls that now leave school at the end of the compulsory school period. From the character of the training required and the close articulation with the elementary school, it is apparent that such schools are best fitted for administration by public school authorities.

THE TRADE SCHOOL.

The trade school taking youths at 16 years of age or over, and furnishing a training to take the place in whole or in part of the apprenticeship system, is an institution which labors under the severest economic difficulties, whether considered from the side of maintenance or expense of attendance. Figures from schools now in operation indicate a grade of expense that obviously makes such institutions prohibitive for any except large cities, representing exceptional specialization and concentration of industries; and even in such cities it is too early to prophesy that the results obtained will be permanently considered in proportion to the expense.

EVENING SCHOOLS.

Evening schools represent the first form of industrial education in this country, and they reach to-day by far the largest number of individuals under instruction in this field. As a means of supplementary instruction in mathematics, science, drawing and technical subjects, they present a simple and effective method of industrial education, at least for young men above, say, 18 years of age. Taking the young worker after the wage hours of a day are closed, such schools and classes represent the most easily available form of industrial education for the great mass of young workingmen and the simplest types from the standpoint of organization. Practical evening classes which afford an opportunity to broaden the shop experience of the day stand in the same relation to the worker, but they offer a more severe problem in expense of administration.

Evening continuation schools were for half a century the backbone of the German system of industrial education. To-day that country is coming to a realization that for students between 14 and 18 the evening is not the best time for instruction, and she is bringing the work of her continuation schools into the day period. It will naturally require considerable time for this country to reach the same point and to bring about a general agreement among manufacturers to allow learners in their establishments to attend industrial improvement schools during working hours. The positive benefits that result when such a plan is followed, and the close correlation that is made between the work of the shop and that of the class room have, however, been so strikingly shown that this system of industrial education deserves to be increasingly studied by both employers and schoolmen. When the time for attendance upon school work is granted to learners or apprentices by employers and the wages continued during this period, the economic problem for the boy is solved and inasmuch as the public school is not called upon to supply the costly equipment for practical work, but only that instruction specifically fitted to the technical needs of the learners, the administration expense is reduced to a minimum.

In its beginnings such a plan is evidently most readily applied in cities and other localities where the concentration of high grade industries gives a large number of apprentices or learners in a comparatively few lines. The application of such a system to low grade industries and to cities of varied manufacture is evidently much more difficult both as an educational problem and as a matter of organization, but it does not seem unreasonable to expect that with increasing public support and co-operation of the employers a gradual and steady extension of this plan of education will result.

CO-OPERATIVE INDUSTRIAL SCHOOLS.

Another type of part time or, better, co-operative school also demands special attention, viz., the type in which the initiative is taken from the school side and high school students are given opportunities to spend half their time at work in industrial establishments and half at school. Such a system gives a larger amount of time to general education, but although very promising results have been obtained from experiments at Fitchburg and Beverly, Mass., it still remains to be seen whether such schools will become an important factor in supplying a large number of workers to the industries.

APPRENTICESHIP SCHOOL.

The apprenticeship or corporation school is a part time school of the first type, in which both practical training and instruction is given within the commercial establishment. Where the industrial corporation is of great size, it is probable that this method, which allows a maximum of co-ordination between both lines of instruction, will be increasingly adopted, but for a great majority of industrial establishments such a plan is hardly practicable and division of labor between the employer on the one hand and the public school on the other is the method that seems to make for the greatest efficiency and economy.

SECTION 2: FROM DR. DAVID SNEDDEN.

Information obtained from "Conversation" with DR. DAVID SNEDDEN, *Commissioner of Education for Massachusetts.*

Massachusetts has always been very much interested in education, and has done a great deal for certain kinds of education, always holding the view, like their ancestors and the people of Canada, that a boy or girl growing up in a family should go out into an efficient life. That tradition is a part of the State's inheritance.

The evolution of the general elementary school in Massachusetts has been steady. Failures in development have been due not so much to lack of ideals on the part of the people, as to inability to get machinery to carry them out. The regulation compelling attendance of children up to 14 is now enforced quite rigorously; and up to 16 where a certain amount of literacy is required up to the fifth grade.

More than half a century ago there were people in the State who felt rather keenly the need of doing something to heighten its industrial efficiency; in fact, Massachusetts caught this influence from England when the Crystal Palace Exhibition in London brought it into consciousness in 1851. As a consequence, drawing was introduced into the Boston schools, being looked upon as the best instrument for the preparation of workers. In 1870 a special Normal School was started in the State for the training of teachers of drawing, naturallywith the elementary school mainly in mind. Somewhat later Manual Training came to be thought about a good deal, not only with the idea of helping the individual but particularly to react on higher industrial efficiency, a sort of inheritance of the old family idea that a boy should be trained to do good work in addition to his school training. Manual Training was made to some extent obligatory in certain city schools—mainly, however, in reference to children under 14. This legislation came in the latter eighties, but the movement itself began earlier. The first beginnings of Manual Training in America were in 1876, and arose from certain exhibitions in the Russian Department of the Centennial Exposition in Philadelphia. Sweden, through Nääs, also contributed a good deal, and there is in Boston an excellent little school of Sloyd under Gustav Larsson, where teachers are trained for the Sloyd specialized form of Manual Training.

Need for Industrial Education.

But while the people of Massachusetts recognize drawing and manual arts and Manual Training as contributing to the enrichment of general education, they frankly confess that these did not amount to anything in promoting industrial education. A great deal had been said in regard to the need of Massachusetts for more industrial education. Some years ago the Southern States began to erect textile mills. Massachusetts, which had been the supreme textile centre before that, took alarm something like that of England in recent years that a great source of prosperity might be taken away from her. Then what came to be considered was that success must be achieved along the highgrade industries, the conception that is widespread in Württemberg.

There were other factors in this problem. The textile manufacturers themselves recognized that wherever there was foremanship and skill in their works, it was very likely to be in the hands of a Scotchman or Englishman who had got his training over there. Then people began to reflect upon what would happen when that supply of leadership was wanting; so there came a conviction gradually that there must be industrial education. Very few people, however, thought of that as a possibility before the age of 14; in other words, the great majority of people thought this industrial education must be beyond the age of 14, and that the school programme should only be moderately modified.

Higher Technical Education.

Long ago the State had made certain beginnings with regard to higher Technical Education, having two very well developed schools for the training of the engineering type, which is essentially professional, and also for agricultural leaders. Those belong to the college level of education; they have little to do with the rank and file of foremanship in education. Four or five years ago, after an inquiry by the Douglas Commission, the State created a Commission on Industrial Education. Obviously the spirit of the Legislature was that these schools must be really industrial schools, that they must not be imitation schools but that they must define for themselves their purpose, and then find the means of realizing that purpose. That Commission on Industrial Education produced several reports, and under its initiative schools were started in New Bedford, Lawrence and Beverly; beginnings were made in Worcester, and a variety of evening schools were organized. The State Board of Education had existed for many years in charge of the Normal Schools, and in general supervision of the schools of the State, A few years ago, after considerable agitation, a good many people became convinced that it was not desirable to have two educational authorities in the State, and the forces were unified. Certain executive officers were provided for the Board of Education; the old Secretaryship was abolished; and the law directed the Board of Education, which is a citizen body, the members serving without remuneration and acting in a rather legislative and advisory capacity, to have a Commissioner and two deputies, one of whom should have a special acquaintance with industrial education.

Present Situation in Massachusetts.

The situation in Massachusetts now is this:—the Legislature provided that there should be industrial schools, or as the leaders prefer to call them, vocational schools, under that term differentiating agricultural schools, preparatory schools for a number of manufacturing pursuits, and household arts schools preparing for the household arts callings. There is another group of callings, which might be termed commercial—business education, etc.—which is fairly taken care of by private and general public schools, hence does not come under Industrial Education. The Legislature furthermore provided that pupils must be 14 years of age before they can enter these schools. Then in order to open the way for their development it provided that any community maintaining these industrial schools could receive out of the treasury of the State, for reimbursement, an amount equal to half the running expenses of the school, to put it broadly.

It was perfectly apparent that what the State wanted in its industrial schools, towards which it was contributing this money, was something which was in a very genuine sense vocational or industrial education. There was no feeling on the part of any of the officials that the object of this was primarily to make more effective workmen in the sense that they would be of more value to employers; the primary conception was rather that industrial education was wanted because a large number of boys and girls did not have opportunity to learn how to work efficiently. It was felt that a good deal of boys' work, while profitable, did not lead anywhere except to a blind alley, and that there ought to be something that would do for the boy what the old-fashioned apprenticeship did—to give him a broader industrial outlook, better intelligence and a wider range of skill, so that as he marched into manhood he would find himself in possession of a much more complete range of powers.

Industrial Education Must be Differentiated.

Dr. Snedden had been working on the problem of vocational education a number of years in another State, and had become convinced that to realize the purpose of a good industrial education it must be differentiated rather definitely from the traditional education, especially the traditional High School and Secondary Education, because the old-fashioned High School, of which there are many in Massachusetts, had its traditions so firmly established and its ways and methods so fixed, and its schoolmasters were so prepossessed with the academic and bookish way of doing things, that it was rather hopeless to try to make industrial education of an effective sort grow out in connection with their machinery. Hence Dr. Snedden had opposed the tendency, which he believed he found in the Board of Education and in the people who were discussing this subject when he came to Boston. He personally favored the notion that the thing to do was to build up a set of separate schools which, like infant industries, so to speak, should be allowed to work out their own methods and traditions; and that the only way to do that was to make a rather sharp line of separation—what perhaps might look to an outsider like an artificial line of separation—until they should know what the common school as such could accomplish. For about a year and a half they had been working towards the realization of that ideal; talking and lecturing over the State and writing some; assisting in the organization of schools and helping those who already had schools formulated to fix their standards and define their work.

Some Conclusions Reached.

Out of these things are coming two or three convictions which Dr. Snedden outlined with the understanding that though all the officials present agreed with them, they contained experimental features. First, Industrial Education is going to succeed only as it finds its group, and they must locate the group. As long as the assumption is that all boys are alike in point of ability and economic possibilities and surroundings, independent of interests and tastes and ecomomic future, not much progress will be made, because in every community there are a certain number of boys whose economic position, tastes, aptitudes and opportunities of all sorts lie along the line of becoming members of professions that it is very important to have. After all, their number is limited, and they have been very well attended to in the education thus far.

Then there are other groups. To-day a very large number of boys and girls leave school as soon as the law permits, and go to work, many of them because they like to work and they like any kind of work better than school work, for they have reached the point where they don't care any longer for the very bookish studies of the school. That must be admitted, and accepted as a fact. In Massachusetts tens of thousands of boys and girls go into industry just as soon as the law permits them. The type of work to which they go is not very good, from the standpoint of its educational possibilities. It does not have in it very much of capacity for developing their powers, industrial or other. That period from 14 to 18 is peculiar, being not only the plastic period as far as the ability of youth to learn is concerned, but peculiarly the period during which the necessities of the youth require that he should be taught something substantial towards a calling.

Practical Work First, Books Second.

These industrial schools are built up on separate bases, the conception being that they must be housed separately and work out their own conditions. The following conclusions, which are somewhat startling, have been reached. Under the present plan of procedure the idea is that a boy of 14 should give 60% 70% or 80% of his time not to studies in books at all, but to doing in some broad lines the work he is fitting himself to do. If it is a machine shop industry, he must give a large part of his time to machine shop work, always seeing that the task before him is adapted to him, and that when he has a moderate degree of power in it he goes to something more complex. That idea finds its source in the apprenticeship system itself, because that was essentially what it was. If a boy wants to learn printing, or even farming, he is expected to devote himself largely in his earlier years to practical work. Then as soon as the boy gets his feet firmly founded on the realities of the practical work, he is expected to be led by his instructors out into what may be called the intellectual interpretation of the work; to penetrate a little into science, and what science means for that work; into mathematics, and what mathematics means; into art and what art means for that work.

This reverses the traditional education program, which assumes that the first thing for a boy is to learn drawing or geometry and then go to his machine shop work. Now the boy does his shop work, and then comes to algebra, mathematics, hygiene, or the hundred and one subjects that can be coupled up with this. In that way Dr. Snedden thinks they can make the type of worker they are after—the person who has skill, but on the top of skill has industrial intelligence, breadth, adaptability, flexibility.

Professional educators will realize that this is a stupendous program; that there is hardly a teacher in the country prepared to carry it out; that there are no text-books or manuals to help prepare that kind of a program, it is so difficult. It is a new development. In a sort of essential way it assumes that the apprenticeship system was, after all, the best way to teach a young person to work, provided that system could be supplemented as it should be. The ideal apprenticeship system was that which took a boy at 10 or 12, or even 7, put him at simple tasks, and then saw to it that he graded up—that as soon as he could do anything moderately well he should be put into something a little more difficult. The thing Dr. Snedden thinks they can do in their schools is to supplement that work with studies that will enable the boy to get enough reach in drawing or science to command whatever abilities he has.

Agricultural Schools Desired.

They are trying to carry that out in a great variety of special ways. For example, they want agricultural schools in Massachusetts. They have an agricultural college, but it takes the boy at 18 and assumes a high school education, and very few people are so situated that they can take that. A series of agricultural schools below that is wanted that will take boys from 14 to 15 and equip them to be simply intelligent, broad-gauged, successful farmers. Merely putting a boy in a class-room and making him read about agriculture and perform some little experiment in a cellar or somewhere will not accomplish this result. The thing to do is to get the boy doing something in farming as certainly as the farm boy did before there were any agricultural schools. But this school must be organized in such a way that the boy can grasp the task as a whole; than he can see around it; that he can learn wherein this or that science, or these economics or this problem belongs to his farm.

That type of instruction can be had by organizing the units of practical work. Let a boy care for a sixteenth of an acre of corn as his first task, and carry it through to the stage where he has to sell it, doing every step of it on a field basis; and while he is doing that, let every step of his instruction be illumined by the best science that can be given by the agricultural instructor, who knows the science perfectly well; and let the boy take that in connection with the practical thing. When that boy has grown some corn and raised some chickens, and so on, he has gone through certain lines of type activity, and has the basis of his equipment. The machine-shop schools are on that line. That represents the pedagogical problem with which Dr. Snedden and his associates are struggling. It begins to appear highly probable that that type of school is expensive, and that many people will not be in a position to attend such separate and individualized schools as this.

Part-Time System Most Promising.

There is a growing conviction in Massachusetts that what is called the part-time system of vocational education has, after all, the greatest promise. The difference between the part-time system and the other is that instead of building the shop in the school, advantage is taken of the shop as it exists, and the school is brought in to supplement the shop. At West Lynn the apprentices spend part of the time in their shop work and then they give part to the study of lessons that can best be stated in class-rooms, the latter having rather intimate connection with what they have been doing. Furthermore, what they are doing as apprentices is graduated, so that a boy is not kept indefinitely at one highly specialized task. One of the pathetic things about modern industries is that it does not make a great demand on skill. Little children can be picked up by thousands from the streets and put to work at once, and employers say, 'We don't need any industrial training'. Perhaps the ideal thing is to bring this part-time school in not for industrial training, but to carry along some strand of education while the child is at work.

At Beverly boys have one week of schooling and another week in practical work. Conditions could be imagined where it might be possible for a boy to go to school a week and learn things that had no relation to his practical work, but that is not permissible under present Massachusetts legislation.

The Legislature gave the Board of Education $6,500 to make an investigation into this part-time work, and Mr. Murray has been appointed as special agent for that purpose. What is possible and feasible in the way of part-time education for those between 14 and 17? The formulation of the problem in that definite way illustrates what is being striven for in several directions at present in Massachusetts; that is, to define a particular problem and then attack it, not talking about the whole scheme of education so much.

Dr. Snedden and his associates believe that as soon as they can get the co-operative attitude on the part of employers, and some additional legislation they will find their greatest possibilities so far as the manufacturer is concerned. Much of the State's agricultural education also is founded on this part-time idea. Certain schools that Mr. Stimson is now organizing require that a certain amount of work shall be done on the boy's own home farm, such as the raising of a sixteenth of an acre of corn; and the instructor must have time to visit these farms. Many of the ideas for that work were taken from Ontario, from the work that is laid out from Guelph.

Elementary Uniformity Unwise.

At present there is usually no differentiation in school work below 14. The American people are very much afraid that if work is differentiated there, some doors of opportunity will be closed; and there is a widespread feeling yet that education must be kept uniform thoughout the elementary schools. Personally Dr. Snedden does not agree with that view, and does not think it at all a wise tendency, and so far as his personal influence goes he is constantly urging differentiation in the seventh and eighth grade work, the seventh grade beginning about 12 years. This is the period of compulsory attendance at the school, and the children must attend. The fundamental American conception is to keep all the children together—not to have a labor class over here and a less-labor-class over there—and any attack on that idea would meet with disaster; but he believed it highly desirable and very feasible in one of the great city schools to make certain studies, say English literature and English expression, English language and geography and history, common for all children in the general classroom; then differentiate the remaining part along any one of four lines. A certain group of pupils might elect to take foreign language and possibly algebra and geometry; naturally those who are probably going to high school and college would be the ones encouraged to do this. Another group might elect a richer course of manual training than the present, which is about two hours a week. Ten hours a week would be very much better adapted to lay the foundations of subsequent vocational education, and if a group of boys wanted more generous shop work than at present, he did not see why it should not be done, and why arithmetic and drawing should not be studied in connection with that manual training. Another group might select commercial education—Arithmetic, tabulating and calculation being important for that group. Then a fourth group might take Household Arts, sewing and cooking. There should be no class differentiation at all, and the alternate groups would continue on an elective basis; alternative pupils are permitted to take Latin or German or French. That system is exemplified in the Fitchburg Normal School—a scheme that Dr. Snedden had bee- helping to encourage—and he believes that in a very few years the city schin Massachusetts will adopt it. There is a good deal of feeling against the scheme of differentiation, some thinking that if manual training is there everybody should have it, and that if the schools have German or French, everybody should have German or French. That is the peculiar feeling about study that prevailed fifty years ago at Harvard.

Citizenship Taught through Work.

There is a fine humane sentiment abroad in Massachusetts, and the people who hold it are sometimes alarmed lest in their work Dr. Snedden and Mr. Prosser are thinking of the worker as worker, of the producer as producer, and not as a person simply rising to a higher level of efficiency as producer; and that they are going to lose sight of the finer and more essential side of life—citizenship, with culture appropriate to what the individual can take in. Dr. Snedden said it was sometimes thought that the way to train a man to be a citizen was to tell him something about what a citizen should be; to get him to read books and pass examinations in the duties of the citizen, in the Constitution of the United States, etc., whereas in fact citizenship grows out of experience, as does a good deal of culture.

In illustration of this point he cited the case of the Manhattan Trade School for girls in New York City, organized by philanthropic people to meet the conditions of the tens of thousands of Russian-Jewish girls going, as soon as the law permitted, from poverty-stricken homes into lofty buildings to manufacture shirtwaists, etc., at power machines. As conditions are to-day, these children have to go to that work, for the families are desperately poor, with ten or fifteen children in a family. These philanthropists saw that while a certain percentage of those little girls survived the severe discipline of the factory, a great many of them broke down in operating the complicated machine. They were plunged suddenly into an awful wilderness of machinery and insane demands. These ladies realized that this was a very wasteful process; that those girls drifted into the streets and recruited the wastrel class of that city, so they decided to do what they could to fit the girls for that industry with a better preparation. The school course was short, practical, and six or seven months; and its one justification was that it was better than the conditions as they were. Their primary object was to put the girl on a basis where she could earn $6 a week instead of $4. But in following that object, inevitably and necessarily a lot of other kinds of education attached itself to this work. The girl had to work with textiles, but the little bit of attention gave that girl some discrimination as to the quality of textiles, color and harmony, and the girl got a certain amount of cultivation in that direction. That girl never thought about her health, but the women teachers asked what was she lunching on, whether she took proper precautions in her general regimen so as to preserve her strength, whether she wet her feet and left them wet during the day, etc. The girl saw the thing right before her, and was lifted to a high plane of physical efficiency such as an ordinary school, with its academic approach, could not accomplish. The traditional attitude of the girl was to skimp and evade wherever possible; she wanted to beat the employer because she believed it was the object of the employer to beat her. The school worked on this idea: Cannot you give more, and be a little more conscientious and faithful and honorable? Furthermore, what about your fellows? Do you work with them toward union among other girls? The teachers were constantly bringing up the idea that the girls should get together and work together, and not simply stand as individuals against a system that was so much bigger than they. What is the use of teaching the American Constitution? Nothing comes of that to bring the girl into a knowledge of her conditions; and here is the acting, living citizen.

Massachusetts Educational Problems.

In Massachusetts it was realized that the man working in a shop with a boy and leading him to a higher efficiency as a worker has an unrivalled opportunity to give that boy the text of actions that will make good citizenship possible, and that will make health and life under various contractions possible, because he starts from a significant, real, vital foundation.

Dr. Snedden noted that the schools spoken about during the afternoon practically centered about four lines of work for boys—(1) printing work, (2) metal and machinists, (3) woodworking and building, (4) electrical and engineering. The two greatest industries in Massachusetts are textiles and boots and shoes; these are largely within what Mr. Prosser describes as the automatic processes, and it is not clearly in evidence that schools are practical there, although they may come in within the part-time work. The product of boots and shoes is $250,000,000 or $300,000,000 yearly, and the product of the textile industry is probably more than that.

SECTION 3: FROM MR. C. A. PROSSER.

Information obtained from 'Conversation' with Mr. Chas. A. Prosser, *Deputy Commissioner, Massachusetts Board of Education, Boston, (now Secretary of National Society for the Promotion of Industrial Education, New York).*

Mr. Prosser spoke of the difficulties to be dealt with in connection with factory workers and wage-earners on a large scale. It was comparatively easy in considering only a few trades; but the great mass of factory workers in Massachusetts, most of whom are in unskilled occupations differing from each other, need to be analyzed. There are certain difficulties in that State, due to the sex of the workers, their capacity, the nature of their employment, and the economic, industrial and social conditions surrounding them.

It is well known that the typical female wage-earner is less than seven years a producer in her trade, all the rest of the time being a spender in a home of her own. This makes the problem somewhat different from that of the boy, and raises the question whether it would be profitable to train those girls for the few skilled trades that are open to them—only dressmaking, millinery, high-power machine work, and certain other specialized trades in other occupations.

Some have said it would not pay to train those girls for that short time; that it would be better to train them for the occupation as wife and mother. Those who look upon occupation training as socially profitable for a girl point out that as she is going to marry she needs training for what will probably be her life work, but that all the training for skilled trades such as sewing and trimming hats, etc., is a kind that fits the girls to fulfil many of the duties of the home as well as to do effective work for a short time as producers in industry. Considering these two ends or goals for girls, it would seem that they ought to have two ways out, assuming that what is wanted in every case is to give these children an equal chance to have efficiency along some line or other.

Various Groups Needing Training.

Conceive of the different groups of girls that need to be dealt with. Here is one in a skilled occupation who probably needs to be trained for it, even temporarily. Here is another in an unskilled operation, who has ability for dressmaking, and who probably ought to be trained away from her job in a textile mill and fitted for the other job. Here is a girl who has left school as an illiterate, and needs training in the elementary branches acccording to law so as to give her civic and domestic intelligence. Here is another who has ability to take high school subjects that will lead to self-improvement, better social standing, and all those things that are dear to the heart of a woman. Here is a girl engaged in an automatic process in some shop or factory, who should probably be given such directed recreation as would palliate the deadening effects of her employment. For the girl who is only going to serve temporarily in this occupation, probably the only way out is to give her proper training for home duties such as sewing, cooking, personal hygiene, first aid to the injured, care of the sick, care of children, and all those things that are later on to come into her life.

Those who believe in that sort of a program point out that training in the Household Arts offers two ways out for those girls. The girl who is fitted to carry on her elementary school work properly is sometimes able to do the English, reading, etc., better when she is approached through the practical Household Arts, for she learns to do by doing; hence the training might both remove her illiteracy and train her for her future occupation. In the same way this girl who is going to be trained for one of the skilled trades open to women is at the same time preparing herself splendidly for some of the home duties. Possibly, even in the case of a factory girl, evening classes and part-time classes during the day in the Household Arts might well constitute a sort of relief from the strain of her day's work.

Problem of the Growing Girl.

It has also been pointed out that those who advocate the training for the home for girls between 14 and 18 must recognize what seems to be a handicap because of the lack of interest of the adolescent girl in household requirements. This suggestion appears to have a measure of truth in it. Girls between their birth and 10 years probably have a great deal of interest in the things of their home—their little stuff and cradle and bed and doll baby—and in their play go through a great many home activities, but about their tenth year they seem to lose considerable of that interest; while the adolescent girl in school or factory appears to have her attention entirely diverted from the home towards the problems of school, factory wage-earning, dress and social amusements, home duties being, if not repugnant, at least unattractive to her. That interest does not seem to return until some fellow begins to call at the house and she looks to him as a prospective husband, and possibly begins to consider how she is going to perform those duties, when she awakens to their importance. This is why many will receive greater results through training in Household Arts.

Between 14 and 16 there are difficulties because of difference in the capacity of those workers; they are not all cast in the same mould, and have not the same abilities. You have the illiterates that ought to be dealt with; and also the fellow ought to be given a chance by training that will lead to civic improvement, and possibly business or a professional career—many of which channels would be closed to the factory worker. Then you have thousands who have been drawn into service at one of those special machines highly speeded; who are employed in manual and manufacturing processes of all kinds, and need a way out in the form of day and evening recreation. But it must be remembered that the boy is to be a producer all his life, and not a spender; hence we have one end of the scale to face with the male worker, whereas we have two ends to face in the case of the female worker.

Unskilled Occupations.

The difference in the conditions surrounding the employment of those people should be taken into consideration. Probably more than 20,000,000 workers in the United States are engaged in unskilled occupations, for which the shop with its machinery can train a great deal better than the school; and it is probably a sound principle that the school should never seek to fit for an industry which can do that work better. These unskilled occupations are always overcrowded; there is no need of preparing workman for them, and there is no body of related study in arithmetic, drawing, science or art of any kind that can be given to those workers that will make them more skilful. Hence the problem in all cases is to train them away from the thing they are doing, over towards another occupation, or away from illiteracy and towards self-improvement, or deal with them through some kind of recreation.

Habit-centres v. Thought-Centres.

One of the most difficult problems to face is this constantly increasing group of people who are engaged in unskilled work of every kind. Social workers are agreed that such work is deadening in its physical, mental and probably moral effect on the worker. The man engaged in a skilled occupation is calling into play his habit-centres, and the thought-centres are drawn out also; but the worker engaged on a machine is calling into play only the habit-centres, and when the day's work is over he seeks some sort of experience that will take him away from the habit-centres he has been exercising, and toward the thought-centres. He seeks excitement, and that often leads him into drunkenness and debauchery and criminality of all kinds. Many people today think that the only way out for the worker engaged in such employment, and who does not need training away from illiteracy, who does not want this education, and who has not capacity for skilled occupation, is to take him where he is at his job, and see what can be done by getting a certain portion of his time to ameliorate the deadening effect of his work. There are people who dream that the time is coming when these specialized machines have been developed to the full, when the workers in front of the machines will be so productive that it will not be necessary to run the factory so many hours to supply the world's needs, and the worker will be paid so much more that he will have more of his day away from his job. If that be true, there is a still greater responsibility resting on educators to direct the worker's leisure hours, which his employment to-day seems to make a point of danger to him.

Dr. Hermann Schneider, of the Cincinnati School of Engineering, who has thought on this subject of the thought-training of these factory workers, advocates dealing with them whenever they can be got hold of, during either day or night, or both, through all sorts of recreation and entertainment that will be a complete change of experience to the worker by resting the habit-centres and exciting the thought-centres. Hence he would favor for these people social settlements, recreation centres of all kinds, bizarre entertainments, moving picture shows—largely of an educational character—a dance hall, a theater that gave moral plays with the proper license, and directed play and amusement of every kind. While that may sound like an imaginative program, said Mr. Prosser, there is no telling to what this work will lead before it is through.

Women Workers and Home Support.

In connection with the problem of the thought-training of the worker, his economic condition must be considered. A recent investigation by the Federal Government shows that in the textile establishments of the United States, the female workers contribute about 26% of the home support. This means that any time she is off from the factory we must consider the effect it will have on the family condition. Business is not a philanthropic institution, and reduction of hours of labor means reduction of wages; that is an economic proposition.

That means that there will be all sorts of groups to deal with, some of whom are able to go half a day to school, some a whole day, some two days, some day-about, and some who cannot afford to give any time from the factory, and who will have to be taken care of in evening school instruction of one kind or another. These are the problems that are facing educators, who must know whether it is possible for manufacturers to arrange their work so as to let these children out, and whether the shifting of those employees for a half day or a day will be a business loss by bringing in a new workman and interfering in some way with the continuity of the work or with the process; also whether it will be possible for the employer to secure employees to take the places of those who have been given time off. It has been said that if the "doffer boys" in textile mills were given half a day off a week, it would be necessary for employers to pay about two-thirteenths more to their present staff. Those things show some of the difficulties to be encountered in the attempt to deal with this problem.

Work the Public School Must do.

There are many difficulties from the school side, yet it seems as though the training of workers into effectiveness as wage-earners will probably have to be done through the machinery of the public schools. This program means a great deal more money, though the public schools to-day say they have not enough money to do what they would like with the group that has not yet entered on wage-earning.

One of the most necessary things is to secure a sympathetic attitude on the part of the public school people for such a movement. Regular public school men everywhere apparently lack an understanding of the existence of these groups of people and their needs, and fail to sympathize with the fact that they are probably the weakest link in the chain to-day, for whom the community must do most.

The regular schoolmaster tends to prove everything from his books, but those people from the industries have to be taught by doing; they have to be carried forward very largely out of their experiences; they have not very much power of imagination and visualization, but they grasp the principles of these things if approached on the basis of what they know and are doing. An illiterate girl who has failed to do the work taught in the public school could be reached through the things she does in sewing or cooking or in her special work, her arithmetic being the little things that arise in connection with that work, her spelling starting with names of utensils dealt with in her work. One of the large problems will be to bring the public schools people to sympathize with the needs of these workers, and also to be willing to change their methods so as to deal with these people in the only way in which it seems possible to handle them.

Advisory Committees must Co-operate.

The wage-earner, whether in the skilled or unskilled occupation, is to be dealt with just in proportion as the public school will be able to co-operate with outside agencies. There have been a lot of things dumped on the schools in the last twenty-five years—responsibilities they never faced before— and there has been a feeling in some quarters that they would be able to solve the problems without calling on outside help. Mr. Prosser did not believe they would be able to do it in industrial education until they were able to command the service of the outside people who have something to give. For example, if the public school system is to fit the girls for skilled trades, they would be utterly lost without advisory committees composed of people who had had experience in these skilled trades. If they are to fit for a machinist a boy who was engaged in textile work, they would certainly need the help and advice of some machinists. What the practical man brings to such service above everything else, is the disposition to check up things from the standpoint of results, while the schoolmaster always puts emphasis on methods. By the combination of the two, they would probably get somewhere.

Mr. Prosser was of opinion that where public schools undertook to establish recreation centres for the wider use of school property, in an attempt to deal with workers on specialized machines, they might well call in the services of social settlement workers, philanthropists, people who had made a special study of such groups, and knew well about their experiences, and of course more about the way in which they needed to be dealt with.

It is also apparent that a great deal of experimentation is needed. There is a danger that even after a lot of facts have been learnt, a man seated in an office will speculate and theorize about things that will come to pass. Mr. Prosser closed by saying:—"We have not had any experiment in part-time far enough on to show its effects; we have not had any attempt to ameliorate the lot of the factory worker; I do not know of any adequate attempt to deal with the illiterates. The things we need are a knowledge of the conditions in the field, and then experiments along various lines that will be illuminating to us in our various efforts."

SECTION 4: FROM DR. S. D. BROOKS.

Information Obtained from "Conversation" with Dr. Stratton D. Brooks *Superintendent of Public Schools, Boston, Mass.*

Dr. Brooks thought that our Commission might be interested in his impression of the comparative differences between what he saw in Europe and what America has. The first great difference he noted was that in the older portion of the German schools, for example, they cut very close to what the boy is going to be, while in American schools in from seven to nine tenths of the cases the had no notion of this. German education may thus direct itself more definitely to a specific thing. It is an accepted condition of society there that a boy is to be a mechanic or a laboring man of a certain kind, and there is no escape from it; but in America it makes no difference what a boy's start in life may be, he has the same opportunity as the other fellows if he can squeeze by and get to the top. Consequently the foreign school has a much easier problem in preparing a boy for a position because it is not trying to hold him in the non-restrictive phases of education.

Judgment-training the School's Function.

Dr. Brooks defined the non-restrictive way to be to open the powers and judgment of a boy, so that he may ultimately fit any opportunity that arises because of his sound judgment and to create a flexible habit of mind in which the boy is not at all bound by any given set of conditions, but can always meet new conditions. In America the courses of study, both elementary and high, emphasize the judgment side, giving a great variety of opportunity to judge things and training to ultimate ability to judge all kinds of conditions. It appeared to him that American education in twenty years had progressed very rapidly on the side of the judgment-developing subjects and had ceased to emphasize so much on the reflexes.

He thought that while schools must give a pupil reflexes, i.e., things that adults learn absolutely —such as multiplication, spelling, etc.—and must teach him certain facts, yet emphasizing the reflexes gives restrictive education, the purpose being to create a habit of mind that the boy cannot break, so that he must arrive at the right answer. While a boy trained in judgment-development is less able, when sent out at 14, to do accurately a specific piece of work than he would be if more time had been put on the reflexes and less on the judgment, he still believed that any education that makes the boy worth a dollar a week more at 14 makes him worth $10 a week less at 25.

When we come to the reflexes of industry, the skill of hand to do a certain thing in a certain way as we find in the division of labor in a factory, Dr. Brooks holds that this has absolutely no place in the Public School education; it is absolutely restrictive. The more a man excels in it the less effective he is as a man in general. Such education has no field at all in education at the public expense. But where a man may become a better workman by the exercise of his judgment, there is the proper field for industrial education; and that means that he must learn to use materials of different kinds and be able to judge about them. In other words, the school—the industrial school—ought not to produce the finished product, because the finished product is the result of restrictive education, and you have made a man who cannot do anything else. In America, at least, we have not yet come to that, on the whole.

Evolution of Industrial Education.

Dr. Brooks was very much of the opinion that industrial education will go through stages; that we will have a lot of very specific schools trying to show that this boy is really prepared now to do something; and at the end of ten years they will do just what the manual training schools have done. Twenty years ago the manual training schools were opposed by labor interests because they were going to make carpenters and blacksmiths and machine-shop men; but he did not think any labor man abuses the Mechanic Arts High School now because they have generalized the proposition so that in schools the training in judgment, based upon material and tools in operation, with mathematics applied to that, enables boys who go out with that to begin as apprentices, but ultimately become foremen in shops because they have acquired a better education.

German vs. American Ideals.

It seemed to Dr Brooks that the industrial education problem of Germany is quite different from that of America, where the feeling predominates that fundamentally, there is no society, no body, nothing except the boy's ability to compel him to go the bottom and stay there; whereas everywhere in Germany he had found evidences all the way along of causes to prevent any man getting out of his class, the number who rise being exceptional. They will point to this man who is Prime Minister, who started at the bottom, but he is only one out of a million, the rest are all at the bottom and are expected to stay there.

The other thing Dr. Brooks observed in Germany, more particularly in their schools as compared with those of America, was their attitude towards discipline and law. All through the public gardens in Munich there was no policeman, but a little railing, and no children over the railing. They all obey the law; if it is "verboten" to pass, they accept it so; and in the schools it is the same way all through. Then they go to the army and they have an absolute dictatorial control. Now, it appeared to him that all this produces a condition and type quite different from that of the average American. The latter have a habit of initiative, of starting to do things, and develop a responsibility for their own actions. The tendency now is to put it up to the child to take care of himself and to send him out as a citizen who has to take care of himself, not by force of law at all, but because he going to help make the laws.

Dr. Brooks thought the German system of education is not applicable to this country except in pieces, which meant that a particular type of method could be found that was excellent, and certain things that one would like to fit into the American system, certain things that are much better than anything to be found here; but he did not think the final product would fit American conditions as well as their own. He felt that American methods secure more variety, more initiative, more alertness, more quickness of judgment, more ability probably to start wrong and back up any time to get right. The trouble with the Germans is that if they ever started in wrong, by the time they could get stopped and reverse the thing, the other fellow would be all over with it.

Practical Arts High School.

Boston has the ordinary elementary schools, then above them high schools of various kinds—High School of Commerce for boys preparing to be owners of businesses, on the whole; commercial courses in all the High Schools for stenographers and book-keepers; two separate High Schools, one for boys and one for girls, for college preparation; one Mechanic Arts School; Manual Training High School; and one school for girls called the Practical Arts High School, to which Dr. Brooks called special attention.

In this school an attempt is made to train girls, who are willing to stay, by means of the essential elements of a girl's education—preparing for the home—and to make everything in that school centre around the home, particularly in the application of art. For example in buying furniture they are given $35 and take six months to look at all the sideboards in Boston; make a long study of what is best for the money and the art side of it; then they buy a sideboard which is supposed to be the best one for the money. An old house is rented and the girls decide upon what the window curtains shall be, make the design for them and make the curtains themselves. Then white cloth is bought that does not match what they have already bought and the chemistry teachers take up the matter of dyeing, and they are not allowed to put them up until they are dyed. Then they take up dressmaking and study the artistic form; then there are variations from that form, then variations from the design that would make it harmonious for their own particular form. They take up the same thing with dresses and hats. They all have these general purposes, not only to make dresses but to make them intelligently, and to make dresses for children; not to become milliner but to know processes, qualities and arbitrary values.

At the end of two years those who wish to become dressmakers may do so and they go into the regular dressmaking course and make dresses to sell. Anyone can order at this school a dress for his wife. Those who want to be milliners enter the millinery course, and they get positions in Jordan, Marsh and Company's and probably these girls will be forewomen some day and will be a power because they have the right artistic conceptions.

A very large share of very well-to-do people send their children to this school. The first two years the general principles of sewing are taught but the same thing is not repeated often enough to make them expert in it. The distinction is made between general and trade teaching. In the trade school pupils have to learn not only to make a good button-hole, but to make enough of them to earn a living at that; hence they have to keep at the same thing until they get speed. The course here is different.

Practical Work in Housekeeping.

Take the cookery as a simple illustration. In the first place the girls, of whom there are 400 to 500, run their own luncheons. There is a committee appointed to buy from the market; they are allowed so much money, and it is their job to search the markets and report, make the bills and figure out the cost of the luncheon, which is sold at cost; and they get up for themselves a fairly good meal at about 8 cents a day. Secondly, in this rented house they take from time to time, and under certain circumstances, 16 boarders who come only for noon luncheon; and these pupils run the boarding house and prepare the meals for them at 15 cts. or 25 cts. or whatever it is. Thirdly, they run what is called the home table. Once a week they invite five or six and have a regular luncheon, just as a lady would have in her own house if she invited a company to dinner. That is generally done on Wednesday, and from Monday to Wednesday the teacher is not allowed to go into the building. Once they invited the Mayor to luncheon. Different girls conduct this luncheon every time. They elect a chief cook, with so many assistants from the first class and so many from the class below, and the committee in charge of the table decorates it. Sometimes they get a fixed sum, say $3, to produce a dinner for six persons; then there will be five committees appointed, and each one sees which can get up the best dinner for $3. Other times they reverse the process and see who can get up a fairly passable dinner for the least money, and so on. The mathematics, etc. are worked into the thing all through. They learn to can fruit, and in order to cover the expense they sell it again.

Domestic Science in a Separate School.

The Board's experience had been this. They attempted eight or nine years ago to put domestic science in the High Schools and teach girls something about home-making. They hired very excellent teachers and put them into these separate classes; but the general interest of the school being something else, the children who elected it were in every case assumed to be incompetent, or not so brilliant, or poor, or somehow inferior. Hence it became decidedly unpopular and in fact died off entirely. Yet the minute the school was started in a separate building they had 200 to 400 girls a year, and more trying to get in than the building can accommodate; and those are girls from a social circle that would not be either poor or dull. There is not the slightest distinction in the public mind; this school is as good a school as any, and is attended by children of all classes of parents without distinction. Dr. Brooks did not think it ever entered their minds at all that it might possibly damage the school if it were looked on as one that only the children of poor people attended. It did not turn out so at all.

The difference between this separate school for Domestic Science and the general High School is this; in the latter pupils elect English and French, History and Domestic Science, but those in English or French are all getting ready for college, and are going to Normal School or taking a commercial course. In the separate school the girls take English, Art, History and Domestic Science, but the latter is the first thing—the thing that is emphasized. Every teacher there is an expert in dressmaking and art, and the whole art really has this basis. Pupils draw a design for the class, and that design which they make in the drafting room they have to work out in the next hour in the dressmaking department.

Of course History is not directly related, but for a time they were taught French on the basis that they were going to be heads of Millinery departments and to be buyers in Paris, and thus they had an entirely different notion than that they were simply studying French. The school has what is called "atmosphere"—the same as the Practical Arts High School has.

Provision in Boston Compared with Germany.

In regard to Continuation Classes, the German Continuation School of Munich, Bavaria, is a thoroughly equipped school covering every trade in that city. In general Munich is in what would be called the Arts and Crafts stage of development. Even their factories are practically hand-work, and are only developing from handwork from the fact that they have 20 or 30 fellows doing it. Munich has 6,000 artists who make a living mostly by designing things; and everything bought there is designed by an artist or an architect and worked out by a craftsman. Consequently they have developed a very complete system of machine-equipped continuation schools. In Berlin, on the other hand, Dr. Brooks did not find any machine-equipped continuation school—due presumably to the fact that North Germany is in a large factory system and has a different work problem. He found that they were reciting in civics for the purpose of making better citizens out of them; that they were making drawings and studying mathematics related to their business, but they got practically no training on the specific processes of their trade, whatever it was.

Compared with those things, Boston has had for 30 years what is called the evening drawing schools, in which are taught shop drafting, architectural drawing and general mechanical drawing, and Dr. Brooks thought them better than any he found in Berlin. They are continuation schools with this difference —that Boston students have to go in the evening, while in Germany the government control is such that they can make the employer let them go in the day time. What is called the Evening High School in Boston has courses for mechanical foremen, that is, mathematics and English that apply to their business. That is all Dr. Brooks found in Berlin, only they were doing it in the daytime, while Boston does it in the evening.

Trade School Work in Boston.

The essential thing in a trade school for printing is that the boy shall learn in the school what he needs in the business but cannot learn in the shop about printing. Now, that differs from what a good many people have in mind when they talk about a trade school. They want the boy to learn exactly what he will learn in the shop. Of course you do teach him what he will learn in the shop to a large degree, but the important thing is to teach him what he cannot learn in the shop. For example, the boys are taught the proper setting up of type. Dr. Brooks showed a sample of the way one of the Board's Circulars had always been printed, and said that from the point of view of the expert printer it was very poor. He showed how it ought to have been set on a lead pencil design, which is psychologically and æsthetically correct. The children practice on this to get the difference of effect, and after they have got it drawn out right they set up the type and see the difference, That is a thing that no man who was paying them would allow them to do.

Continuation Day Schools.

Definite continuation day schools were started in Boston two years ago and are now giving courses in salesmanship of various grades, in the raw leather business, in retail and wholesale drygoods. Employers let pupils come twice a week during the day-time without deducting from their wages. Two teachers do nothing else, and several teachers give only one class; then experts are obtained from the trade to give a very large share of the work. The Shoe and Leather Association sends down nearly every week some man to take up some phase. Forty young men in the leather business are studying. There are no classes in the day-time for men working at the trades, but in the Industrial Evening School there is organized instruction in any trade that the Union asks the Board to organize. The Board would equally do it if it was not the Union that asked, but it happens that the Union is the only crowd that get together, and the only ones that do ask it. The men in the machinists' trade asked for a course in jig and tool-making, which was the next thing above where they were, and 27 of them attended; 3 of them knew something about machine work, but had always had only one phase of it—they had either worked on the floor or at the bench or filing. Though they were Union men working at Union wages, there were only 3 that had a sufficiently wide knowledge of machine work to enable them to do jig and tool making. In other words, the men who came from the trade into that class were not as well equipped for advancement as were Mechanic Arts High School boys who never had had any trade at all, but who had had the wider opportunity to do things.

Evening Courses on Demand.

In general an evening course is started whenever the crowd gets together and asks for it, and there are probably a dozen such. The janitors would have to learn how to clean windows, how to use oil on the floor, to handle minor repairs, the relation of bacteria to dust, how to build fires, combustion, combustion units, the value of different kinds of coal and all that sort of thing.

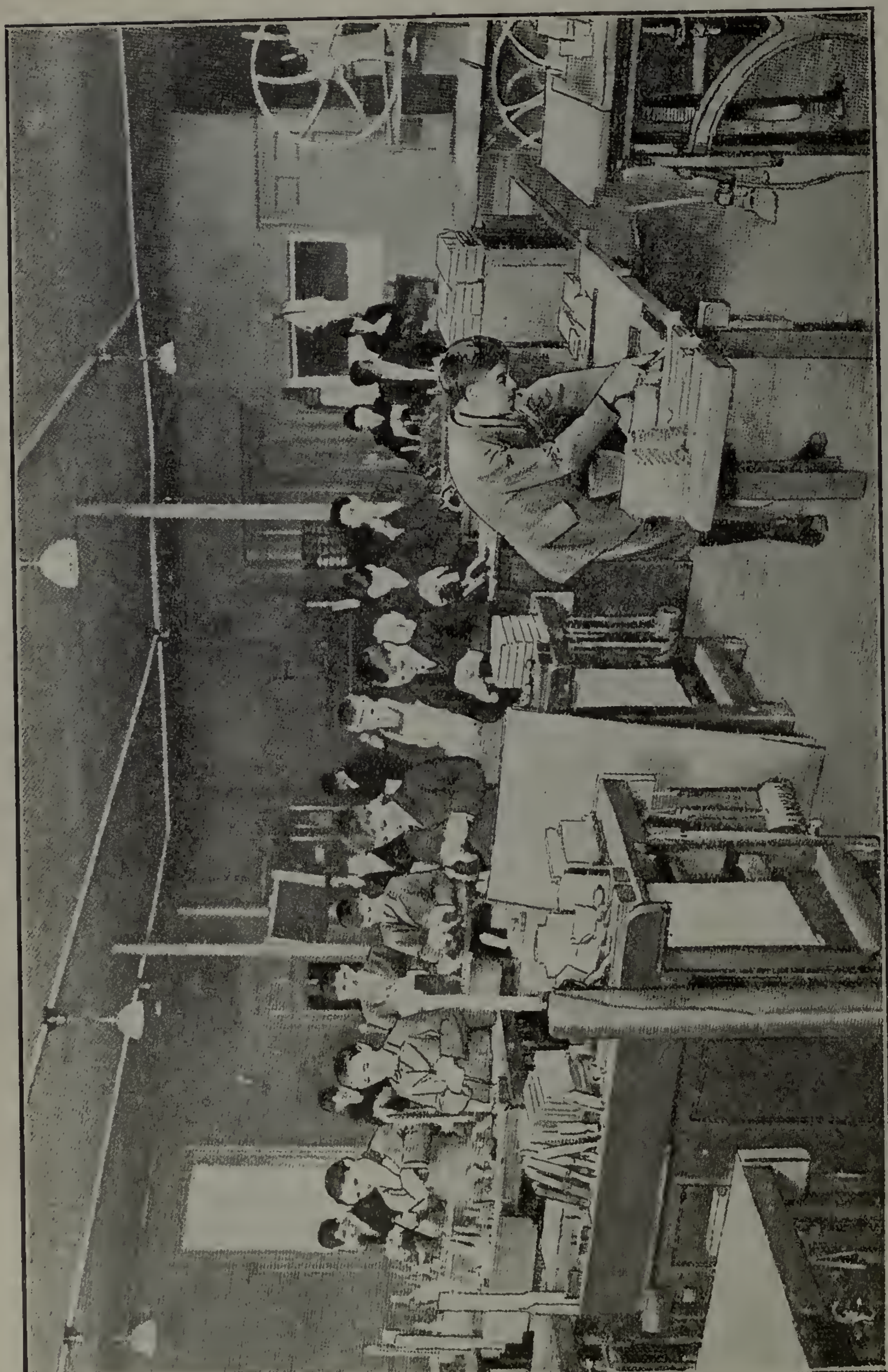
Those evening classes are held in the Mechanic Arts Buildings, where there is also a day school. The day continuation schools must be held where the people are, so they take a loft or any kind of room, because they cannot get the people to go half a mile from work. So instead of taking a school building where they have to attend, as is done in Munich, the Board is coaxing them along, and they only attend when they like it and are quite willing to stand the loss of time, and the student comes back having become a better workman. Boston has nothing like the German Middle Technical School, where workmen who had been a good while in a shop could come back for a year or two.

When asked by the Chairman whether he felt any sense of danger from young people who waste their time after 14 and have no interest in education, Dr. Brooks replied: "We have that and probably always will have it. An attempt is being made to minimize the danger by means of these trade schools—not because we believe the trade school better for them, but because they would not go to any other kind, and they might not go to this kind. But a great group of children who must stay in school until 14 don't really get any interest in what they are going to do in life until 18 and between those ages they ramble round. The Board would like to put in a different kind of school from what they have and are now trying to put in the industrial school. It is of course unknown whether the pupils will like that kind of school, or whether it can be made so they will like it."

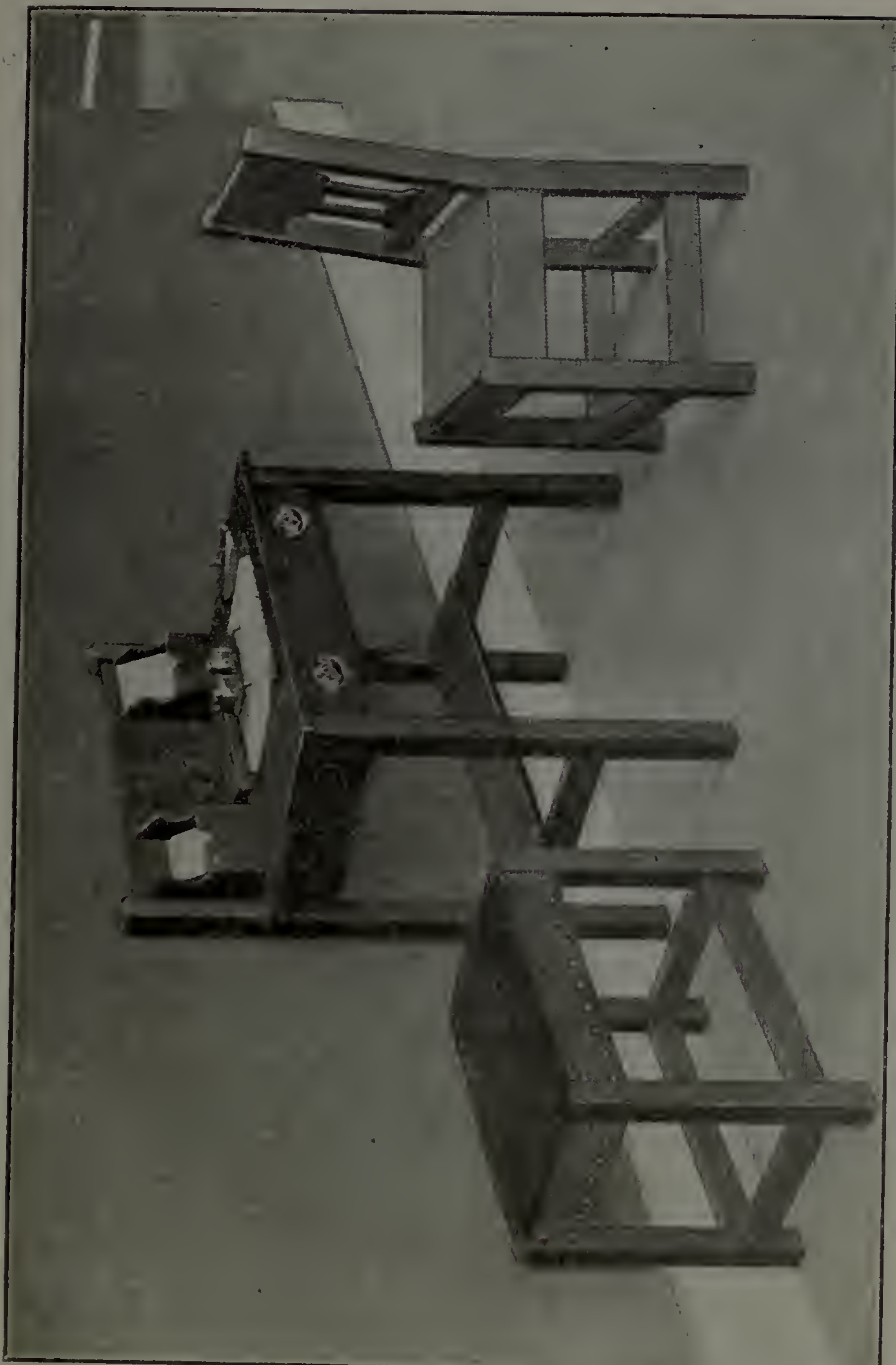
Vocational Guidance.

Boston has attempted in the public school to organize vocational guidance with a bureau that investigates all the businesses, determines what opportunities exist and what qualities are necessary for success, and in turn conducts courses for teachers for that purpose. Two selected from each school are called the Vocational Council; they attend these courses and find out what it is desirable

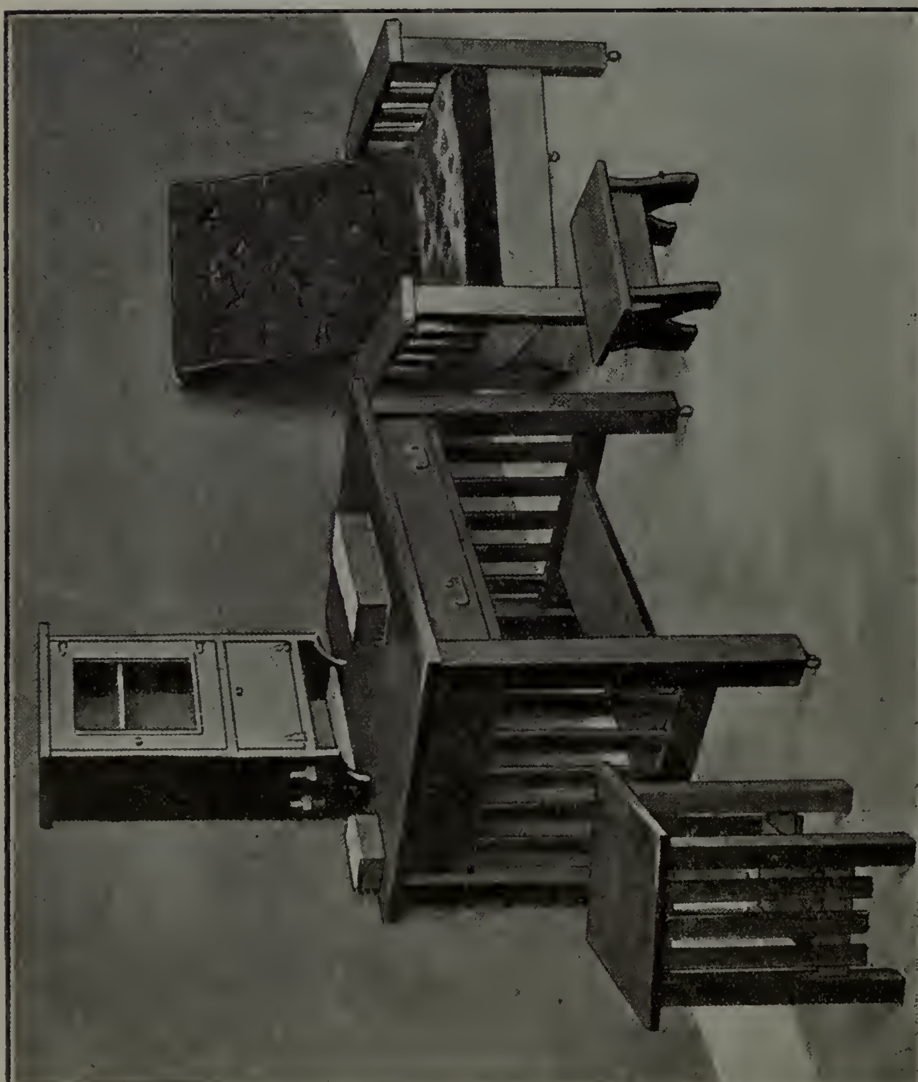
ELIOT DISTRICT INDUSTRIAL CLASS : BOSTON, MASS.



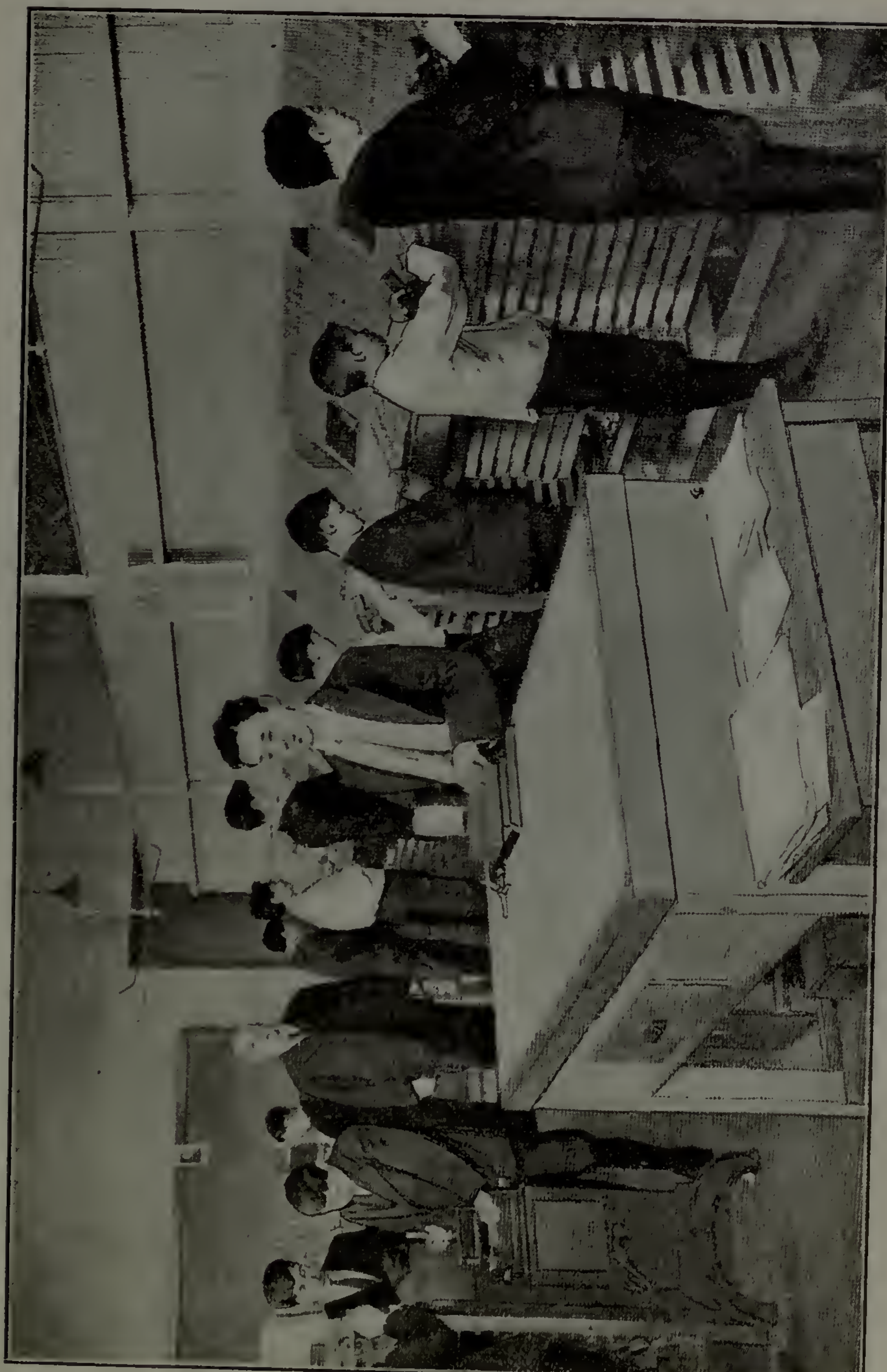
AGASSIZ DISTRICT INDUSTRIAL CLASS : BOSTON, MASS.



Examples of Woodworking.—Grade VIII : Boston, Mass.



EXAMPLES OF WOODWORKING.—GRADE VIII: BOSTON, MASS.



Pre-Apprentice School.—Composing Room: Boston, Mass.

Pre-Apprentice School.—Bookbinding Room: Boston, Mass.

what a boy or girl should be able to do on entering any kind of a business and they take time to discuss how to determine what a boy's real qualities are. Negatively, of course that is an easy job, for one can say at once that a boy who has no accurate physical control of his hands should not try to prepare for dentistry, or that one who had absolutely no qualifications in drawing should not try to become an architect. But, back of that specific problem, in which there is every opportunity to fail dozens of times, the Council are endeavoring to conduct lectures and courses, emphasizing in and through the parent that before the student leaves school he should aim in a certain way.

Without having any specific trade in mind, the school authorities are trying to give the pupils impressions of the ways in which trade develops and to enable them to acquire a certain alertness and skill in general.

An experiment of one kind was conducted in the Quincy School. A group of boys were put into elementary ironwork, and the School House Commission sent a lot of odd jobs, e.g. a lot of rough castings, and they learned how to file them. As soon as they have learned that, they will not do any more, because the object is not to make castings but to teach them how. They have certain drills, planers, etc. What is aimed at is to give the boy some appreciation of what work means, so that he may have some basis of choice, for example, as to whether he will go to a trade school or to a Latin school.

In printing this same thing is done; the seventh and eighth grade children are given two hours a week extra in the elements of printing before they come to the time when the pre-apprentice school starts. If it is found that the boy has no aptitude at all, the Vocation Councillor will tell him he has not the qualities to become a printer. To another boy she will say "I think you might succeed as a printer; you had better go to this trade school for printing." Dr. Brooks' opinion was, on the whole, unfavourable to differentiation before 14; he thought it was ultimately going to be disadvantageous to push the age of selection down lower. He was "going to stick for 14 years of freedom, and let the choosing be done after that."

Counting the Cost.

Boston established a system of accounting with each school district separately, with all the items, and with the best possible division of the money spent in the school. In the Adams district the cost was $26.38 per pupil, while in the Agassiz district it was $35.05; yet those districts are supposed to be exactly alike. It was found that the average expense per pupil per year for janitor service was 11 cents in one case and 19 cents in the other. The janitor was spoken to, and the next year he had an expense of only 9 cents. By this accounting scheme Boston has saved $100,000 a year. In addition to that, nobody now bobs up and says the Board is wasteful.

The endeavor is to standardize the system. Each principal is assigned a per capita allowance for certain items such as text books, drawing supplies, cookery supplies, etc. He is told he may have $1.15 or $4 per pupil, and then it is up to him. In general he is encouraged to spend all of that, because certain standards have been established and spending less money should never occur if the school is to be weakened thereby at that point. One evening school cost Boston 18 3-10 cents, and another 21 1-10 cents. In the evening drawing schools the minimum cost is 38 cents and the maximum 54 cents. That difference was looked up, and it was discovered that by an old rule of years back things had been so arranged that if those drawing teachers happened to teach in one building they got $4 a night, but if they happened to teach in another kind of building they got $6, although any number of them would have been glad to do the work for $3. So a new schedule was established beginning at $3 and running up to $5, and nobody resigned, they were all glad to take it. The Board's business agent now makes a report. For four or five years they merely ran along and "guessed." They "guessed" they needed so much for salaries; now the only guess in it is the number of children coming in that will require additional teachers; and allowance is made for that.

SECTION 5: FROM DR. F. H. SYKES.

Information obtained from "Conversation" with DR. FREDERICK H. SYKES, *Director of Technical Education, Schools of Industrial and Household Arts, Teachers' College, Columbia University, New York City.*

One thrills with the possibility of education on seeing a nation like Germany in our own lifetime pursuing her policy unswervingly from small beginnings to great achievements, turning a poor nation into rich one, the most powerful on the continent of Europe. It is a question of efficiency. We cannot get efficiency without training, and under our modern system of industry we cannot get training without schools. All the new things have arisen by means of schools. Until recently, Medicine, Dentistry, Naval Architecture and Military science had no schools; and so all along the line of modern development, including Mechanical, Electrical, and Civil Engineering. No existing technical school in any industry is more than approximately a hundred years old; the watchmaking school in Geneva is claimed to be the oldest, but it was established only in 1824. The new things that have come up—called the professions as a rule—have their established schools which are today regarded as the normal way of proceeding, as the obviously right thing, producing efficiency in the lines that were planned for; but a hundred years ago that was not the normal way of learning law and medicine.

THE NATIONAL PROBLEM OF EDUCATION.

Having proved this in one line, is it applicable all along the line? Germany says it is; they believe in it; they have organized it. Switzerland, Denmark, Holland, Belgium, France, Italy, Austria, also believe in it and have organized it. Scotland, even more than England, believes in it. The countries that believe in it most are making Technical Education obligatory, so that there is practically not a boy or girl as apprentice who does not get, in State-directed schools, all the technical knowledge of his trade or calling by an attendance of from 6 to 10 hours a week. That is true of the chemistry needed for the boy who is learning dyeing; of the drawing needed for the carpenter; of the bookkeeping for the business management needed by the shoemaker; of the drawing and design needed by the stained-glass worker. In addition to this general work—and here is the peculiar thing about the best of the German schools, the Fortbildungsschulen—they realize that a man is also to be a man and a citizen, and they do not neglect civics; and, in the religious countries at any rate, they do not neglect religion, though that may be a matter of politics as much as of education.

There is a mass of conviction represented by the experience of nations that have tried this experiment, and America is beginning to believe that what others have done it must do, and do quickly, for the United States is from 30 to 50 years behind Europe. In one thing the American people are in advance of any other country, viz., interest in women's education. That has characterized the United States.

New Adjustments and Extensions.

The vitality of the public education system of the United States is receiving ample demonstration in the adjustments and extensions it is now everywhere making to incorporate the ideas and programme of industrial education. Educators realize that systems, if vital, must change, must grow, must specialize; an our system of education is fortunately so vital and responsive that it is ready to develop to meet the new demonstrated needs.

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The adjustments that have taken visible form in the work we call manual training, domestic science, domestic art, and so on, at first seemed to be merely a demand for "the practical" in education; they are now seen to be a clearer recognition of right method in education, of the facts and values of child development, and of the shortcomings of our educational system. That is what lies behind the new education to give it what we begin to realize is a revolutionary force.

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The root of the matter is that the public school system of the United States is not adequately efficient as an educative force. For reasons of faulty administration, indifference of parents and children, lack of adequate motive in instruction, the hardship of economic conditions, the public school system does not yet reach and hold the children it is provided to instruct. Even where it is best organized and administered, say in cities with a population of 25,000 or over, approximately half the children who enter are scholastically dead at the end of the seventh grade; a third of them enter the high school, and about one-twentieth actually graduate.

The "Deadly Parallel".

To put this generalization more definitely: Professor Thorndike of Columbia University has shown that in 1900, in cities of 25,000 and over, out of 100 eight-year-old pupils living long enough, the number retained till any given age is as follows:

School Longevity—Per Cent.

Age	10	11	12	13	14	15	16	17	18
Per Cent	100	98	97	88	70	47	30	16.5	8.5

During the last 10 years we have increased the school longevity up to the 14th year by about 5%.

This school mortality is due, in part, to economic pressure, though less so than is currently believed. The main reason is that the material, method and direction of elementary education repel all pupils whose aptitudes and interests differ from those of the orthodox schoolroom, and repel them in increasing numbers as pupils grow in consciousness of their powers and likings.

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To separate the child in school from all his natural activities and environment, to train him through abstractions, chiefly to interpret and use symbols of reading, writing, and arithmetic, to teach subjects of instruction, not as related to the child's mind or life or future vocation, but after an order or classification of their own—that is the school practice which modern school reformers have not yet succeeded in breaking down. The kindergarten, the manual training movement, the household arts movement, the vocational education movement, have all been powerful centres for the diffusion of new conceptions of methods and material of elementary and secondary education. The older practice is, it is true, somewhat modified, but in the main it still persists.

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The New Education Vitalizes.

The question concerns first the elementary school. In recent years the most vital changes in material and method of instruction in the elementary school have come from the ideas and methods of industrial arts education. Elements of industrial education are already in elementary schools of the better type—drawing, clay modelling, wood working; something done in physics, nature study, commercial geography; here and there we find metal-working, dress-making and cookery, and would probably find them in all schools, if people would stop thinking of education as expense. Education, real education, it should never be forgotten, is not expense, but investment.

These elements are already in many elementary schools; but many people are at sea in the bearings of the whole matter; as some one has phrased it, the idea of industrial education is to put blisters on the hands instead of on the mind. The basis of the new education is very different. The true basis for the new education in the elementary school lies in the nature of child thinking. Child thinking is essentially objective. It prefers seeing and handling a thing to mere talking about it. It prefers doing the thing to mere hearing about it. That is a principle, also, for much of our higher instruction—the laboratory and shop method of science and engineering. But it is the indispensible method in childhood and in the education of the child. The child thinks most when he plans what he is interested in doing.

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Preparation for Industrial Life.

Household and industrial arts are a part of the curriculum of every other civilized nation. Every modern European nation makes domestic science and domestic art—foods and cookery and household management, sewing, repairing, garment-making—an integral part of elementary education. The most advanced nations make wood-working and metal-working, physics and chemistry a part of public elementary education.

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In the same way the industrial arts subjects are a preparation for industrial life. They are not a trade preparation so much as a preparation of the understanding, the spirit, the habit. They cultivate familiarity with tools, the mental and physical co-ordinations called for in all industrial manipulation; they develop industrial intelligence and lend dignity to labor. They are the means, and the only means now available, for diffusing an interest in form and color —in a word, in beauty; and so through them we can do somethingto remedy that incredible lack of taste that marks a nation that has lost the traditions of art in all its industries.

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What We Must Do.

It is necessary first of all to accustom boys and girls in the elementary schools to think about the environment in which they live; about the things that are useful, helpful, interesting in that environment. That will differentiate the rural school from the town school, and the town school from the city school.

Then we must enrich the curriculum of that elementary school by constructive and artistic studies that bring out the qualities, the aptitudes, that are in the boys and girls there. That is the starting place; and any system of industrial education that starts in any other place will not start at the fountain head. Divergence of interest will be found in children from the Kindergarten. Towards the end of the elementary school there will begin to be divergences of natural choice, interest and environment; strong divergences that will be marked in the city between industrial and commercial ends; between the boy who has a strong feeling for machinery and the one with a strong feeling for accounts. The girl also will begin to differentiate herself and some of her interests. By the seventh grade, normally 12 years old, you can begin to have classes that specialize on a particular line; that is to say, bench work, we will say carpentry, or cookery, dressmaking or needlework, etc.

Asked as to whether, in speaking of enriching the courses by some form of artistic training, he had in mind any addition to the course, or a modification of the existing course in so far as the subjects now taught might be taught in another way, Dr. Sykes said that would depend upon the conception of the normal type of school. In certain schools it would be an addition. Any good school, however, is expected to have work in the concrete—using that word in the sense of various objects, which may be clay, wood, textile work, spinning, cookery, or any work in the concrete—and to have that work begin in the first grade of that school and continue to the end, it being general in the earlier grades and specialized at the end.

The work done in a particular grade should be correlated; that is, all that the boy or girl does in that particular grade hour after hour should have connection with everything else that is being done in that grade. Therefore if they are doing some constructive work in a grade, the arithmetic there will concern the particular thing they are doing. If they are going to make a table, or tabaret, or something, the measurement and calculation of cost, stock to be used, etc. will constitute a correlation with the mathematics and arithmetic of the school. There should be a wider application in the schools of the correlation of all parts of the day's work and the week's work.

The Crucial Years of Life.

The hope for the largest effect of trade education lies in those two anticipatory years, and then in the 15th and 16th years in definite trade schools before the boy can enter shop or factory as an apprentice. Most shops do not want a boy till he is 16; the boy does not want the school as at present organized; his parents do not want him at home, but want him to earn his living; so the boy is pushed around from corner to corner. The two most important years of that child's life—the dangerous and critical 15th and 16th years— he is filling in selling newspapers, carrying telegrams, any kind of unskilled labor that he can put his hands to, or drifting into crime. The testimony of the Chicago probation officers is that one of the greatest causes of crime is the neglect of children, in those two years, from the absence of proper educational opportunity.

Somebody may say, "Yes, but they have got to earn their living." Prof. Thorndike a few years ago had 1000 cases examined in the city of New York as to the reasons for leaving school, and his judgment is that the economic value of children going to work before they are 16 has been greatly over-estimated, and that it is not so much the economical reason that causes non-attendance at school, but that the school is not worth attending—for them; that it is built for another class of people who are being trained for universities.

Industrial Arts Education and the Secondary School.

A percentage—estimated as high as 40—of the pupils of the elementary school (in cities of 25,000 and over) enter the high school. Is our high school education all that it should be? Revolution is now beating on the walls of every high school in our land. During the last two years 32 high schools of New York State have differentiated from the old-line type and put in household arts, agriculture, and shop work into their curriculum on a par with old-time subjects. But the old-time type is still the predominant type everywhere.

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The basis of a plea for universal industrial training by the State is that such training is the greatest factor in industrial efficiency, and that no other organization can adequately furnish it.

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Abroad, we see training and efficiency go hand in hand. In the countries where technical education is most highly developed efficiency strikes you at every turn: the cleanliness of the streets; the even, quiet movement of the street cars; the perfection of machines; the artistic lines and durable construction of the houses, the beauty of the stained glass, the quality and design of the linoleum you walk on; the planning of city extensions, of garden cities; the wealth of industrial countries like England, Belgium, France, Germany, the revival of Italian commerce.

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The New Force—Technical Education.

You get the conviction driven home and pressed in, that behind all that you see and experience, behind the whole movement for the betterment of the nations wherever you go in Europe, *the new directing force is technical education.*

On the one hand there is the striving to create and apply beauty to industry; on the other to increase efficiency in every line of production. And the total result is that mere living itself is better organized, is moving to a higher plane.

A change is coming in the economic situation, by increase in population; the old time of natural products is passing, and that of the manufactured product is approaching. Going further and beyond that, there is a movement from ordinary to finer manufacturing, and life is becoming more finely organized; problems such as transportation and big industrial combinations are becoming more and more complex.

Where are the people coming from that are to handle these things? You want a textile industry; well, you can have it by putting up a tariff; but what kind of textiles will you have?—Crude textiles that cannot be imported because the duty forbids; but if you want fine textiles where do you get them? From countries where they have fine textile schools and technical training. No matter what the United States tariff is on textiles, the fine ones must be got from France and elsewhere abroad. That is a beautiful story of the German manufacturer who bought cottons in England, brought them to Germany, put designs on them and sold them back to Great Britain. What he sold was brains, as he said, for he put brains into his product. All along the line of modern industry the nations are facing this need of a higher knowledge than was possible under the old-time industrial situation.

The Apprentice Problem.

The apprentice system has gone, both as a teaching and learning institution. The industrial revolution brought about a good many readjustments of relations between apprentice and employer, and in the readjustment somehow the employer's liability to teach was lost in the shuffle. The employer is no longer under obligation to teach, and does not; a trade is "picked up." Modern nations like Germany have faced the fact that the old apprenticeship system has gone, and therefore determined to have a new system for new conditions. They will not abolish apprenticeship, for they say it is a good thing to have a boy bound and to know that he is going to stay and learn thoroughly; but they realize that as a State they have to give a boy the training he cannot get in the trade. So they start all those State schools everywhere to supplement the training of the trade—not to give trade training, for they rely for that upon the factory and the shop and shop experience. But they believe that shop experience alone is inadequate, and that all the things that really can be well taught by means of schools should be taught by schools and added to what the boy or girl is getting in the trade.

Dr. Sykes thought it likely that the school authorities in America would provide a real trade school for the boy after 16 to teach him the trade as well as the principles, also continuation classes, so that the boy from 16 on would have shop experience of the trade while working for wages, and the theoretical side of it in the school.

Dr. Sykes said he was a strong believer in the use of the school plant to its utmost extent; and that the strong demand for training was to be seen among workmen everywhere in the way they attended evening classes, took correspondence courses, flocked into business colleges, and attended evening lectures; and he thought it was a disgrace that educational institutions were kept open for only five days a week and six hours daily.

Columbia University as a Training-ground.

Columbia University realized several years ago that their evening technical courses would furnish a new supply of trained teachers. Hitherto Manual Training teachers had academic qualifications plus a certain interest in mechanics. That type of teacher is able to teach academic subjects in a trade school but can never teach trade subjects or shop work. The evening courses in technical education gave the beginning of a large supply of trade experts—men who had finished their time in machine shops or as pattern makers, cabinet makers, wood carvers, foundrymen, forge hands and plumbers. Such people can now get the equivalent of one year of college work (from the point of view of their preparation for teaching) in three years, by giving 5 nights a week, or even 4 if they have a fair elementary and secondary education. This is the fourth year of that plan.

Dr. Sykes outlined the organization as follows:—The School of Household Arts is one unit; the School of Industrial Arts is another unit. Both schools are willing to operate at night or in daytime, late afternoons or Saturday night, it makes no difference; they want to get students. The group of experts who wish to become teachers is in charge of an adviser who sees that their programme is made out rightly according to the College requirements.

Asked whether if men, already technically trained in shops, gave their whole time for three months in evening classes they could prepare as teachers, instead of having them wait for two or three years, Dr. Sykes said he had asked the Board to establish scholarships so that they could get the men in the daytime and give them a year and put them earlier at work, but lacking State aid the only feasible thing was to make the cost as light as possible by leaving them in their occupations and allowing them to attend at night. He would regard three months as inadequate, but in six months he thought something very admirable could be done.

One course only is given to this evening group on what is called the teaching of industrial arts in trade and technical schools. It covers the meaning of industrial education, types of organization of those schools including curricula and methods of presenting particular subjects. When it comes to the methods of presenting particular subjects, the professor of Arts education steps aside and the professors of woodwork, mechanical drawing, machine shop and forging are called in to show how they give their subjects; so that, in a measure, the methods of teaching are presented. A man, if a good mechanic, might be prepared in a year to be very good trade teacher.

One peculiarity about trade teaching in America, Dr. Sykes remarked, is that it is beginning to specialize. In the older times the Manual Training teacher was a manual training teacher and taught anything. Now the demand is running along three lines—for specialists in drawing, woodwork, and metal work of the community. Other things needed, but in less demand, are electrical and photographic work, printing, etc.

Shall the School Products Be Sold?

One of the very great problems, in Dr. Sykes' opinion, was what was to be done with the material product of the schools. The Manhattan Trade School for girls at New York was founded on the principle that the product should as far as possible be made on trade orders and sold. The school was successfully built up on those lines; the wholesalers co-operated in giving orders and disposing of the product. His own observations abroad summed themselves up thus,—that if they sold the trade product, the school was a good one; if they destroyed the trade product, the school was a bad one. There was no better illustration of that than the workshop school in Berne, which observes machinists' hours, the boys being at school in the same hours they would be in the factory. They have three weeks holidays which they would not have in the factory, but they are about half of the time at school work and half of the time at shop work; and all the stuff that they make there, that can be made without interference with the regular progress of their work, is done on trade orders and sold, these sales paying half the entire cost of the school. Apparently there seems to be a drawback in an educational organization that would sell product in competition with individual workmen; but we should consider that a boy in a trade school would otherwise be in the trade itself, and making the same thing in the trade, only making it not so well as he does in the school. In other words, you have the working boy and the product in either case, so it makes no difference. In the school his product would not be so large, because it would be dominated by the thought of making him familiar with many processes, with machines, with design and calculation; in other words, there is more human product and less mechanical product, while in the factory system there is a larger mechanical product and no human product to speak of.

Population Always in Advance of Schools.

Commissioner Simpson having suggested that in any system of education there would have to be a readjustment of the number preparing for any particular occupation so that the total number required would not be overrun, Prof. Sykes said that showed the necessity for co-operation with the people of the industry --the use of local Commitees. Personally he did not feel this necessity, because he could not foresee an educational system that would ever be up to the training of all the people in any given industry; he thought they would always lag behind. In the textile industries there are, for instance, only five or six schools in this, the biggest cotton-raising country in the world. It would be a long time before the schools would ever catch up with the cotton industry. When Canada has a system of industrial education for 7,000,000 people, the country would have 10,000,000 people. The school would never catch up. In a stable country it would be different, but in a growing country it cannot be done.

Industrial and Household Arts.

The program of studies in these schools in connection with Columbia University is as follows:—

1. Graduate curricula leading to the degrees of Master of Arts, and Doctor of Philosophy.
2. Professional curricula, two years in length, leading to the degree of bachelor of science in education, with the bachelor's diploma in teaching; requiring for admission, two years of work beyond the high school, including two years' collegiate instruction in modern languages, in English, in mathematics or natural science, and one year's instruction in history, economics, or sociology.
3. Curricula, two years in length, leading to the special diplomas in teaching, open to mature students who can not meet the full academic requirements of (2).
4. Curricula, of one or two years, leading to special certificates.
5. Special students may be received in any special subject.
6. Part-time students may become candidates for degrees or diplomas.
7. Students are received without matriculation into Special Classes in Household Arts, and Evening Technical Courses in Industry and Commerce.
8. The Summer Session extends from July 5 to August 16.

School of Industrial Arts.

Students who wish to specialize in the field of Industrial Arts should take work in this school as their major subject. The requirement for admission is determined by the work they propose doing, as follows :

(1) *The degree of Master of Arts and Master's Diploma in Education*, with a major in industrial arts; open to college graduates only.

(2) *The degree of Bachelor of Science and Bachelor's Diploma in Education* with a major in industrial arts. Open to students who have done two years' work, subsequent to the high school, in normal school, college, or technical school. Such students follow a two-year Curriculum, which includes one of the major subjects below, together with additional elective courses to make up 60 points of college credit.

(3) *The Special Diploma for Teaching Industrial Arts.* Open to teachers who wish special training for the teaching of industrial arts; who are not able to meet fully the requirements of previous training under (2); the two-year curriculum outlined under (2) is followed.

(4) *The Special Certificate for Teaching in Industrial and Trade Schools.* Open to expert mechanics and craftsmen who desire to become teachers of shop-work. For these a special one year's program of full college work or a three years' program of night work is arranged.

(5) *The Bachelor's Degree and Diploma in Teaching Commercial Arts.* A two-year course, with the same requirements as (2) and (3), respectively, above. Also, a certificate course of one year.

(6) *The Special Certificate in Applied Arts.* A two-year course; open to students who have had full secondary education; this diploma qualifies for admission as candidate for a special diploma and the bachelor's degree and diploma (see above).

(7) *The Special Certificate in Drafting.* A two or three-year course of evening study open to those who wish to qualify for positions as mechanical or structural draftsmen.

(8) *The Special Certificate for Clerical Work.* A one-year course open to high school graduates who wish to qualify as a clerical and administrative assistants.

Fees. The annual tuition is $150 with laboratory fees as stated. Part-time students may be admitted to any course in the School on the authority of the Director, at fees determined per course or at the rate of $7.50 per point.

Evening and Special Classes. Courses listed as Evening Technical Courses are given at night and are open, without examination, to men and women who desire to obtain higher technical knowledge in their callings.

THE SCHOOL OF HOUSEHOLD ARTS.

Students who wish to specialize in the fields of teaching, practice, social service, administration, and decoration as related to the Household Arts, should take work in the school as their major subject.

General Statement.

The School of Household Arts is a School of Teachers' College which has as its field the arts and sciences concerned in the conduct of the home, the hospital, the institutional household, and related vocations, and the educational courses related to instruction in these subjects in schools of various types and grades.

Students who desire to prepare themselves to teach Household Art or branches thereof are offered courses to qualify them: (1) as college instructors of household science, in chemistry, biology, economics, art, and administration, as well as in various technical subjects of household arts; (2) as directors and instructors of household arts in normal schools, secondary schools, technical and trade schools; (3) as supervisors and teachers of household arts in elementary schools.

As a technical school, the School of Household Arts offers the training necessary to persons engaged in, or wishing to prepare for the various occupations other than teaching represented in the activities of the School. Special opportunities are offered in house management, home cookery, household administration, house decoration, dietetics, institutional cookery, lunch-room management, nursery management, laundry management, and similar technical and industrial fields. Students who desire to follow the technical courses as a training for occupations other than teaching are admitted to all the facilities of the School. Qualified students can also take courses in other departments of Teachers College and the University such as fine arts, music, industrial arts, chemistry, history, economics, and sociology.

The School of Household Arts occupies the new Household Arts Building, completed in 1909-10 at the cost of a half million dollars, which provides laboratories and all possible equipment for instructions and research in all divisions of the household arts and sciences, and contains as well a special library of household arts.

Fees. The annual tuition fee is $150, with laboratory fees extra. Part-time students may be admitted to any course, on the authority of the Director, at fees determined per course or at the rate of $7.50 per point.

Special and Evening Classes in Household Arts. Special classes are given in Cookery, Design, Dressmaking, and House Management, for persons who wish to secure part-time practical instruction without regard to certificate or diplomas. Classes begin in October and in February. They are not open to resident students without extra fees.

Organization in the United States.

Writing in the Teachers' College Record on this topic Dr. Sykes makes the following statements:—

Middle Technical Schools.—Our highest schools of Engineering and Architecture provide more and more adequately for the highest class of professional and technical workers. But the men and women of the middle technical classes we neglect, and this class—the efficient instruments of the engineer and the architect and the superintendent—is probably 16 times as numerous as the highest class. In the city of London, the new provisions for technical education include 1 high engineering school, 7 polytechnic schools (middle technical schools), and an equal number of art-industrial schools. What we have already done sporadically in the textile schools of Lowell and Philadelphia, in the technical schools like Pratt and Carnegie and our Schools of Industrial and Household Arts of Teachers College must be done with an aim and a system by state and nation, adequate to the greatness of our commercial, industrial, and household interests.

Art-Industrial Schools.—Middle schools for those industries that depend in large measure on art for their character and value are a most urgent need in the United States. Schools of the art industries, such as the printing industries, the ceramic industries, the finer wood-working and metal-working industries, interior decoration, photography, have in foreign lands demonstrated their usefulness to an extent that stirs the American observer to admiring envy. Here the splendid gift of artistic inheritance that comes to us with our immigrants we waste and lose: the very boy who works in hammered brass in the elementary school to excite the teacher's surprise and commendation, is found next year driving a delivery cart. When we open up schools for the art-industries we shall have American-born artists in our industries. Then, perhaps, we may produce color prints to equal the Germans, and fabrics to equal the French, and porcelain to equal the English.

How the colleges will react from the pressure of vocational training it is not easy to foresee. That they will adjust themselves in part to the new demands is certain; but it is probable that before the adjustments are made, we shall have colleges of a new type established that will unite the so-called cultural studies with training in the technical arts.

Libraries and Museums.—In the provision of public libraries, we lead the world. The need of industrial and art-industrial and commercial museums has still to be recognized and supplied. What we have done for museums of fine arts needs to be done in every great city for the industries by which these cities live.

Agricultural Schools.—The organization of state systems of agricultural education from the rural school to the agricultural college will parallel in every stage the organization of the industrial and commercial schools of the towns and cities. Progress in this field of education is already rapid.

Training Schools for Teachers of Technical Arts.—The extension of program of normal schools to include the subjects of industrial (including commercial), household arts, and agricultural education is proceeding apace and should be pressed on. Technical schools have everywhere a duty and opportunity to select and to train the expert workers who can also teach; on such men depends the success of our trade and co-operative and continuation schools. Teachers College has tried to be forehanded by instituting its Schools of Industrial and Household Arts, the chief end of which is the training of teachers of technical arts; but already the demand exceeds the supply.

Vocational Training a State Investment.—This vocational training through schools has hitherto been the privilege mainly of the specially gifted or the specially fortunate; and in general this training has been confined to the professions, and the individual has had to pay for his training. We are ready now to think more broadly in this matter, and consider if national efficiency, which is a concern of the nation, can be provided for by state and nation; that the many to the measure of their ability and their needs, may have the training hitherto denied them; that we may utilize adequately our chief resources, the men and women of this land. The program outlined above will take money; but it is, we insist, not expense, but investment. Investment by the individual in education is shown to be financially remunerative to the individual; state investment in education is likewise demonstrably remunerative to the state; there remains then this final state investment in state vocational education. The burden is no more serious than that of any other type of secondary education.

Summary.—To sum up: The new education aims to train our people to meet the problems of livelihood and living—to apply science and art, craft and machinery, method and organization to make possible a higher achievement of living for all. The great new stream of education must penetrate like a vast irrigation system through the land, pushing its rills into the remotest communities—as universal, as essential, as beneficent as the free elementary school. This is the latest and most measurable contribution of education to life. "That man only," said John Ruskin, "is educated who is happy, busy, beneficent and effective in the world." To that idea—that men and women may in this land be happy, busy, beneficent and effective—the new movement of vocational education is devoted.

CHAPTER LXI: VOCATIONAL SCHOOLS OF INDUSTRIAL TYPE.

SECTION 1: INTRODUCTORY.

From all sides the Commission heard that the tendency to leave school at the age of 14 is so insistent that the ordinary school is unable to hold a large number of the pupils whose parents could afford to keep them in attendance longer. It is claimed that here the Vocational School is able to offer sufficient inducement. For example, in Buffalo more than 60% of the cases reported as leaving school at the age of 14 leave not from necessity, but because of the unsatisfactory opportunities of the regular grammar grades. This has been said without any intention of belittling the good work done in the ordinary day schools. It is complained that the fault lies in the system, not in the way it is carried out.

The immediate purpose of the Vocational Schools is not to teach a trade, but to give the pupils such series of experiences that they shall know what good workmanship is, and be better able to appreciate its worth and importance by being able to do the work with enjoyment. The boy who leaves the 6th grade is not ready to learn a trade; in most cases he has not the physical strength or the maturity of mind or body, but he is ready to do work from which he will form habits of care, thoroughness and accuracy, and discover to himself for what trade or occupation he is naturally fitted.

In the case of girls, Vocational Schools follow either the course of preparing them for home-making or for one of the industrial or commercial employments. In the course for Home-making, each of the three sections or departments of cooking, sewing and book-work receive full attention, usually not less than 2 hours per day during a 2 years' course. The cooking and sewing are brought up to housekeeping; millinery and dressmaking grow out of the sewing, and are substituted for it as the work goes on.

The Problem of School Products.

In all these schools, what to do with the output of the school in the form of the products of the school shop raises questions which have to be answered in accordance with local conditions. Wherever the school can make articles to be used or consumed by the school authorities or the municipality, that seems a proper destination for it. It is claimed that where the pupils know that their products have a real commercial value, they do the work better, and are more interested in the school studies than where the things are made only for their own use. There is also the development of the social or civic spirit through the pupils knowing that they are in some measure contributing in towards the cost of the school.

Arithmetic of the Book or the Bookcase.

Those in charge of the schools express satisfaction with the progress they are making. Where the book work and shop work are so conducted that the one gives meaning to and needs the help of the other, the pupils derive greater benefit from both. The lessons in arithmetic arise from calculations of the cost of the product, such as the desk, bookcase, a dress, a hat, or of the meals served to the teachers. The pupil feels a direct and personal interest in the number work, which does not arise when he is called upon to do a set sum in arithmetic. In many cases the pupils in these schools are taken for visits to factories. These occasions give rise to lessons in composition and other school work, all of which help to develop ability and interest in the industrial activities of the place.

SECTION 2: "CONVERSATIONS" RE INTERMEDIATE INDUSTRIAL SCHOOLS.

The Commission had the advantage of discussions with Messrs. Murray and Allen, of the Massachussetts State Board of Education, as well as Commissioner Snedden and his deputy, Mr. C. A Prosser, concerning the Independent Industrial Schools. Their aims, the character of the work they do, and measure of success which they had attained, were observed as far as practicable and discussed with the Principals and others. Out of that material the following general statements have been gathered.

In Massachusetts no community is obliged by law to give any form of industrial education. The practice has been to make a school or course of education permissive, and then to make it mandatory upon communities. Industrial education is at the permissive stage now.

The legislation under which the work is being conducted deals with three groups of interests:—

(1) Children at 14 years of age who may leave the regular public school and take advantage of the Industrial School, exercising their choice between the school opportunities and the situation with pay;

(2) The young man or woman who has already gone to work, and who may take either Continuation Classes or get the benefit of one of the part-time or half-time classes;

(3) Such schools in Massachusetts as, to a greater or less extent, serve one or more of these classes.

The complete system of industrial schools as contemplated by the State Law includes all-day sessions for the boys and girls; evening trade extension work for the mechanic who is employed during the day; and the opportunity in the day time for part-time instruction to young people who can get a certain time off from their wage-earning occupations. Experience has shown that the best way to introduce the work into all these classes of schools is through the medium of evening classes first. "Get the workers there, do something for them, and then get a sentiment in the community which favors industrial education. By such means you will find that the people and the authorities of the locality quickly learn a good many things about industrial education that they did not know before, and thus become ready for development.". The plan of the leaders in Massachusetts is to urge the people to begin evening schools. The State pays two-thirds of the salary of the instructor of evening classes.

Evening Courses for Various Groups.

Evening courses are established in many places in the Commonwealth, the conditions of admission being two:—(1) The student must be over 17, and (2) he must be on the job. These courses do not pretend to teach a trade. They simply take a certain defined group and deal with some very limited practical end of that group, without any relation to any other course whatever. There is another series of courses, *e.g.*, one school gives a course of house carpentry in roof-framing only. Another school opens its shops to men employed in a specialized line of industry, and says, "If you are a lathe hand and want to run a grinder, come in and we will put you on the grinder; that is all we do; that is all you say you want; we will give it to you." Another group says, "We are employed in machine work and want to become tool-makers in a special branch." The school says, "All right, we give a special course in tool-making for machinists." All those courses would be designated in that way, even if it was called academic work—the course in arithmetic for house carpenters; the course in arithmetic for machinists; the course in blue-print for machinists; the course in drawing for carpenters. It is called the "Unit" course. The scheme in every case is to serve a certain group already in the industry who have a certain specific need along what might be called a narrow line. An evening school undertakes to give that particular thing, and then so far as the school is concerned it is all off; there is not an attempt to give a series of related courses. It may be that the group comes back and says, "We want an advanced course in this same thing," and the school gives it; but there is no organization of series of related courses such as drawing, mathematics, English and machine shop practice. This particular school is the one that is aided by the State. The communities maintain other evening schools of a more general nature.

Attendance Requirements.

All boys between 14 and 16 years of age must be either at school or at work. If a truant officer finds a boy on the street under 16, he asks why he is not at school. If the boy says he is working, the officer assures himself of the fact, or sends him back to school. The State law is reasonably well carried out. The 16-year law dates back 10 years; the 14-years dates back 30 years. It provides a heavy fine and a jail sentence for any employer who employs a boy or girl who should be in school, and there are State factory inspectors whose duty it is to see that the law is enforced.

It might safely be said that every boy in the Industrial School would be employed for wages if he were not at school. In the case of 95 per cent of the boys, if they were not in the Industrial School, they would be at some sort of job through which they would not be receiving training to fit them for work which would yield permanent satisfactions when they are grown up. The Independent Industrial Schools do not divert into themselves boys who would otherwise go on to the High Schools. In the case of New Bedford it was cited that after the opening of the Independent Industrial School the High School got as many pupils as ever and the Industrial School got 150 pupils who would not have gone to the High School, but would have left the Grammar School without further education.

Industrial School Features.

One characteristic of this industrial school should be kept in mind:—A vocational school is not in any sense an outgrowth from or ingrowth towards any other type of school; it is an outgrowth of the industry rather than of any other type of school. A boy goes into this school when he could go into the shop itself. This industrial school taps a new group, for these boys of 14 would probably have gone out to industries. Figures show that only 6 per cent would go from Grammar School to High School. After a while these boys are going to be leaders of industry. They will climb from the shop work to foremanship; and they will be socially superior to the fellows who find their way into the industries by accident, and get only the limited experience the shops now give. The Technical High School fellows will go to the Technical Institute, and go through by what is called the "white shirt" approach.

Experience with the industrial schools made it evident that the instruction must be quite specific towards qualifying the boy to do well in his vocation when he has left school. There is much closer scrutiny of the results of an institution which undertakes to train for practical achievement than there is of an institution which simply undertakes to give a general cultural training. The degree of efficiency is more easily checked up in the case of the industrial school. The school undertakes to train a boy so that he will be a competent mechanic, and by virtue of his training demand and expect better wages. The school gets a quick reaction on itself, both by the pupil and his employer, that does not come back to the school which has a course of general cultural work. It does not make so much difference in regard to the reputation of a High School whether 50% of the pupils are not trained efficiently; nobody seems to know or allocate the cause. In the case of the industrial school it gets a quick come-back. This has led those in charge of the industrial schools to differentiate very sharply in their methods of instruction. It has led to the teaching of the pupil on the basis of a working knowledge of the facts with which he will have to deal when he enters upon his employment.

Shop Work and Class Work Correlated.

At first some schools were organized on the principle of what has been called the parallel experience. For the purposes of administration these were regarded as two essentially unconnected experiences, although every effort was made by the teacher to co-ordinate or cross-connect them. Mathematics were taught as mathematics when the boy was in the class-room, in the regular sequence as arranged in the text-book, but sometimes using the content or subject-matter of shop experience. Now, the teacher learns what the boy has been dealing with in practical mathematics in the shop, and gives him experience in that class of calculation during his school hours.

In all cases the plan or scheme of the school includes the proposition to train the pupils through the turning out of products which have commercial values. In the case of some schools the pupils devote a portion of each day to shop work and the remainder of it to class-room work closely correlated or co-ordinated with it. In the case of other schools the pupils devote a period of a year more or less continuously to shop work, receiving their theoretical instruction in connection with the practical work they are doing. In the case of the school at Springfield, that is the way the instruction is given, although part of it is given in the shop and part in the class-room. Then one day every week the class-room work surveys what has been done, particularly in mathematics and drawing, with a view to giving the pupil a knowledge of the general principles which have been ascertained, and showing him how they may be applied to other cases.

Does not Lead to the High School.

When a pupil enters the Industrial School he cuts himself off from the schools intended for the professions, unless he goes back and starts over again. Fifty or sixty per cent of the boys who go into these Industrial Schools are those who have not completed the Grammar (Public) School course, and not having played the game by the rules they cannot enter the High School. As the High School does not recognize the training in the Industrial School as of value for its purpose, the boy would not receive credit for his industrial work. Consequently boys do not enter the Industrial Schools as a preparation for High School work.

"As the situation stands at present in this State the Industrial School is an independent organization, and not a preparatory school. It goes entirely on the principle that a boy is going out from that school right into life. That is what might be called the official standing of an Industrial School. In other words, a boy makes his choice in a broad way when he enters the Industrial School, and if he has made a mistake he must, to a certain extent, retrace his path."

Qualifications.

A boy entering an Industrial School must be 14 and able to read and write. It is not required that he has spent up to the sixth form; a boy is admitted on exactly the same basis when he has given his age and the school certificate. The actual work of the school when he enters is the test whether he shall stay or not. If he shows he cannot do the work he has to leave. The actual work of the school raises the academic standing of the boy by testing him out. Mr. Allen gave a practical illustration of this. When he organized the New Bedford school he took with him a teacher of mathematics from the High School, and they found, as near as they could tell from their experience—Mr. Allen had considerable High School experience—that the boys who had had two years' training where academic work was related to shop work in this way, were better in mathematics and English and their power to understand than the average pupil they had been accustomed to deal with in the High School on more than a two year basis.

Mr. Murray corroborated this statement from his experience in the Newton Independent Industrial School, adding that the Board of Trustees, which is made up of some members of the city government and some members of the committee which controls the public schools, passed a resolution a year ago that any boy leaving the Grammar School at the sixth grade and taking three years at work in the Industrial School should be entitled to his Grammar School diploma just as if he had stayed in that Grammar School.

How Boys are "Tried Out."

When the boy enters the school he is asked what line he wants to follow. Mr. Allen said that when speaking of an Industrial School the leaders thought of a school fitting for a particular industry, such as metal or wood. If a school is undertaking to deal with more than one group, it is regarded as a group of schools; so that Worcester from their standpoint would be regarded as a group of two schools—one wood-work and the other metal-work. Take Newton: suppose a boy says "I want to be a printer," they set him to work in the printing department. After a while it appears that the Lord did not design him for a printer; so he comes back, and they agree there has been a mistake. Then the boy says "I have had my eyes opened in this school; I have stuck my head more or less into the machine-shop; I have a notion that is where I belong." They say "All right, go and try it." There is a trying-out process in the early stage of the game. That is the way the boy is taken care of, but he makes the test when he enters the school with the opportunity of making a new choice if it appears he made a mistake in the first place. The number of trials a boy has depends on how many trades the school provides. Newton has woodworking, metal, printing, and electrical work. Each of these schools is organized with regard to local industries.

Admission to Classes.

As far as the State is concerned, there is no specific time for admission to these schools; a boy may come in today and be admitted. There is no regular admission once a year, except that he must be 14. That has complicated dealing with those boys, because they drop in all through the year, and it is almost impossible to deal with them on a class basis. Instructors must not have more than 15 boys in their class, for a man cannot do satisfactory work with a larger group. One school that started with a unit of 30 fell flat, and it practically put the school out of existence. The whole thing might be in one building, as in

Worcester. Under the law the local community furnishes the building and equipment, and the State does not care whether it is scattered over various places in the city; it is all the same organization. Very often these communities, having certain equipment which was frankly intended for another purpose, use it for the purpose of this State-aided plan, and sometimes it is used for another purpose also.

Dr. Robertson asked whether the gentlemen thought that the Industrial School was complete in itself, and did not call for another school to which some of its pupils might go on; or if it did require such a higher school, whether any existing school was suitable as a secondary school to the Industrial School.

Finishing at the Industrial School.

Mr. Prosser replied that there is no demand for such a higher school in connection with the Industrial Schools.

Dr. Snedden thought that without doubt there would be a demand for continuation from the Industrial Day School in evening work. In Lowell there is an evening school for foremen which takes the high-grade artisan, those capable of handling the more complicated technical work.

Mr. Murray said that Newton Technical High School had made so much of a modification that it is practically open to the boys of the Industrial School, but with two exceptions the boys had not taken advantage of that. He cited the case of a boy who had really finished his three years in the Industrial School, and when asked why he was not attending the Technical High School he replied, "I don't think that is the place for me; I ought to get into work, and I believe I like the printing better than patternmaking." Though he had put in three years at pattern-making and did excellent work, he had taken up with printing. He believed a boy with that type of mind was better off at work than if he went to the Technical High School.

Mr. Allen said that the one great difficulty is the unwillingness of the intelligent boy to work his way up through the shop and enter an industry through what Mr. Prosser calls the "dirty shirt" end, although there is large opportunity in the State for shop-trained boys of ability to rise, and large establishments are looking for such boys. They could get plenty of technically trained men, but not the other type.

SECTION 3: THE NEWTON (MASS.) SCHOOL SYSTEM.

Information obtained from "Conversation" with Dr. Spalding, *Superintendent.*

A chart has been prepared showing what the Newton School System stood for and was trying to do only half a dozen years ago, also what it now stands for and is aiming to do in the immediate future. For a long period, ending about 1905, it consisted of an elementary school topped off by courses the main idea of which was preparation for college, normal school or technical institute; but all the while the pupils dropped out from the 5th grade up to make a living.

The uniform answer of these embryo craftsmen and home-makers to the question "What preparation have you had?" could only be, "Reading, Writing and Arithmetic." There was a barrier—"no preparation" —which was broken only by students who went to higher schools open only to those preparing for the learned professions. This old type of education was thus described by the School Committee of 1910:—"It selected, retained and educated those who were fitted by natural endowment and interest to profit by what the school thought fit to offer; others were eliminated all along the way, and with little concern for the precious material thus forced to waste. It stood for uniformity in materials of education, in methods and in product."

The New Idea in Education.

The new development has been inspired and directed by the idea that "it is the function of the school to educate every boy and every girl; to eliminate none, to accept all. It fits work and method to individual needs, and strives to send children out of school just as individually diverse as nature designed them to be, and as the diversity of service which awaits them requires." The "no preparation" barrier is lacking in this section of the diagram, and pupils are able to give answers showing some special preparation for different lines of work—commercial training, technical trades, machine trades, cabinet work, etc., in addition to reading, writing and arithmetic, which are basal.

In order to give specific preparation, there now appear on the diagram, instead of a single High School, two High Schools and several types of trade schools —all carried on under one roof in the Technical High School—besides the Independent Industrial School; also special classes for backward children, and the development of the elementary school that leads into the High School instead of the little elementary school for illiterates of some years ago.

Dr. Spalding stated that he considered vocational and industrial training but an incident, though a very important one—only a striking phase—of the growth of public conscience concerning the great problem of education as a whole, which has developed in that direction at present. Industrial and trade training, he asserts, has no conflict with Greek and Latin. It is simply an adaptive kind of training that certain boys and girls need, just as Greek and Latin form an adaptation and perhaps will always be needed by some boys and girls. He suspected that many other things which we now scarcely think of as educational or proper subjects for instruction will have to be brought into the curriculum of our public schools as the problem grows upon us and as we are solving it.

Vocational Education.

Now we are beginning to do in our public schools just what our higher schools and colleges and universities have always depended upon for their main success—vocational training; for notwithstanding all we have heard about culture, the fact is that they have trained for vocation —they have trained the leaders in the higher professional walks of life. Now the public schools, filling a lower and earlier phase in life, must train in suitable vocations, such as society demands, those boys and girls who will not get their vocational training in higher institutions.

Massachusetts has local option in education as in all other matters. While the schools have always been organised under State laws, and are State institutions, beyond the very minimum of education the trade schools are developed locally, and up to the last three or four years localities could go as they pleased, being required to support them financially to the fullest extent. Excepting a few poor places, having valuation below a certain amount, no cities or larger well-to-do towns have ever received any State support in educational matters till within the last three or four years.

Newton's Schools and State Aid.

The people of Newton have developed their educational scheme and worked out their problem as they saw it, in response to their own ideas and ideals, and in harmony with, but not going far beyond, any State requirements until recently. This community is paying the cost of this educational development, excepting that the State, under certain conditions, reimburses the city one-half (say $3,000) the expense of maintaining the Independent Industrial School; also one-half the expense of evening classes in shop work and drawing held in the High School building. These two exceptions amount to less than 1% of the total expense of education. Manual Training and Domestic Science do not come within range of State help, though the State authorities will say at once that this does not indicate a lack of sympathy with that kind of education.

Out of a population of 40,000, the schools are attended by about 2,000 pupils doing work of High School Grade, or 5% of the total population.

Lunch is furnished to the pupils in exchange for tickets, by which means they can all be supplied in 5 minutes.

How the Newton System Works.

The city of Newton is made up of seven or eight villages, and pupils enter whichever school they please. The Technical High School building, which is used also for evening classes, is situated just across the road from the Newtonville Grammar School, and was visited by the Commission. This Technical High School Mr. Allen calls a "full-time full-responsibility" school. The Newton Grammar School is a High School with the usual literary and classical course.

While the two schools are organized separately and have separate corps of instructors, about 300 pupils come from the Grammar to the Technical School for practical handwork—girls in cooking and boys in mechanical shops.

In every year of every academic course fully a third of the pupils of the Grammar School take a minimum course of practical work in the Technical High and before they get through fully two-thirds of them will have had practical work at this school. Practical work is compulsory for those belonging to the Technical School, and those not wishing for it must go over to the other. The changes at the beginning of the year are about equal, 20 or 25 starting in one school and changing over in each case. It is a good opportunity to judge the two systems—the same ground, the same city, the same general system, and practically the same social standing.

THE TECHNICAL HIGH SCHOOL.

In this school a very wide range of work is covered all the way from that which comes very close to trade training to the opposite extreme of preparation for college—without Greek, however, which has not been asked for, though a good many take Latin. The variety of courses running side by side under this roof would make half a dozen schools, such as Manual Training High School, School of Practical Arts, Trade School for Boys, Commercial High School, etc. The size of the place compels this school to maintain under one roof all these different departments. On the whole, Dr. Spalding thought the advantages outweighed the disadvantages, and that the school can do what it professes to do better than if the departments were separated. The work can be adapted to boys and girls as necessity arises; a girl can be shifted, or partly shifted, from one course to another, whereas the schools, if separate and distinct, would lose many misfits who start in the wrong place and drop out. The aim is to make the most of such a boy, and this school gets its hands right on to him, and if he drops out, the responsibility cannot be turned off from the school on to someone else.

The "transferred class" affords a concrete example of the determination not to sacrifice any boy or girl to a system or to any mechanical methods. There are grades and promotions, etc., but these are used all the way through in the interest of the pupil, instead of sacrificing the pupil to them.

Grading and Promotion.

The idea all through the grade schools is to put the boy and girl where they can do the best work, and provided they do the work well, let them go as fast as they want to, or force them to go more slowly. This plan has resulted in getting together in the higher grades a considerable number—not nearly as large a proportion as this school or most schools used to have when following pretty rigidly the ordinary plans of grading and promotion. It has been found that altogether too many boys and girls were in the higher grammar grades who, though of proper High School age, yet judged by their standard of accomplishment in grammar school grades, could not get into High School, or could only get in very late, when they ought to be graduated from High School. The question was, "What is best for these particular boys and girls, regardless of any schemes or plans for grading or promotion?" The answer was this:— "Boys and girls who will be 15 next September, who have gotten into the 8th grade will be transferred into these special classes in the High School. Boys will be under instruction of a man for academic work adapted to what they need, correlated to hand work and shop work and mechanical drawing. Similarly the girls are gathered under one woman for their academic work adapted to and correlated with work in the kitchen, sewing room, etc. That academic work occupies 10 hours of the week, while practical work takes the other 20 hours.

Testing Value of Hand-Work.

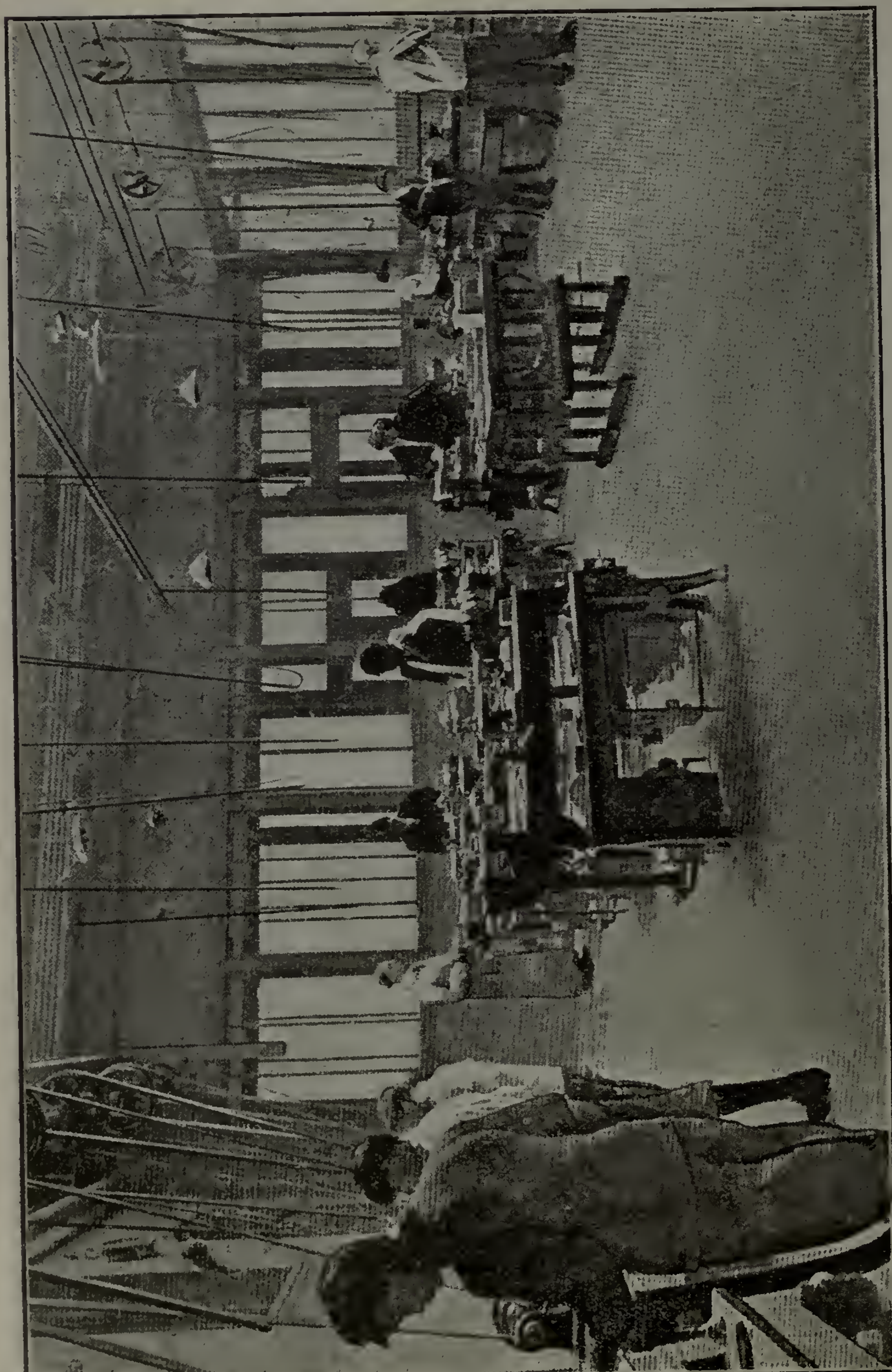
Last year that clsss went through the whole course and it was found that many of the boys in particular were not deficient in grey matter, but they had been misapplying it. When their instructors understood them and gave them means of expression through the hands that appealed to them, they developed, even at the eleventh hour in their schooling, into boys of more than average ability. The girls did not show as high a grade of average intelligence, yet the results of their instruction were perhaps fully as marked. Instead of dropping out of school, as many of them ordinarily would have done, almost all, both boys and girls, stayed clear through the year; three fourths of them determined to go through the High School in some regular course. Out of about 40 girls of last year's transfer class, 27 are now in High School and have started on regular courses there. It is the custom for the instructor, at the end of 5 weeks, to inform parents of any deficiency or backwardness. Last term the pupils of the whole school had shown deficiency or weakness in their work in 326 subjects. Those 27 girls, to receive their proportion of the school average of such notices of weakness, would get 11 notices, and it would have geen gratifying if they did not get any more, remembering the type of girls they were, the poor records they had made in the past school and during their year of transfer work, and because they were the very lowest strata of the school enrollment. Instead of 11 the whole lot received only 3 notices of weakness. Dr. Spalding considered this a perfectly fair test, for the teachers who send those notices in many cases do not know the girls at all. That was the strongest endorsement of the success of the one year's work. There were 27 girls in the school doing better than average—enough to get their pass marks and a great deal better than the average total in the school—and they were of the type that would have been lost to education if they had not been brought into this school.

Newton Leads in Facilities.

Dr. Spalding remarked that the city of Newton had made more adequate provision for education than any other large city in the country. It has a bigger plant, a bigger corps of teachers, and better equipment, than any other community, and the people have grasped the problem so that they can see around it. They are ahead as to accommodation, and have room for the future, so there is no temptation to eliminate pupils; their function being not to keep out, but to bring in everybody. Newton has never been behind so that they have had to have part-time classes. The idea of a permanent part-time class has never been known in this city.

In addition to the Technical High School, with Commercial Department, there is the Newton High School. The two Newton High Schools are separate, but co-operative in organization and administration. Most of the academic subjects

PRINT SHOP, NEWTON TECHNICAL HIGH SCHOOL.



WOOD-TURNING SHOP, NEWTON TECHNICAL HIGH SCHOOL.

are taught in both schools, but courses are not duplicated, being arranged to suit various needs. Some are for pupils who will probably complete their schooling with these courses and enter commerce or industry; others give an all-round academic training with a view to either finishing at High School or going on to some higher institution. Nine distinct and complete courses are offered. Three (the general, the classical and the scientific) are given in the Newton High; the others (the technical, the extra-technical, the technology-college, the fine arts, the clerical and the business) are given in the Technical High. The wide range of elective and optional studies offered in connection with each course makes it possible to furnish every pupil with just the work and opportunity he most needs.

Nine Distinct Courses.

The *General* Course (4 years) offers a wide choice of elective subjects. The *Classical* Course (5 years) includes Optional Handwork for boys and Household Science and Art for girls in all years. The *Scientific* Course (5 years) includes general subjects as well as manual and domestic work, more time being alloted to the latter. The *Technical* Course (4 years) prepares for admission to all normal schools and to the State Textile Schools. The *Extra-Technical* Course (4 years) prepares for work in the productive industries, and gives an all-round technical-academic education. The *Technology-College* Course (5 years) prepares for admission to all schools of Technology, or departments of colleges, and all Normal Schools. The *Fine Arts* Course (4 years) prepares for admission to the Normal Art School and all higher schools of Fine and Applied Arts, giving an all-round academic education, strong in Fine Arts. The *Clerical* Course (4 years) prepares for commercial life in every branch, while the *Business* Course (4 years) trains for more responsible business positions, whilst giving a broad general education.

Singing and Physical Training are compulsory for the first year, and Physical Training for 3 years in the Classical and Scientific courses.

Graduates of the Technical High School are expected to arrive at positions as foremen and superintendents, having more knowledge of science and mathematics, though less of practical manipulation, than boys from the Industrial School.

There is a Preparatory Class for those who have reached High School age but have not passed Grade 8; course 1 year, one-third being given to academic subjects and two-thirds to practical, including mechanical drawing and shopwork.

Commercial Course Leads.

There are more pupils in the Commercial Course (400) than any other. The percentage of attendance of girls is almost the same in both schools. Preparing for higher technical instruction such as the Institute of Technology, Cornell, etc. there are 170, and the boys in the Technical course are about 170. There are about 50 students taking the Fine Arts course only. In 2 years' time there will be a larger proportion relatively taking the technical as distinguished from the commercial courses. If the 4th year were cut out, that would take about 50 off. Principal Palmer explained that many boys and girls have gone from the Commercial Course into business in the last 7 or 8 years, and such efforts have been put forth to assist graduates in finding employment that boys and girls coming to that course know that on completing it they will have an earning power 3 months after graduation of $8 or $9 per week. The boys and girls looking to the Extra-Technical Course, which more nearly approximates a trade course prepared for mechanical work, do not have that outlook. The dollar does loom large; in many cases the bribe to change to the commercial course is the knowledge specifically of just what they can earn when they get through that course.

Industrial and Academic Relations.

Dr. Spalding said it was not proposed to make the industrial training of the school the dumping ground for those who could not do anything on any other subject. Referring to the claim that practical training opens up the mind and gives impulse *per se*, Dr. Spalding said that those pupils and many others would have succeeded a good deal better if they had had practical training. He thought the failure of pupils under ordinary conditions was due in many cases to inappropriate subject-matter, unsuitable teaching, and other things. He added that instead of technical grammar and some of the more difficult portions of arithmetic they had been for two or three years substituting more handwork, even to 10 or 12 hours weekly in Cooking and Manual Training. More of this will be done where found necessary or advisable.

Differentiation of Studies.

As regards differentiating at entrance, any graduate from the elementary school may attend either the Technical or the other High, though a good deal is done in the way of advice by the elementary school teachers. Those who do not graduate regularly are simply transferred, because it is better for them to be in this school. They may be transferred conditionally. Before this was done, a good many were being put into this school who could not go into the High School, and they did about as well as the others. They were put in on trial, which spurred them to their best endeavour, and not more than 2% dropped out. Some condition might be made about the subjects they could follow.

Differentiation and Discipline.

Principal Palmer, when asked whether any need was found for differentiation, two years before pupils leave the elementary school, for those coming here as compared with those going elsewhere, said he would consider differentiation in work for various individuals rather than in relation to this or that school. Dr. Spalding added that those who needed differentiation would naturally come to the Technical High School. Out of 33 girls who entered High Schools the previous fall, 26 had come to this school, and 7 to the other. Dr. Spalding mentioned that the printing class at the Stearns School helped it to differentiate.

Mr. Palmer remarked that schools of this type get pupils who have selected work for which they are better fitted and more competent. Some boys, who are differentiated from other groups and specialize on pattern-making, can do anything that comes within their range or power, and they are orderly, diligent and attentive, because they have found what they want. In the later years of the commercial course, when boys and girls have found what they are expected to do, there is more aim, so that there is no question of discipline; they work diligently and take care of themselves.

Vocational Guidance.

The School has an Advisory Committee consisting of 25 business men resident in Newton, but mainly connected with business in Boston. It is organized into several committees, one of which is on manufacturing. These men have intimated that when the school has graduates from a senior class in its Extra-Technical Course, they would be glad to take them on. The pupils have already done something in the summer vacation, and there is one now on part-time.

Manual and Industrial Training.

Mr. Murray explained that the Manual Training of the course is general for all pupils who wish to take it, and all pupils take it in the city, no matter what High School work they are going to do. In the 6th grade in one school girls and boys devote about 10 hours a week to cooking and sewing, woodwork or printing. That has been a success viewed from the amount they have accomplished in their academic work, and what they have done in the printing work. He thought that Grades 7 and 8 should have 4 to 10 hours Manual Training weekly, and classes in the Secondary Schools should have 6 to 10 hours weekly of Industrial or Manual Training work.

The work of the Independent Industrial School, Mr. Murray added, is going to be made as skilled as possible. The boys from that school seem to enter the industry as skilled workmen, and probably quite a number will come up through to positions of responsibility. In the Technical High School they are more likely to approach it from the other end. From the Technical High School, up to the time this school and the one in Cleveland were established, less than 5 boys passed into productive industries. The fellows who take the Extra-Technical Course will probably soon become foremen, and there are quite a few specializing in drafting. Last year there were boys out drafting who got $10 and $12 a week. The boys in the Industrial School will be ahead of the boys in the Technical High School in the matter of manipulative skill, whereas the Technical High School boys will be ahead of the others in scientific matters. The group in the Industrial School would never have been reached by the High School, and in the Technical High School they could not have had the amount of shop work they get in the Industrial School.

Referring to the foundry, Mr. Murray said that if he were doing the work again, he would not put in a forging shop, but would have a better foundry than this, and make more of the foundry end, putting only a few forges in connection with the machine work. Forging as an art is going out; more drop-forging is being done. Mr. Murray would have had a big enough foundry so that they could have had an iron-melting cupola.

SECTION 4: THE INDEPENDENT INDUSTRIAL SCHOOL OF NEWTON, MASS.

A brief statement has already been made on the Independent Industrial School at Newton, Mass., in the chapter on Elementary Education. (See pages 91, 92).

At the time of the Commission's visit the School had been established 3 years, and had 50 or 60 pupils under 4 teachers. The cost of maintenance was $7,780, of which $1,200 was for equipment. The State pays half of the current expenses. Boys must be 14 on entering. Three years is considered as long a course as a boy will take; a job is then found for him, and he gets a diploma after he has been at work a year. He may then be regarded as about half through full apprenticeship. Boys are warned during their school time of the danger of being kept at one machine job, which makes them narrow.

It was stated that 90% of the boys in Industrial Schools would be in "cheap" jobs if there were no Industrial Schools. There is a by-law in Newton that boys and girls of 14 to 16 must be either at work or in School. The Industrial School has not interfered with the High School attendance. The school time is 6 hours daily for 5 days a week, 11 months of the year. At first half the time is given to practical work; later on, two-thirds.

The school prepares specially for Pattern-making, Cabinet-making, Machinist, Printing and Electrical trades. After going to work, the boys may attend evening classes in the Technical High School building, upheld by the Unions; while day pupils have access to the better equipment of the latter school for special purposes.

Boys may enter at any time, hence class treatment is not always possible. Classes are generally limited to 15, and individual instruction is given. The work is undertaken on a commercial basis, being profitable to a certain extent, but not so as to exploit the boy or interfere with his instruction. Usually apprenticeship shops in schools are strong on products, in order to make the school pay, but the Industrial School reverses that method.

SECTION 5: THE INDUSTRIAL SCHOOL, NEW BEDFORD, MASS.

This school was opened in 1909, and in 1911 was removed to the present building, which was originally an old carriage factory. The boys themselves did most of the fitting up and adapting of the new building to the requirements of the school, the only work they were not capable of accomplishing being some of the plumbing and the plastering.

The course of study is mainly intended to develop the experience of the boys along the lines outlined in the policy of the State. The age of admission is 14 for the day classes and 17 for the evening classes. The courses of study (3 years in length) include Machine Shop Drafting, Machine Shop Practice and Automobile Construction; Architectural Drafting, General Construction, and Cabinet-making; Steam Engineering, Electrical Engineering; together with Millinery and Dressmaking for women.

The evening classes are intended primarily to improve young men in the calling which they have adopted, and not to take a young man from one calling and fit him for another.

In the day classes there are about 110 boys and 30 girls, and 400 to 500 pupils in the evening classes. The cost of both day and evening work amounted for the year to $23,000, of which 20% was for evening work.

SECTION 6: THE VOCATIONAL SCHOOL, SPRINGFIELD, MASS.

At the time of the Commission's visit this School was temporarily established in the upper floor of a factory. The pupils had lined the wires, put up the shafting and fitted up the whole shop. The flat was divided into two sections, one for school work and mechanical drawing, the other for woodworking and iron work.

There were 85 boys in attendance, taking a 3 years' course. Principal MacNally had 4 assistant teachers.

Boys come here in lieu of finishing their grammar school education, and if not here they would be out looking for a job. The departments are Wood-work and Machine-work, the latter being divided into tool making, machine tool building and repair work. The Woodwork is divided into cabinet-making, pattern-making, and carpenter work. The labor unions are anxious to have a bricklaying course, and an electrical course has been suggested, but this can be met in evening classes. The Machine department is far better attended than the Woodwork, owing to the impression that this work pays better, though in fact when the boys learn conditions in both trades they find that woodwork is best. Mr. MacNally proposes to start a printing class and relate it to the literature class. The class-room teacher selects what will be printed, and it is carried out in the Manual Training shops at two centres in the city, where the boys go in for type-setting, which is related to literature, drawing, designing and shop work.

Work is done at the Vocational School to meet the needs discovered in the grammar school, and Mr. MacNally, being Supervisor of Manual Training in the grammar schools, is thus enabled to make the one serve the other.

Boys Work on "Projects."

This school has no text-book on mechanical drawing; the boys draw what they are working on. They work on the "project" basis; all the school work centres on the project the boy is working on. The boy must work up his specification for the job; he must make his working drawings, and his estimates; then he comes in and works on the job in the shop. When it is finished he writes up his notes and makes the cost record, and is ready for the next job. (See "Job Record" and "Cost Record" hereafter.)

The teacher-machinist was taken right out of a shop, and has proved a first-class teacher; there is no disorder when he is in the shop. A house carpenter who had been doing regular contract work in the city was tried out that year and had been found most satisfactory, and the boys have acomplished many times more work than they ever did before.

This school has not 24 benches all in a row, with all the boys doing the same thing; here is apparent confusion, but in reality discipline through intelligent diligence. By this means it is doing more for the lads and getting a greater amount of work. For an hour a day instructors interchange; one has had industrial teacher-training; the other is wholly an industrial man and not trained as a teacher. Both men are a sort of midway between the formal academic man and the shop man. The academic man has a different group every day; this school has five groups, and as there are five days in the week, it is a smooth arrangement.

The formal class-room work for one day in the week is based on shop experience. The boys are not handicapped by the class-room group. The boys have five hours in the academic part; in the shop part they have six; that gives the academic teacher an hour to go into the shop, get the records, take them home and get ready the work for the next day definitely related to what they have been doing.

Boys Finding their Vocations.

There is no indenture of any kind to hold the boys in school. Many are found to be inapt, and their parents are told that they are not adapted for this. Some boys show particular aptitude for a trade and anxiety to get out and make money.

There is a vacation of two months in this school, as in the grammar school. Mr. MacNally has had more of the old boys coming back at the beginning of September than he has at the end of June. That meant that some had quit in June and gone out to work, but that they were ready to come back in September, and they were better boys when they came back. Mr. MacNally thought the actual experience of being out and hunting for a job about as good as anything they could get.

Mr. MacNally gave one or two instances of boys who had proved backward or troublesome in the grammar school but had turned out very well in this school, where the work is concrete.

THE SPRINGFIELD VOCATIONAL SCHOOL.

Job Record.

Name.............................. Date.................

Job................................ Dept.................

	Rating.	Instructor.
1. Specifications Sheets, No. 2. Drawings Plates, No. 3. Estimates: One on specifications Six on varied specifications 4. Shop work: Progress ( ). Workmanship ( ). Total time ( ).		

Month.	Dates Hours														

5. Shop notes: Give sketches, tools, processes, principles, difficulties 6. Cost Record 7. Materials: Sources, processes of preparation, strength, etc. 8. Related studies		

Cost Record.

Name.............................. Date....................191

Year..............................

Order for..........................

Material	Total Cost	(See other side for Details)		
Time	" "	" " "		
		Totals		
Began	191 ,	5% Incidentals		
Finished	191 ,	Total Cost		
Workmanship				
Remarks				

Details.

		Quantity	Price		
			Total......		
Time	Construction				
	Finishing				
			Total......		

SECTION 7: FROM MR. ARTHUR D. DEAN.

The following information was obtained from "Conversations" with Mr. Arthur D. Dean, on the occasion of the visit of the Commission to Albany, N. Y., supplemented by information contained in the Eighth Annual Report of the Education Department of New York.

The vocational schools will succeed only when they are suited to and an expresssion of the life of New York State. The problem has been to interpret this life in terms of educational effort. For years a well-knit and unified system of schools has been in existence in this State. With the passage of a law authorizing vocational schools there came the problem of administering them in the letter of the law and at the same time continuing the best traditions of our State system of education.

The problem was deeper than the mere establishment of a few isolated and special schools. It was the problem of establishing a new type of education which would work alongside of, and not be antagonistic to, the older type. It was to be a type that would assist the older in doing better a few things that its good intentions led it to do, and at the same time develop within itself a line of work which it could do a bit better than its neighbour who had primarily other things to do.

State Support to Industrial Courses.

Differences in the amount of State support and administration between the courses called Industrial in the 7th and 8th grades of the grammar schools and the lower ones are as follows:—

An Industrial School or class may draw a State grant of $500 towards the salary of the first teacher, and $200 for the second one, while a grant of only $200 may be drawn for a teacher in the lower grades.

The Industrial School or Classes must have a course of drawing, shop work and related bookwork—the latter as close as it can be made considering the lack of teachers of experience and the want of subject-matter well arranged pedagogically to enable them to make the one fit the other well.

The local authorities provide the shop accommodation and shop equipment, deciding upon the character of the equipment—which must be adapted to the locality and the industries—after study and consulting with the State Department of Education. The State gives a grant towards the cost.

The main object of the shop work in the 7th and 8th grades is to arouse the interest of pupils in industrial matters, to bring about a knowledge of fundamentals of the industries of the locality, to give them a good general elementary education. The Industrial School prepares and qualifies them (1) to go from the school to actual shop practice for wages, or (2) to go on to a higher school and obtain preparation for entering upon employment.

Mr. Dean's ideal of the kind of school for a comparatively small town or village is a class with just one teacher who knows the practical work in one or more of the industries, and mechanical drawing. He cited the case of one successful school with one such teacher, who knew plumbing and sheet metal work, had fair ability in mechanical drawing, and could do something in electricity and carpentry. The boys took some carpenter work, did little jobs of plumbing, put up electric bells, wired the basement of the school, made drawing tables, benches, etc.

Outside of New York City there are now 109 teachers giving instruction in homemaking to 17,113 girls in the upper grades of the Grammar School and in the High School. In the same territory there are now 68 teachers giving instruction in manual arts to 13,320 pupils in the upper grades of the Grammar School and in the High School.

The Intermediate Industrial School.

The plan as now operating provides that five-twelfths of the school program shall be given over to shop, laboratory and drawing instruction and that the remaining seven-twelfths be devoted to "book studies," closely related to the shop work and drawing—which practically amounts to saying that the pupils shall for the remainder of the time take the regular elementary school studies corresponding to the seventh and eighth grades. Both boys and girls have similar work in English and history. The arithmetic course for boys differs from that for girls. The geography is viewed as an outgrowth of the life-long problem of providing food, clothing and shelter. The physiology is studied from the view-point of hygiene and sanitation rather than from the structural only. The shop, laboratory and drawing work differs with the sex concerned.

The questions naturally arise: Are these children receiving an education? Can they enter the High School? One superintendent writes: "We had no trade school for our graduates of the Intermediate Industrial School to enter. They were obliged to enter our regular courses in the High School. We had hardly expected that many would care to. That was the reason for advising them to enter the vocational school. The majority, however, did enter the High Sschool, and for all I can see are doing as good work as those who finished the eighth grade in the regular schools."

How Industrial Work Helps the Academic.

On the surface it would seem impossible to do as much bookwork in seven-twelfths of a day's program as the regular seventh and eighth grade pupils accomplish in a whole day; nevertheless, thus far the pupils in the Intermediate Industrial Schools seem to be accomplishing it. Let us note the possible reasons. We must remember (1) that in the vocational sections a teacher does not handle more than 25 pupils at a time and more individual instruction is possible; (2) that the book studies of English, history and geography may be so correlated that penmanship and spelling are brought into every written lesson, and that practice in reading appears in the history and geography; (3) that the bookwork is not interrupted by the visitations of a drawing, music, or manual arts supervisor; (4) that the connection between the shopwork and the bookwork is so close that one naturally assists the other; and (5) that the hours spent in the shop and drawing room afford a relief from brain fatigue.

Conditions of State Aid.

The law states clearly certain conditions which a vocational school must meet in order to be considered as entitled to special State aid. (1) It must be independently organized—not necessarily in a separate building, but most assuredlyestablished with a distinct vocational purpose in mind; (2)must have an enrolment of at least 25; (3) must employ full time of a teacher; and (4) must have a course of study meeting the approval of the Commissioner of Education. The first three conditions admit of no changes, and are to be enforced in all places without variation from the word of the law. The fourth condition allows for considerable latitude and discretion.

Although separate organization does not require a separate building, it does require a definite and separate register of pupils, a definite yearly report to the Department, and a definite purpose distinct enough from any other educational purpose within the school to avoid any obscuring of the vocational idea. The vocational work is not to be mingled or confused with the work of other departments or courses, though including much in common with them. The plan of work need not prevent pupils enrolled in "schools" of agriculture, mechanic arts and homemaking from reciting English, history and other "book studies" in the same classes with other pupils in the local school system. It should be kept in mind that the "agricultural school course" does not refer merely to a single line of study, but to a group of related studies forming in itself a scheme of education having a distinct vocational purpose.

The "Open Door" Policy.

The general industrial, or Intermediate Industrial School, is intended to explore, through various kinds of industrial work, the industrial capacities of children. It assumes that teachers will keep a watchful eye upon individual interests. In short, it assumes that when a boy leaves this school he has some knowledge of where he is going, and some preparation for his work. Some boys will know, for example, that they want to be plumbers. They know this because the Intermediate School gave them some instruction in tinsmithing, sheet metal work, and mechanical drawing, together with the elements of other groups of trades. They deserve the open door. To open the door to a High School course is to offer an opening through which they can not and will not pass. In effect, it is really a closed door. To furnish them a place where they can learn a trade after they have settled upon it is the best kind of an open door.

There are now 35 industrial and trade schools, employing 145 teachers. These schools have a day enrolment of 3370 pupils and an evening enrolment of 2933 pupils, or a total enrolment of 6303 pupils. There are 527 other pupils using the equipment, but not enrolled in these schools.

SECTION 8: SENECA VOCATIONAL SCHOOL, BUFFALO, N.Y.

This school started with cabinet-making, but soon there was a demand for printing, and a small hand-press with one type case and a small amount of type made up the equipment. Soon a power press was added, with a large assortment of type. At the end of the first year there were 60 pupils, 3 teachers and 3 trades—carpentry, cabinet-making and printing.

The school admits boys who have completed the 6th grade and are over 13. At the end of the 2-years course pupils graduate with Junior Trade School Certificates, issued by the State, but they may remain 2 years longer for advanced work and receive Senior Industrial Certificates, or enter the Technical High School. There are now 96 boys enrolled.

The school is in two divisions, A. and B. All who have not completed the seventh grade are placed in the B. division. One-half the time is spent in the shops while the other half is spent in the academic work. Those in the A. division take up Arithmetic, Algebra, Book-keeping, Business English, Spelling, Commercial Geography, Practical Physics, and Chemistry. Those in the B. division study Arithmetic, Spelling, English, and Commercial Geography.

Laboratory Methods in Teaching.

The academic work is closely correlated with the shop work. To illustrate: the carpentry students learn how to figure, by arithmetic, the lengths of different timbers used in a house, such as common, hip, jack and other rafters of any shaped roof. The knowledge gained in the academic room is in turn applied in the shop.

The teaching is done with the aid of models and drawings. The shop teachers furnish the academic teachers with such problems as they find actually coming up in their work. In this way no time is wasted in teaching things which are not practical.

The last addition to the academic department is a well-equipped laboratory. The table is large enough to accommodate 8 boys. Each boy has his own reagent bottles, Bunsen burner and an electric heater and furnace. For the physical experiments there are a double-cylinder hot air engine, a motor and generator, pulleys, weights, air-pumps, telephone and telegraph instruments.

For the work in chemistry the Babcock test is used, the New York State Board lactometer in the analysis of milk, thermometers, a still for water, and all the common chemicals. It is believed that every boy ought to know something of the chemistry of foods, as it helps to make his work more interesting and renders him less dependent on the judgment of salesmen.

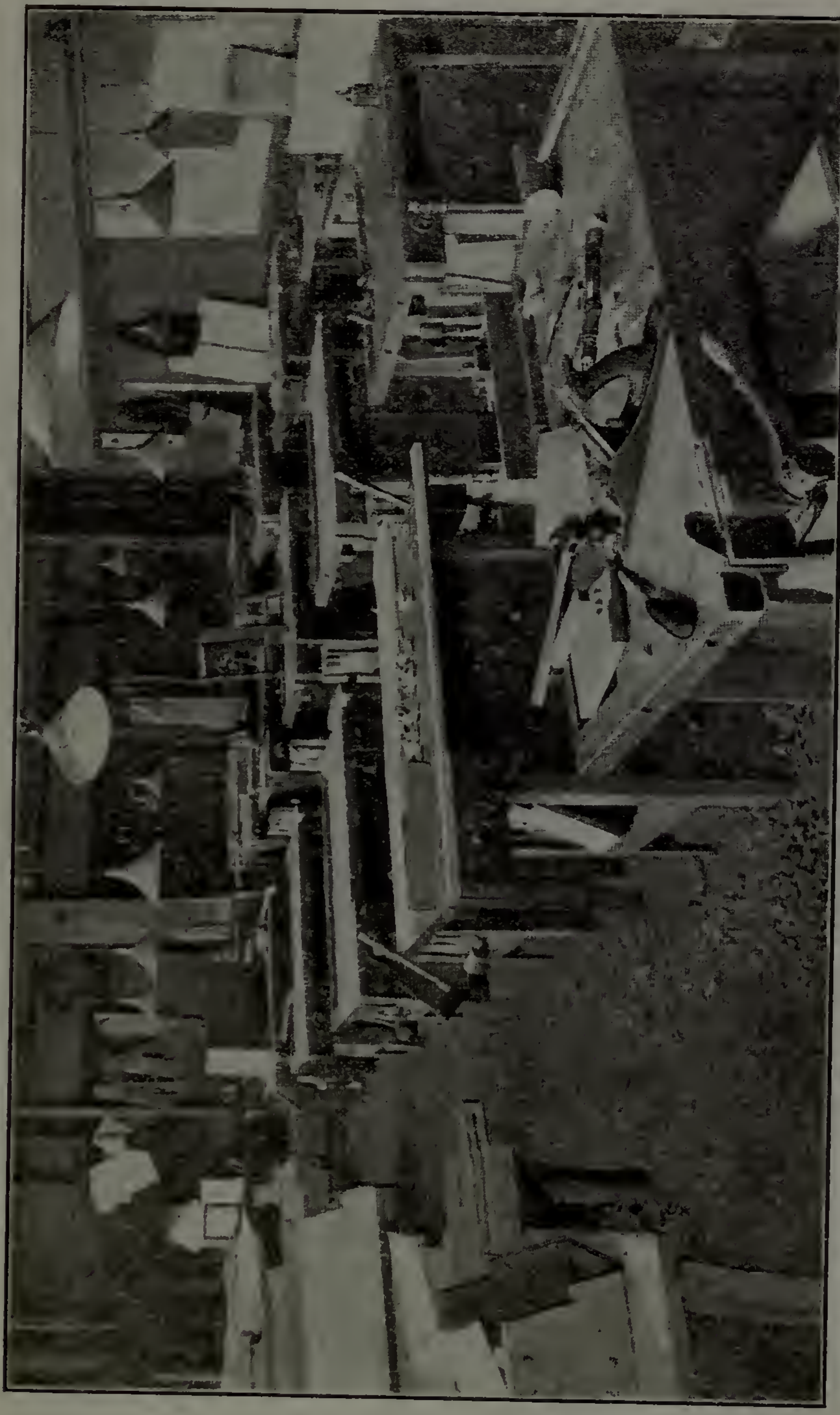
Cabinet-making and Carpentry.

The cabinet-making course begins with the most elementary work, such as jointing up boards, and leads step by step to the making of complicated pieces of furniture. Since this is the age of veneer and inlaid work, much time is spent on these branches of the industry. This work is done only by advanced students. In this department tabourettes, book cases, book racks, piano seats and chairs have been made.

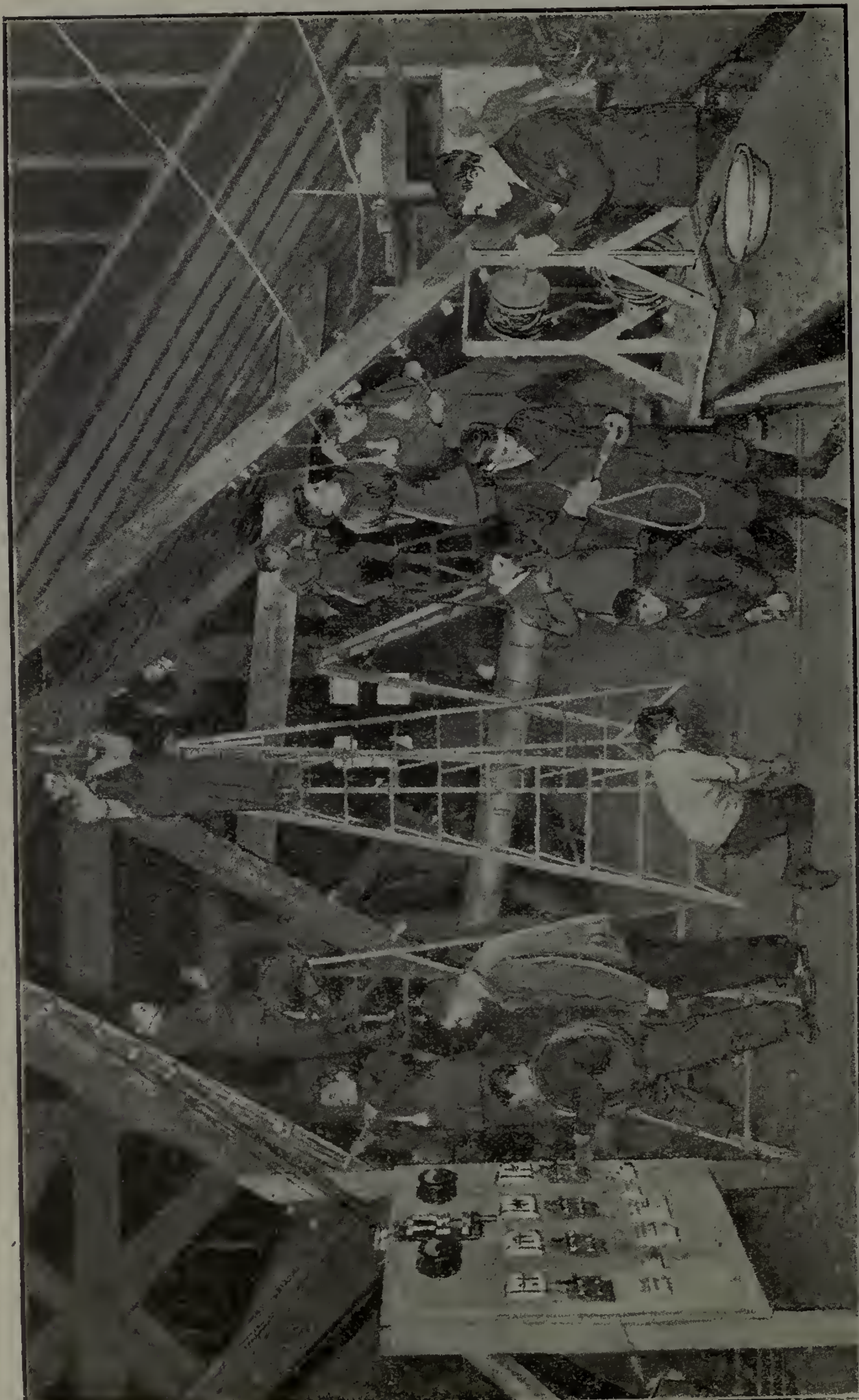
The carpentry classes are taught to lay out the different parts of a house with the square, just as it would be done in actual work. They have put up the frame for a house and constructed the roof. They have built doors and windows and the frames for each. All the work is done according to blue-prints made by the boys. To make this work still more practical, they have constructed 60 sand boxes and a large number of screens to be used in different schools.

Printing Department.

The next department is the printing. Here may be found all the up-to-date materials used in a commercial shop. The equipment consists of type up to and including 72 point (about ¾ inch high), type cases, stands and cabinets, galleys and galley racks, wood and metal furniture, and two Gordon job presses, driven by an electric motor. There is also a stitcher and a lead cutter. Upon entering his class, the boy makes a study of the type and cases so that he may

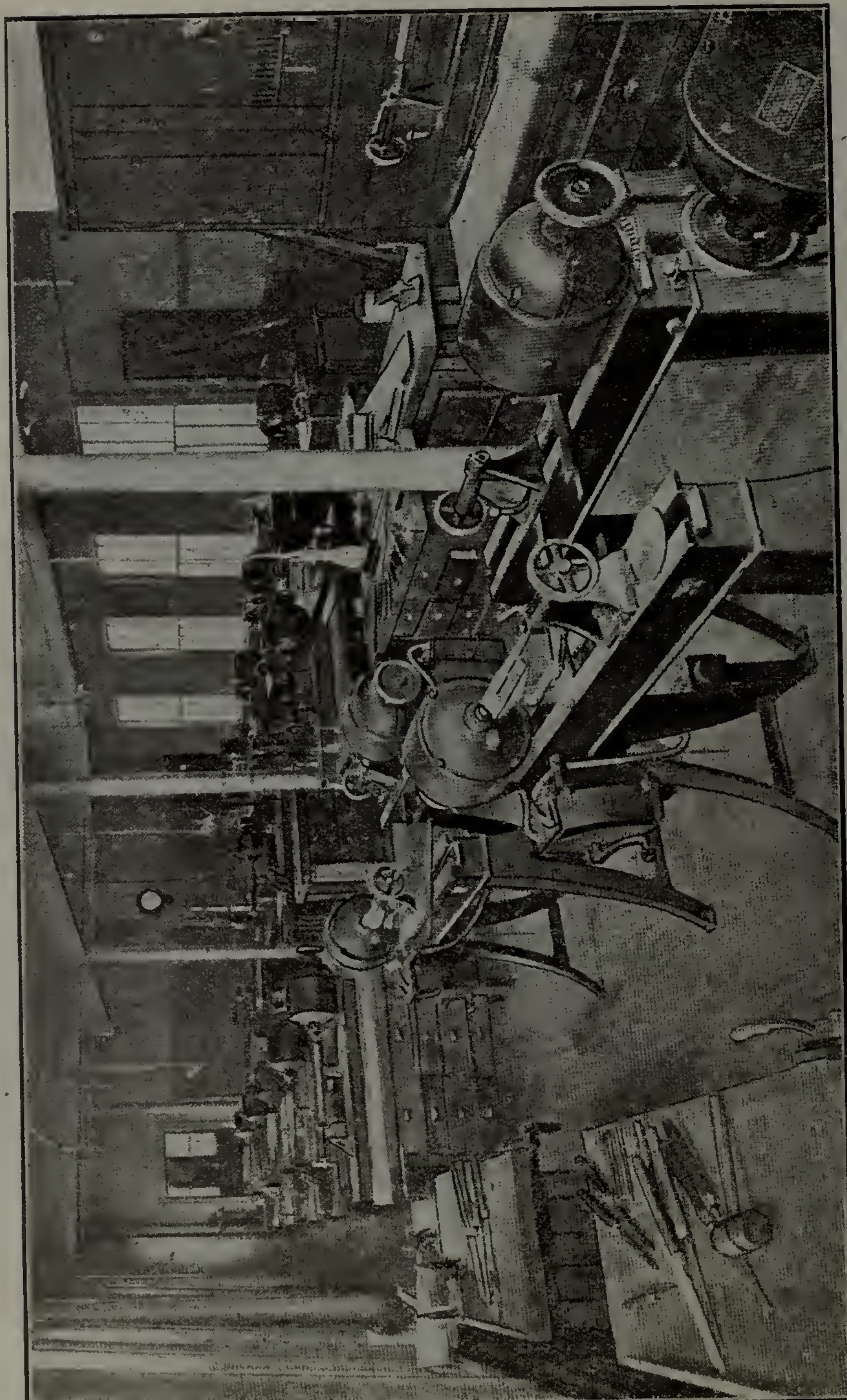


THE CABINET SHOP, SENECA VOCATIONAL SCHOOL, BUFFALO, N. Y.

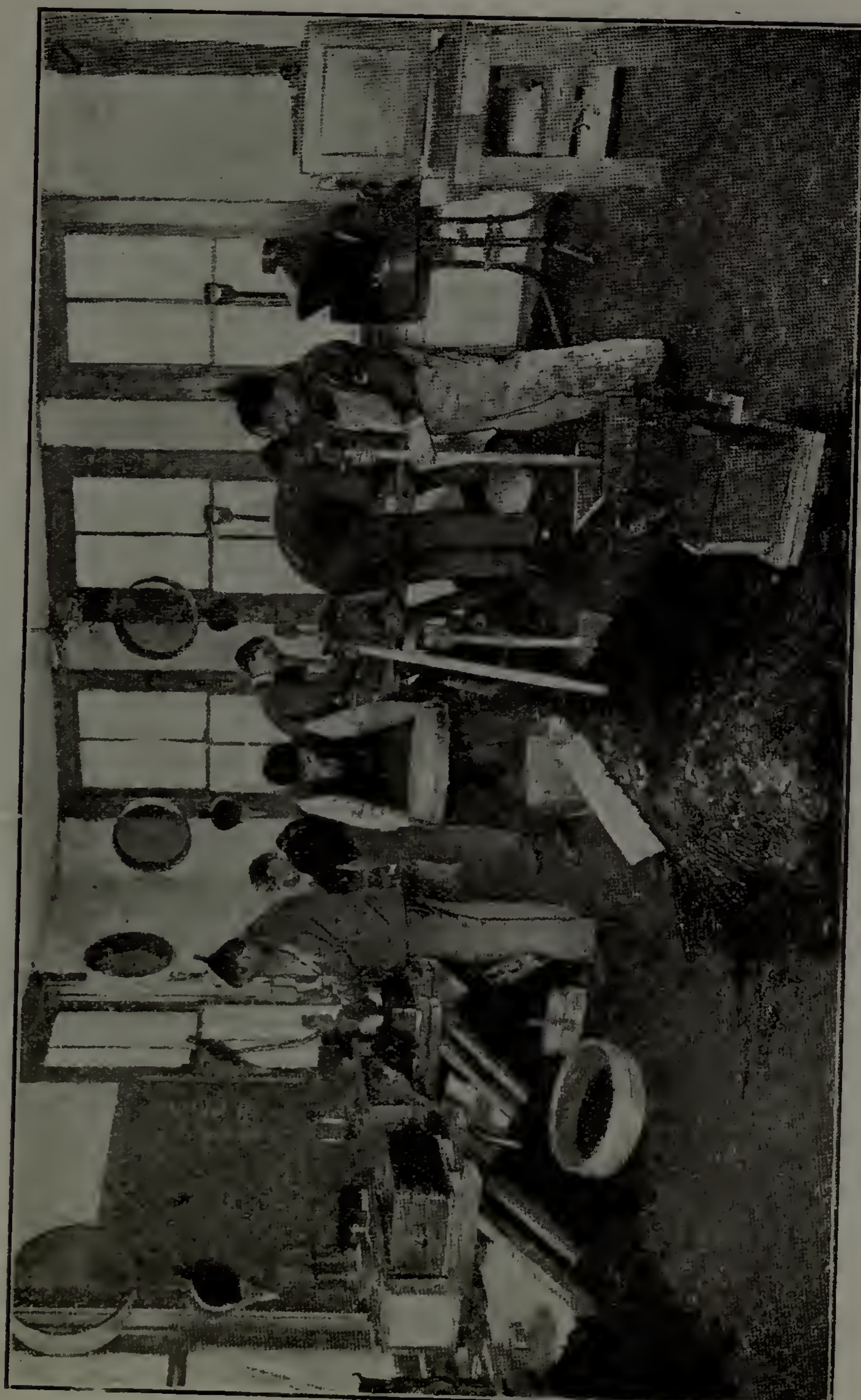


CLASS IN ELECTRICAL CONSTRUCTION, SENECA VOCATIONAL SCHOOL: BUFFALO, N. Y.

FINDING OUT THE REASON FOR THINGS, IN THE LABORATORY, SENECA VOCATIONAL SCHOOL: BUFFALO, N.Y.



A large Wood Turning Shop, Black Rock Vocational School: Buffalo, N. Y.



Finding out How to Work, in the Foundry, Black Rock Vocational School: Buffalo, N. Y.

know where to find the letters and characters used in printing. From this he advances to distributing type, to setting type, to making ready on the stone and to press work. He is also taught how to mix inks, and he studies color harmony.

The printing department produces beautiful cards, books, pamphlets, advertisements and straight composition work. It prints many of the blanks used in this school and has done small jobs for the other schools.

Electric Construction.

The electric construction class is very popular. The student first learns the terms used in the trade, then takes up bell wiring, telephone and light wiring, and so on to more advanced work. The work is done so as to pass inspection by the fire-underwriters. The school has a large attic where construction work is carried on. In the shop the boys experiment with the electric furnaces, heaters, transformers and other practical apparatus. The school now has an electric generator equipment that is to be used in electro-plating.

SECTION 9: BROADWAY VOCATIONAL SCHOOL, BUFFALO, N.Y.

In the city of Buffalo printing has always been one of the leading crafts, and today stands in the forefront among business enterprises; hence the purpose of this school is to furnish pupils with practical work in printing, at the same time not neglecting their general training. The work is divided into two parts, half the time being spent in the academic department and half in the printing department.

ACADEMIC DEPARTMENT.

Business English.—Essentials of grammar, with special emphasis on sentence structure, paragraphing, composition; use of capitals, punctuation marks, abbreviations; division of words; use of diphthongs, initial letter, small capitals, italic, proof-reader's marks; shop letters, business correspondence; oral discussion of current events and topics related to the printing industry.

Mathematics.—Fundamental processes of arithmetic and practical application of same, as illustrated by the industrial phases of printing; common and decimal fractions; denominate numbers; applications of percentage; rapid calculation in finding cost of printing, paper-cutting, etc.; business forms, simple book-keeping, bank accounts, discounts and modern business systems.

Reading.—Selected from United States History and Commercial Geography.

Spelling.—Systematic course from a standard speller, supplemented by words selected from subjects met in daily work; the "dictionary habit."

Drawing.—Freehand practice in lettering of Gothic, Roman and Italic types; principles of design and decoration in drawing of letter heads, bill heads, business cards, cover pages, etc.; freehand object drawing for proportion and shape; color harmony and its application in the use of papers and inks.

Science.—Study of mechanics, heat, light, sound, electricity and the chemical properties of matter; especial emphasis on the physics and chemistry involved in printing.

Commercial Geography.—Geographic influences affecting food, clothing, shelter; raw materials and chief sources of supply, methods of manufacture, centres of manufacturing, chief routes of transportation.

Industrial History and Civics.—History of printing, paper-making, etc.; industrial progress of the United States and European countries, touching on primitive hand work, inventions of labor-saving machinery, beginnings of organization of capital and labor, relations of employers and employed, duties and responsibilities of good citizenship.

Course in Printing Department.

First Year.

1. Plain and book composition and elementary job work involving type-setting, distribution, spacing, justification, proof-taking, proof-reading, proof-correcting.
2. Elements of press work, involving stone work, make-ready on press, press-feeding, care and use of rollers, varieties of ink and paper.
3. Talks on various phases of the industry including type-casting, point system, shop conduct, etc.

Second Year.

1. General Composition.
2. Typography of books and pamphlet making.
3. Job Work.—"Lay out" of job work involving application of design, harmony, appropriateness.
4. Imposition of book forms.
5. Elements of press work; mixing of ink; color harmony; papers; underlaying and overlaying.
6. Talks on different phases of the industry.

The printing department is supplied with a Chandler and Price 10 x 15 platen press, a 1-3 H.P. electric motor, a 24-inch paper cutter, a Boston wire stitcher, a Rouse mitering machine, a proof press, a lead and a rule cutter, an imposing stone, individual racks and type cases for every pupil, a very complete assortment of type, and the customary furniture, materials and tools of a modern printing office, selected with special reference to the requirements of the school.

The course covers 2 years, on the completion of which pupils are awarded Junior Vocational School certificates issued by the State. After graduation, those who wish to continue their studies are eligible for admission to the Buffalo Technical High School or an advanced Trades School, while those who have to go to work will speedily become skilful workmen with a little experience and practice in a shop. Their training, shop practice, and acquaintance with materials and tools, as well as their workman-like methods, will all combine to give them an intelligent start in their trade.

The students of this School compose and print a 4-page weekly journal (now in its 3rd volume) entitled "The Week in Review, a Summary of Newspaper Clippings on Vocational Education," with editorials telling of the progress in this field, and dealing with other timely topics.

A beautifully illustrated and printed magazine of 88 pages, entitled "Vocational Education" is published by the Vocational Schools of the Department of Public Instruction, Buffalo, the composition, press work and binding being the work of boys in the Broadway and Seneca Vocational schools reviewed above.

This Department is organizing a Vocational Guidance and Employment Bureau.

SECTION 10: THE ROCHESTER FACTORY SCHOOL.

A good example of a school of this type exists at Rochester, N.Y. A large building which was previously occupied by an industrial school of the old type had been turned over to the public school authorities and was by them fitted up

A Well-equipped Printing Office, Broadway Vocational School: Buffalo, N.Y.

Type Setting and Press Work in the Print Shop, Senaca Vocational School: Buffalo, N. Y.

as an industrial school for boys from 13 years of age and upward whose parents and selves preferred the industrial training and education, combined with theoretical instruction, to the course usually given during the last two years of the elementary public schools.

The following statement concerning that school was made by Mr. L. A. Wilson, at that time Principal of the School:—

An Example of Factory School Training.

The Rochester Factory School has for its aim the training of the boys, who come to it, along general industrial lines, and in the fundamental principles pertaining to certain trades. It does not aim to teach a trade; it does aim to develop efficiency and rapidity in execution so that those who go out with a diploma will be better fitted to enter their chosen trade than they would be under any other conditions.

When the school was first opened in 1909 only one course was offered, Cabinet-making. At that time 40 boys entered, and two teachers furnished the instruction. One instructed in shop work and the other in the grade work and drawing. This proved such a success that it was necessary to open another course, and in the following February a course in Electricity was offered. At this time two more teachers were employed, one to give the shop instruction in electrical work and the other to take charge of the grade work. The mechanical drawing from this time on was taught by a separate teacher. At this time the number of boys in attendance increased from 40 to 100.

New Courses Added.

From February 1, 1909, to February 1, 1910, the school was run on this basis, but it was soon discovered that it was impossible for the shop teachers to give instruction in other lines of work. Requests on the part of many boys in the city led to the establishment of two new courses, those in Carpentry and Plumbing, in February, 1910. This necessitated the hiring of three new instructors, as it was necessary to have a principal. The plan of the work from this time can be considered as nearly ideal, the shop men having classes of from 13 to 15, and the grade and drawing instructors classes of from 25 to 30 . Another decided advantage of this plan is the fact that not over 15 boys will finish any one course during the year, and it will be easier to locate positions for them.

In September, 1910, the courses in Architectural Drawing and Machine Design were offered.

The school is under the immediate supervision of the Board of Education, and is free to any of the city boys of 14 in the sixth grade or above. The school is maintained by funds supplied by the State and city. At present courses are offered in Cabinet-making, Carpentry, Electricity, Plumbing, Art Drawing, Machine Design. The length of each course is two years of 40 weeks per year and 30 hours per week.

Aim of the School.

It is the aim of the school to place the boys in conditions as nearly as possible like those to be found in actual practice, and for this reason the school has more of the "air" of a shop than a school. It is in session from 8.30 until 11.30 and from 12 to 3 o'clock. The early closing in the afternoons allows many of the boys to do outside work, and thus remain in school for a longer period.

The work of each course covers the hours weekly as indicated:—

Shopwork 15, Shop Mathematics 5, Drawing 5, English 2½, Industrial History or Geography 1½, Spelling 1. Five hours of home work on Spelling and Shop Mathematics is required of all the students. The boys in the Electrical Department are required to spend three hours per week on Electrical Theory.

The following text-books are used in the correlation with the shop work:—Smith's Practical Arithmetic, Schultze's Advanced Algebra, Thurston's Economics and Industrial History, Jackson's Electricity and Magnetism.

Points Noted by the Commission.

The Principal of the school at the time of the visit of the Commission was Mr. Fletcher. In conversation with him the following points were brought out as represented in the aim and work of the school:—

The school is a little factory. Work is done by the boys which has commercial value. Pupils make desks, chairs and other furniture for the public schools. They do plumbing for the School Board at various schools, also electric light wiring. Mr. Fletcher is of the opinion that it will be necessary to take in commercial work. He holds this plan to be desirable for the sake of the educational values, and not for the money-saving or money-earning results. He finds that this principle can be worked in harmony with the Trade Union men, who recognize the value of the school, and that its extension of work to the turning out of products for sale does not injuriously affect the interests of organized labor. The boys in the manual training and industrial work, who make things having commercial values, are very much more interested in them than in manual training models made chiefly for suitability for the training of the pupil.

Industrial Work Holds Boys and Girls.

Two thirds of the boys who now attend this industrial school had not intended going on to the High School, and would have been out of school contact but for the industrial school; 90% of the boys here and the girls at the Vocational School would have left school altogether and gone to work, into stores, etc.

The boys' school can turn out 7 plumbers, 15 carpenters and 20 cabinet makers each year. Employers report favorably on boys from this school, and state that they are worth more money almost from the start than boys coming direct from the grammar school. Letters received from manufacturers, managers and foremen have proven beyond doubt that this school is supplying a definite need and increasing the efficiency and earning power of its pupils.

Another building for a Vocational School has been fitted up to provide courses for girls suited to those who desired to qualify for domestic occupations or for the trades which women enter in connection with textiles and garment making.

These schools do not profess to teach a trade, but they provide opportunities for experiences which qualify pupils to enter upon the occupation they are to follow with some knowledge of materials, tools, machines and processes used in it, and of the more simple principles which underlie the operations.

PROFESSOR FORBES DESCRIBES THE SCHOOL.

When at Rochester, the Commission had the advantage of discussing the question with Prof. George M. Forbes, of the University of Rochester, who was on the Executive of the Board of Education when the Shop School at Rochester was started, and who continues a sympathetic student of the problems connected with it. The following information was obtained from "Conversation" with Prof. Forbes, supplemented by extracts from an article by him in the magazine "Vocational Education,"* which brings his survey of the subject to a later date.

The first positive conclusion is that it is well to begin on a small scale. The advantages of such a beginning were very great. One was that the school started with no shock, no disturbance, no resistance of the taxing authorities, no protests from conservative tax-payers. There was no campaign in which the advantages and probable results of industrial education, as a cure for educational and industrial ills, were exaggerated or over-emphasized in such a manner as to lead to inevitable disappointment and reaction.

Necessity for Experiments.

A second value of the small beginning, and one which it is difficult to overestimate, is *flexibility* in administration. Flexibility is essential to experiment and experiment is essential to the solution of any problem. This school was a pioneer, being the first in the country of its exact type. Hence experiment was the very breath of its life; but so it is to any beginning in any community, for the individuality of community life and needs makes local adjustment an absolute condition of the success of industrial education. The school was then, as an administrative proposition, thoroughly, completely *manageable*, and the administration could at once attack the problem which it was clear must take precedence of all others, viz., that of the synthesis, the amalgamation, of school and shop.

Now, the antithesis between these in existing practice was clear and sharp. The shop was real and vital, directly serving the community by creating and distributing values; but its aim was *profit*, its activities were all organized about the product, and the human factor was only one means to the sole end. In contrast to this the school was artificial, isolated from the industrial struggle of the community, concerned solely with the human factor and indifferent to any material product. Was a synthesis of these factors possible? That was the

*Published by the Manual Arts Press, Peoria, Ill., March, 1913.

first question. The answer obviously turned upon whether the school could be organized to produce a standard commercial product, meeting a real need of the community, and produced under something like shop conditions.

A School Organized as a Shop.

The determined attempt to try out this was due to the conviction that if the school was nothing but a school, it would not get the boy; that nothing would appeal to the boys so powerfully as industry that was real, and not mere industrial gymnastics with waste of materials; that to rouse his pride and self-respect there must be set for him something like the task of a man and the standards of a man. The first requirement was a real demand for a commerical product which the school could supply. This was found in the school system itself. The demand for teachers' desks, manual training benches, book-cases, etc., was more than the school could supply, and notwithstanding the subsequent expansions, the demand is still greater than the cabinet-making division of the industrial school can supply. The same method was followed in the trades that were gradually added, and at present the actual needs of the school buildings demand all the labor available in the school, including cabinet-making, electricity, plumbing, printing and carpentry.

Effects of Rewards to Pupils.

At the first transition from school to serious labor, some boys were inclined to complain that they were getting no direct benefit from their labor. This led to experiments with rewards of various kinds, including sets of tools and the privilege of making things for themselves.

The effect was not good. In fact the stimulation of the selfish point of view was weakening to the community spirit, the teamwork spirit, which had already appeared. All artificial incentives were abandoned, and sole reliance placed upon the creation of an atmosphere of workmanlike pride in the product and in its service to the community. The ideal of a real shop, a standard product, and consumers thoroughly appreciative of the service rendered, has proved to be the most permanent and thoroughly effective incentive without an element of selfish appeal. It is difficult to overestimate the social and civic value of this attitude towards the work and towards the community.

Problems of the Human Factor.

First, regarding selection, the original school was intended for boys from 14 to 16, as being the normal period of transition from elementary school to skilled industry. The intention was to meet the needs of two classes of boys:

First, those who through economic pressure could no longer continue academic studies, and who, though adapted to skilled industry, were shut out by immaturity and by lack of preparation, and so forced into trivial employments. The chief guide here was the Report of the Massachusetts Commission.

Second, the big boys, dull and backward in book studies, who showed zest for manual training and were presumably capable of skilled industry. These were selected to relieve the elementary school of one of its most serious problems. Both classes were admitted on equal terms, but the backward boys were found to preponderate and to give tone to the school. Experience soon showed their inferiority, even in shopwork, to the boy who had successfully completed the work of the elementary school; and to complicate the situation this led to an embarrassing social alignment among the pupils. Subsequently the Binet mental tests were applied throughout the whole school system, and many of the big, backward boys were found to be subnormal or borderline cases in mental capacity. The problem was solved by the formation of a separate school where the instruction could be adjusted to their capacity, and this arrangement has been found to furnish the needed relief to the elementary school.

The experience was precisely the same with girls, and shows that industrial schools cannot be used, except in rare cases, to transform the dull and persistently backward boys into skilled industrial workers. Success presupposes the securing of an all-round mentality fully up to the normal average, and selection of pupils is now made according to this standard.

Approximation to Shop Practice.

Other experiments were made with a view to securing the closest practicable approximation to shop practice, and methods were adopted or rejected according to the result. For example, student foremen were appointed for subordinate groups, and this promised well and showed marked advantages, but was finally rejected wholly from the educational standpoint. The student foreman and his subordinates missed important educative elements in the work, the penetration to the principles involved and the new insight which could only be secured by the illuminating suggestions and comments of the competent instructor. A time-clock was installed with registrations of arrival and departure, and this has proved of permanent advantage, and the shop day of 8 hours for boys and 7 hours for girls has proved most satisfactory after considerable experiment.

The school and the shop come back out of their artificial isolation when the needs of intelligent practice compel the more thorough study of facts and demand the guidance of laws and principles. Under the influence of this conception much progress had been made in the union of shop and school.

How the Problem was Solved.

At first school time and shop time were sharply divided, four hours being given to each. The school teachers were distinct from the shop teachers, and the school was conducted in the ordinary way except that the selection of subject matter was made with reference to shop use. Now school teacher and shop teacher are the same for each particular trade and the group that is studying it, e.g., cabinet-making, electrical work, plumbing, printing, carpentry. The head of each of these departments teaches the necessary knowledge of materials, scientific principles, the mechanical drawing, the shop theory, and also the mathematics involved in the computation of cost and the making of estimates, all of which teaching is, as it were, done *in situ;* it is vitalized by its necessary relation to successful practice in the daily work of the shop.

On the other hand, the subjects which recognize that the boy is to be bigger than his immediate task, that he is to be in sympathetic touch with all industry, and is to be a citizen as well as workman—in short, the subjects which pertain to all trades alike, e.g. English, the elements of physics, industrial history and geography—these are still taught by separate teachers in combined classes.

But the central problem of such an institution viewed as a *school* is not in the method of instruction, important as that is. The truth is, that just as when viewed as a shop its problems centre in the *material* product and the necessary organization for its efficient production and disposal, so when viewed as a school, its central problem is in the selection and disposal of the *human* product, the boys and girls who are being prepared for industrial life.

Vocational Selection.

The trying out of the more general question whether the boys admitted are or are not misfits in the industrial field as a whole, involves a still larger and more difficult problem, indeed one of the most imperative and difficult problems of modern education.

This means that for the adolescent period there should be no fixed and changeless course of study, but rather the greatest mobility; it means that change of course for many pupils during this period is not necessarily waste, but may be the only path to success, and that the education of the whole period is properly tentative, and experimental, with a view to finding the most effective powers through the most fitting activity.

It means also that two or more activities may go on simultaneously, and thus shorten the period of tryout and hasten the final decision with its corresponding concentration of activity on the essentials of a permanent vocation.

The conclusion is this: A type of industrial education has been developed which amalgamates school and shop in an effective way for pupils from 14 to 16, and the principles of such amalgamation, as herein outlined, seem permanent. They show how an effective instrument can be created; but these principles obviously do not and cannot show how this admirable instrument can be adequately correlated either with the human need, or the industrial need for which it was created, and increasing experience is showing that this correlation is now inadequate. Hence the suggestions as to the direction in which better correlation will be attempted. Success or failure in this direction can only be recorded after further experience. On the whole we may say that we have taken some steps, outlined above, of which we are pretty sure, and which constitute real progress toward a remedy, but to find the complete remedy, the ideal and wholly adequate organization, we have still far to go.

SECTION 11: THE VOCATIONAL SCHOOL FOR BOYS, NEW YORK CITY.

This school, situated between Lenox and 5th Avenue, is intended for boys who desire to prepare for industrial as distinguished from office work. They learn the elements of a trade, and study Architectural, Freehand and Mechanical Drawing, while continuing their general education on lines that will best fit in with this work. A boy's earning capacity is undoubtedly increased by such a course, and he receives a training which he could never secure as an unskilled apprentice.

The school is free, and all supplies are provided. Pupils of good moral character who have graduated from the elementary school are eligible for admission.

The course covers 1 or 2 years, and boys may remain longer. The school is open 5 days a week, and the holidays are the same as in the public schools. Sessions are from 9 a. m. to 5 p. m. with 1 hour for lunch, thus accustoming boys to actual business life. No home lessons are given.

Those boys who have decided on a trade may begin the work on it at once, while those who have not yet made up their minds are given a variety of work, to enable them to select a suitable trade, and as soon as they have decided, they devote their time to it. There are no regular classes, and each boy progresses as fast as he can. In addition to the trade work, all boys have to take trade Drawing, together with the non-vocational subjects, to which they devote about a quarter of their time.

The trades are taught by experienced mechanics, and everything is done to make the school conditions prepare boys for actual business practice. The Principal makes a special point of reproducing shop conditions as nearly as possible. A diploma is awarded on completion of the course, and this is of great help to boys in obtaining employment.

The building is new, and supplied with every requirement, including a lunch room.

The school does not undertake to place its graduates, but the Principal and teachers endeavor to keep in touch with suitable openings, and to recommend boys for them.

Relations to Labor Conditions.

The Principal, Dr. Pickett, stated that he was in touch with the Labor leaders, and found no opposition from them. A committee of the National Federation of Labor expresses itself in favor of this form of industrial training.

Dr. Pickett definitely stated that the school does not profess to turn out journeymen, as the boys require experience and maturity before they can claim to be journeymen. He said, however, that in knowledge of principles and theory of the trade, and in skill of hand, a boy who has been in this school for 2 years is ahead of the average journeyman in the trades represented, and in plumbing can do shop work of as good quality as journeymen. In the printing trade a boy increases his earning power greatly by a year in school.

There were 600 boys in attendance at the time of the Commission's visit. Since the school was opened it has sent about 240 boys into industries.

No work is done by the school for sale, but a good deal is done for the School Authority of New York, e.g., printing, making tables for the recreation department, etc. As the boys know that this work is for real service and use they take a keener interest in it than they otherwise would.

While no allowance is made in apprenticeship for time spent at this school, these boys make faster progress in their trades, and in the printing trade 3 years at school are counted as 2 years' apprenticeship, and 4 years as 2½ years.

Dr. Pickett stated that the great obstacle to the Vocational School was the attitude of the schoolmen and teachers in High Schools. He deprecated the providing of short courses in the art of teaching.

Dr. Pickett thought that neither a boy nor his parents could know before he was 14 what he would be fit for.

Courses of Study.

A. VOCATIONAL.

Wood Work.—House Carpentry and Construction. Cabinet-making and Bench Work. Wood Turning. Pattern Making in Wood. Use of Wood-Milling Machinery. *Metal Work.*—General Machine Shop Practice. Sheet Metal Work. Forging. Plumbing. Moulding and pouring patterns. *Electric Wiring and Installation. Printing.*—Estimating Costs. Imposition. Composition. Press-work. *Book-Binding.*

B. DRAWING.

Mechanical Drawing.—Working Drawings. Isometric Architectural Drawings. *Freehand. Industrial Design. Making and Reading Blue-Prints.*

C. NON-VOCATIONAL SUBJECTS.

Trade Mathematics.—Arithmetic. Use of Symbols (Elementary Algebra). Plane Geometry as used in trade. Trigonometry as used in trade. *English.*—Business Letters. Reading with oral and written expression. Drawing of Contracts. Writing Specifications, etc. *Industrial History. Civics. Industrial and Commercial Geography. Applied Physics. Industrial Chemistry. Simple Book-keeping. Elements of Commercial Law.*

It is planned to add other lines of technical work during the year.

SECTION 12: STATE TRADE SCHOOL, BRIDGEPORT, CONN.

This is a group of shops and class rooms for teaching the beginnings of trades to boys and girls, and is free to any boy or girl over 14, the school being supported by the State. It is open every day in the year except Sunday, and 6 evenings weekly from 7.30 to 9.30.

In *Woodwork* the course is 2 years, for carpentry and pattern or cabinet making, including Shop Practice, Shop Science, Drawing, Mathematics and Civics.

The *Machine Work and Tool-Making* course is 2 years, including Shop Practice and Science, Drawing, Mathematics and Civics.

The *Dressmaking Department* has a 1-year course in plain sewing for girls who wish to become seamstresses, and an advanced second-year course for those who are to be dressmakers. The courses include Shop Practice, Study of Textiles, Art and English.

The *Plumbing* course is 1 year, including Shop Practice, Science and Sanitation, Drawing, Estimating, Civics.

The *Print Shop* offers a 2-years' course in typesetting and presswork, including Shop Practice, Drawing, Estimating and Civics.

The *Drafting Room* bears exactly the same relation to the shops as in a manufacturing plant, all designs and work drawings being made here before being constructed in the shop.

Each department has complete equipment.

All boys receive daily 6½ hours of actual shop practice and 2½ hours of instruction in Drawing and applied bookwork.

The school sessions run from 8 to 12 and 12.30 to 5.30 (9 hours daily, 48 hours weekly).

All girls receive 5 hours of actual shop practice daily and 2 hours instruction in class work. The sessions run from 8.30 to 12, and 12.45 to 3.15 (7 hours daily, 38 hours weekly).

The instructor in Science and Mathematics plans his lessons to meet the needs of the shop as outlined by the shop foreman.

Apprentices from various city factories attend this school one forenoon weekly, at regular wages, for Mechanical Drawing and Shop Mathematics; every forenoon of the week is devoted to this purpose.

Young men may alternate two weeks' work in factories with two weeks in school. The school work includes Mechanical Drawing, Shop Science, Mathematics, Civics, also Shop Practice on a machine which the boy does not use in his fortnight of factory work.

The anti-junk-heap idea is fundamental in this school, the shop work of all departments (except plumbing) being performed on a commercial product, sold in the open market, or made to order.

CHAPTER LXII: PART-TIME OR HALF-TIME CO-OPERATIVE INDUSTRIAL SCHOOLS.

SECTION 1: INTRODUCTORY.

While evening continuation classes have been regarded as distinctly beneficial to adult pupils, their advantages for young boys have been questioned. It has been often contended that for boys between 14 and 18, study for two or three hours at night is too great a strain after a long working day.

The co-operative industrial school affords, through combination, what the apprenticeship school furnishes by the efforts of employers alone. It is founded on a co-operative agreement between a school and one or more employers by which apprentices or other young employees are excused from work part of the time in order to attend school, the latter undertaking to give them instruction wholly, or to a considerable extent, related to their shop work. Boys who could not afford to remain in an ordinary school may thus secure a good trade education while earning sufficient for at least partial self-support; and employers who could not maintain an apprenticeship school of their own are enabled to develop well trained mechanics within their establishments. These schools being independent units, and very closely adjusted to the needs of their particular localities, naturally show much variety of arrangement. Some operate under the half-time plan, by which pupils alternate school and shop work, generally week about; others provide short periods of instruction every week, or at some special time during the year.

Origin of Co-operative Schools.

The term Co-operative Schools originated from the work of Professor Schneider in the University of Cincinnati; and Fitchburg, Massachusetts, was the first to apply the system to the High Schools. Different methods are outlined in the summaries of schools of this type which follow. These schools have been established in few places as yet, and the United States Commissioner of Labor reports that they seem to be regarded with indifference except where they have been tried; but wherever tried, they seem to have been successful and to have won general favor. While they differ materially in their operations, one group is quite distinct—the co-operative half-time schools, in which the pupil is in the school half the time and in the employer's shop half the time. The other co-operative schools, for convenience termed part-time schools, provide only short periods of instruction each day or week, or provide instruction for only a few weeks in the year; all, however, under a co-operative arrangement.

This system is not feasible in the elementary schools because of the youth of the pupils.

How Schools are Classified.

The Massachusetts State Education Office has three classifications for so-called "part-time" schools:—(1) Full-time and full-responsibility, where the school authorities assume responsibility both for the shop training and the school training of the boy (as Newton Independent Industrial); (2) Part-time and full-responsibility (as at Beverly and Worcester); (3) Part-time with part-responsibility, where the school assumes responsibility for the boy's arithmetic, drawing, grammar and English, but does not have anything to do with his shop work. Where the school does not go near the shop, the State Office would classify it as part-responsibility. A school where for a comparatively long period, say a week or a month, a boy has shop experience followed by school experience, is called a part-time school, as distinguished from others like the Newton School, where the shop experience and school experience are much more intimate and there is not a long rigid division of school and work shop.

A plan of co-ordination between the shop work and the school work generally prevails in the half-time or part-time schools.

The difference between a school such as that at Worcester and the half-time School at Beverly inheres in this: that the shop work at Worcester is all done in school workshops, whereas at Beverly, while the shop work is under school control, it is done in a part of the commercial factory. In the case of the half-time school at Fitchburg the arrangement is still different. There the boys do their shop work and receive their shop experience in several workshops of the city, free from school control, although the teacher from the school visits the workshops and thereby prepares himself to co-ordinate the school work with what the pupils were doing in the shops during the previous week.

Each of the three plans has its defects and its merits, and seems to fit in with the local conditions of the place where it exists. A report in sufficient detail on the different types of schools has been made in order to enable authorities in Canada to judge for themselves.

Objections to Co-Operative Schools.

Some foremen at first objected to the co-operative plan because of the bother caused by releasing the boys for a part of the time from the shop, necessitating readjustment of the shop schedule; but as the schools prove their worth this objection is being withdrawn, and the superintendents and foremen are becoming advocates of the plan. Objection is still made to the co-operative plan, from the outside, on the grounds that it may in some instances place the school too much under the domination of the employer, and that the continued co-operation of the employer on which the system depends may be withdrawn at any time, thus closing the school. In theory both these objections seem valid, but in practice no trouble has been experienced along either line.

These schools are looked upon as being in a sense experiment stations where, in addition to the valuable training given to the pupils, standards in industrial and agricultural education are being evolved. Guided largely by the experience of the existing schools, certain theories and principles have been established, which, it is believed, will have an important bearing on the future development of industrial education.

Dr. Balliet thinks the half-time plan is one form of industrial education that is going to be very effective. "It would be better for some children in the upper elementary schools to work half a day and go to school half a day if it could be done. But the half-time plan is only one type which meets a certain problem. It cannot be made universal at all. One thing to be borne in mind in studying this problem is that no one type of industrial school is all we want. We want a good many types, determined by different conditions and circumstances, and differences of communities. In some industries the half-time school is the best; in others it would not work at all."

SECTION 2: THE CO-OPERATIVE SYSTEM OF EDUCATION.

(ACCORDING TO DR. HERMAN SCHNEIDER).

Professor Herman Schneider, head of the Engineering Department of the University of Cincinnati, is regarded as the originator of this system of organized education; and the following brief account is given practically in his own words:

The first active steps towards a solution of the problem of co-operation in industrial education were taken at Cincinnati in 1906 in a conference of the authorities of the Engineering College of the University with the local branch of the National Metal Trades Association. This resulted in a plan whereby engineering students, properly prepared, obtain their practical experience in the manufacturing shops and their knowledge of theory at the University. The students are divided into two sections—one studying at the University while the other is working at the shop, thus alternating theory and practice week by week.

The course was started in September 1906 as an experiment, and was so successful that the attention of the National Metal Trades Association was drawn to it in a paper in 1908. The delegates from Fitchburg, Mass., decided to adopt a similar scheme for training mechanics in connection with the public school system; hence the "Fitchburg plan." The evident economy and efficiency of the system caused widespread imitation of this method of "hitching the shop and the school abreast."

Prof. Schneider thinks that perhaps the best statement of the fundamental idea is this: "The practice of engineering cannot be learned in a University; it can be learned only where engineering is practised, namely, in the shop or field. The theory underlying the practice may be obtained outside of the University, but can be best obtained in an organized system of instruction under skilled teachers."

It should not require much argument, he adds, to show that the practice and the theory underlying it should be taught simultaneously, if possible. "As a matter of fact, the whole argument for the co-operative course, together with the investigation which led to it, would make a long and involved statement, and while it might prove more conclusive than any simple expression, we have always felt that the demonstration of the scheme, together with a statement of the results achieved year by year, would be more effective. While we still believe the actual demonstration to be better than the argument, we find that many erroneous impressions prevail concerning the work.

Alternate Week Arrangement Merely a Detail.

"Curiously enough, many people think that the basic idea in the co-operative system is the alternate-week arrangement. The plan by which theory and practice are combined and co-ordinated is merely a detail, and the alternate-week scheme which we use is the one which happens to fit our local conditions the best. Even in our own school we are devising different systems of co-operation.

"For instance, after four years of experiment, we decided to operate the co-operative courses in electrical, mechanical and metallurgical engineering on the alternate-week plan 11 months in the year, reducing the length of the courses from six years to five years.

"In civil engineering we have the alternate-week scheme eight months in the year, and for the summer months we have made an arrangement with the Union Pacific Railroad Company whereby our students obtain field work in railroading, together with instruction given by the railroad company. In chemical engineering there will be a marked departure, according to our present plans, from both of these details of operation.

"It must be evident that for different localities, different means of getting theory and practice together will be used, and also in different courses the ratio of theory to practice may vary.

The Scientific Spirit is Not Killed.

"Our critics have always felt that the amount of work given would tend to kill the scientific spirit, and to instil a too practical one. A recent occurrence worth mentioning in this connection was a meeting of all the co-operative students with the faculty to discuss the five-year, 11-month plan of operation. At this meeting the students who have been with us three or four years strongly expressed the hope that the course would be made six years long, 11 months of the year. None of the students wanted a six-year course, nine months of the year.

"When the vote was finally taken, it was found that all the men who had had three or four years of the work wanted a six-year course, 11 months of the year, while the younger men were unanimously in favor of a five-year course, 11 months of the year. The reason given for their attitude by the older co-operative students was that they wanted to take up in the University, advanced scientific work of a post-graduate grade, together with certain academic subjects such as psychology and logic, and that they desired also to take a more comprehensive group of technical subjects than is usually given in an engineering course. That is to say, they have become so impressed in the shop with the broader aspects of engineering that they desire to touch not only the technical subjects of their own courses but also many of the technical subjects of other engineering courses.

Teaching How to Tackle a Problem.

"We are more and more convinced that the best thing a University can teach an engineering student is how to tackle a problem, and to this end most of our summer work is devised. All of the summer work in the University is to be constructive, following the analytical work of the previous year's theory. For example, the student's first problem will be something like this: 'There is a barrel of rock salt; you are supposed to have a certain knowledge of theoretical chemistry after your year's work. Here is the laboratory; here, also, are the necessary industrial implements; over there is the library. Now go and make four pounds of table salt. At five o'clock each day let us have a written report on what you have accomplished.'

"Following this and other simple problems, the work becomes more complex, leading into boiler compounds and metallurgy. The student will be compelled to rely almost entirely on his own resources, except for critical suggestions following errors, and by the time he has reached his third summer it is hoped that he will be able to use the laboratory, the library and his theoretical knowledge to make a logical and effective attack on a new piece of constructive work. In his last year he will have several problems which will involve theoretical considerations that he has never met, except perhaps in the fundamentals of physics."

Value of the Co-Ordinator.

The great moving force, according to Prof. Schneider, is the co-ordinator for each class of students in the shops—a college graduate who is acquainted with shop work, and who must be a man commanding a good salary. He spends every morning at the University, in class-room or laboratory, and every afternoon at the shops. It is his work to make a direct weekly co-ordination of the work of the shop with the work of the school. During the afternoons he will supervise the student apprentices at the shop. He will know what they are turning out, their speeds, feeds and cuts, the angle of the tool, how the batch of work is ticketed, how the work is set up, the power drive, in fact everything important in connection with the operation. The next week those working apprentices are in their classes at the University, and all the points observed during their week in the shop will be taken up and explained. Prof. Schneider says the plan is revolutionizing the teaching in his department. Instead of students listlessly sitting at a lecture in engineering, they are alive with question after question. A card system is also in use on which is marked the operation which calls for an explanation of the theory.

How the System Works.

This is the co-operative plan. It works well in Cincinnati, which is a manufacturing city, and the alternate week system allows the application of the plan to many smaller manufacturing centres within a radius of 50 miles of Cincinnati, as students can reach these places at week-ends as easily as they can reach the city itself.

A most important feature of the scheme is that the wages paid go a long way towards supporting the needy student in his college course. It is intensely practical. Students are paid for their services while at the shops on the following scale, each period being approximately 990 hours:—First period, 10c per hour; second, 11c; third, 12c; and so on, increasing one cent per hour for each successive period for ten periods.

The city of Cincinnati is so enamoured of the Schneider scheme that it is just finishing a building costing $300,000 and a power plant costing $150,000 for the University. The educational impulse given the city of Cincinnati by the University is shown by the late erection of one of the most comprehensive and even magnificent High Schools in the United States.

The term of operation of Prof. Schneider's plan in Cincinnati University was originally six years, but it is found that it can be shortened to five on account of the new methods of instruction forced on professors and instructors, and it is suggested that it may be reduced to four years. There is a class for each year, and a shop co-ordinator for each class. There are two shifts of students. There are at present nearly 300 Engineering students, with a large waiting list.

The examination for entrance is severe, not only knowledge and preparation being taken into account, but the personal aptitude of the student. The outside shops are glad to have the students. The course runs over ten months in the year, giving five months each to class-room and shop work. Attention is also being paid to the social condition and recreation of the students.

Successful After Three Years' Test.

Last year the Union Pacific Railway took the output of the University Engineering class and placed them for the two months vacation on sections along their railway route.

No doubt those who have not seen the working of this system will object that a scheme which brings two sets of students into any work on alternate weeks is not practicable and will demoralize a factory. The answer to this, in Prof. Schneider's own words, is that three years' co-operation at Cincinnati and shorter periods of observation elsewhere have demonstrated that the criticism is untenable.

Prof. Schneider in developing his system has adhered to the principle that the University and its funds should be used for the development of brains, not machinery; hence his University has "scrapped" its practice shops. and uses instead the highly organized, well-equipped commercial shops of the city. He says that if one-third the money saved by the co-operative plan were put into salaries for the teaching force, engineers who are deterred by poor pay would be attracted to college, and Universities would then be centres of real learning and research. If a student is to devote 33 months of his life to study under skilled instructors and 33 years to practical work he must be taught in college only those things he cannot learn outside.

Effect of Plan on Teaching Methods.

The effect upon the pedagogic work has been remarkable, and Prof. Schneider thinks this is the most important development of the co-operative course. In every subject the teacher was required to produce his syllabus and answer the question "Why do we teach it?" It was thus discovered that broad fundamental principles were being taught over and over, not as basic principles but as special rules for special machines. Thus a number of courses, *e.g.*, in hydraulic machinery, were found to be merely compilations of what the student has already had in other subjects, with much descriptive matter from machine catalogues; also that many so-called "technical courses" were merely descriptions of practical work which the student would learn more accurately in the shop, and therefore entirely out of place in the co-operative system. By teaching such things the student failed to grasp once and for all the big fact that these principles were broad underlying laws, not ingeniously devised formulas for special cases.

The drawing teachers, in reply to the question, stated that many of the students would become designers, and hence must be able to draw. But it is well known that the real designer in a progressive shop spends very little time at the drawing board. If he is an alert man he is in the shop watching the performance of tools and machines; he frequently consults the salesmen to hear objections to his particular machine and get suggestions for its improvement; he does extensive experimental work, following recent developments at home and abroad; and when he comes to do any designing he sits at a roll-top desk, makes his computations and free-hand sketches, and turns these over to follow-up men who can be obtained for about $75 a month. In other words, the drafting-room is becoming to the designer what the typewriting room is to the management. For these reasons Prof. Schneider holds that it is much more important for the future designer, after he has learned the necessary elements of drawing, to spend the afternoons of his college days in the laboratory, the library, and in consultation with his professor in research problems, leading to computations and free-hand sketches which can readily be interpreted by an inexpensive follow-up man, than it is for him to spend all this time laboring to become an expert draftsman. Hence, except where drawing instruments are absolutely necessary for certain classes of work, as in kinematics, the long periods of drawing have been eliminated from the course, but the student is given definite problems based upon the fundamental principles of physics and required to devote many hours to the laboratory and the library, where he works out his results in the form in which they would go to the drafting-room. In other words, the student is taught first that essential requisite of the engineer—how to tackle a problem in the laboratory and in the library.

Plan of Teaching Reorganized.

For these reasons the teaching system has been reorganized as follows: The first three years of the course are devoted to mathematics and the fundamental sciences, together with the cultural subjects. Physics is the backbone of the whole course, for there is not one principle used in engineering which is not to be found in physics. The teaching of physics has been modified in accordance with the same principle. When a student studies the principles of heat, for instance, he is told how they will be applied in his work in thermodynamics. The professor of thermodynamics starts him where the professor of physics has left off, and these principles are not to be taught him again as though he had never had them. On the basis of his work in physics he will at once start on his problems in thermodynamics. After the first three years we cease lecturing to our students and demand of them original work based upon fundamental principles, which work, of course, is guided by the professor, but more after the method of the post-graduate seminar.

Besides the natural sciences there is another science just as important for the engineer, namely, the science of management. This embraces all the problems of shop economics, and these are introduced in the later years, after the student has had three years of experience in the various departments of the shop. Coupled with these sciences, there is a six-year course in the economic, social, political, and industrial development of the human race, and two years of general economics. There are also courses in the modern languages, sociology, sanitation and English literature. About 25 per cent of University time as distinguished from shop time is devoted to these so-called cultural subjects.

In Close Touch With Industries.

Prof. Schneider, who spends every afternoon in the industries investigating the commercial production manufactured in Cincinnati, believes that developments of his system indicate a radical change in much of the future instruction in engineering colleges. It has been shown, for instance, that just as much business science is needed for building a piano as for building a dynamo, and just as many men are employed in one trade as the other, requiring a similar time for mastering the work; yet if a college of engineering were to announce a course in piano building, a howl of derision would probably arise throughout the educational world.

There are many other industries which are considered by engineers as minor industries, but which have a basis in science. If the investigator is fair, however, he will discover that a broad and thorough training is just as essential for their successful operation as for the building of a machine tool. Since our colleges are endowed for the benefit of the public, and not to make life's pathway easier for the individual of average calibre whose father can afford to send him to school, it should be obvious that to meet the requirements of the industrial community the college of engineering must broaden into a College of Industrial Science. If we pursue this investigation a little further we will find that the first three years of work would be the same for the apprentices in the piano factory as for the apprentices in the machine tool or electrical works.

Institute of Industrial Research.

After receiving a broad training in the fundamental sciences, the mathematics and the humanities, the students would enter upon their last three years with one backbone course of specialized study, together with the collateral branches applying to these particular fields of endeavor. The most promising development has been brought forcibly to us by manufacturers in these so-called minor, and supposed non-engineering, industries, who have proven to us the great dearth of well-trained men for their work. It is a function of the College of Industrial Science to prepare these men also.

Another suggested development is that there will grow up by the side of the College of Industrial Science, an Institute of Industrial Research, which will have about the same relation to the college that the research department of the Westinghouse Company bears to its production department. It is well known to educators that a good research man is often a poor teacher, and that a good teacher is frequently a poor research man. Yet we are always trying to make a good teacher do research work; often, too, a good research man is held down to a miserable salary because his teaching is not as efficient as it should be.

If a number of Universities develop Research Institutes, the next natural step would be a bureau under national direction as in Germany. A foundation of this kind would bring to the college of Industrial Science, without cost, the best research brains obtainable, in exchange for which the colleges would furnish the laboratories. The co-operative system operates in times of industrial depression or prosperity to the satisfaction of the manufacturers, the students, and the University; a logical combination of theory and practice, closely co-ordinated, has been worked out; a great waste of the funds provided for education has been eliminated by abolishing the imitation practice shops; the substitution of work in real shops at fair pay has made the college course possible to many more young men, and hence has permitted a selection of the raw material for making engineers; and the close contact with industrial life in an industrial centre has widened the field of usefulness of the science college and has forecasted an Institute for Industrial Research on elastic and economical lines.

SECTION 3: THE FITCHBURG PLAN OF INDUSTRIAL EDUCATION, HIGH SCHOOL, FITCHBURG, MASS.

The "Fitchburg Plan" is the direct result of the seed sown by Prof. Schneider of Cincinnati at the Convention of the National Metal Trades Association in New York in 1908, when he outlined the system of co-operation whereby the Cincinnati shops take charge of the practical training of students while the University teaches the theory.

Fitchburg manufacturers, who were present, felt that this method could be adapted to High School students who wished to learn a trade and continue their education at the same time, and they offered the use of their shops for the practical instruction of apprentices, if the school board would provide the necessary collateral instruction. The result was an arrangement with the leading local manufacturers of saws and knives, steam engines, grinding machinery, steam pumps and pumping machinery, manufacturers of lathes, planers, railroad tools, tinsmithing, pipe engineering, etc. Textile work was added in September, 1911, a slight change being made in the course by substituting Principles of Cotton Machinery and Textile Chemistry for Mechanism of Machines and Chemistry in the ordinary course. The textile industry in New England employs probably 50% more men receiving from $1,300 to $10,000 a year than any other industry in that section.

By this plan shops far superior to any trade school that can be conceived of were given to the City for the training of mechanics, while the City is not called upon to spend a single dollar for their equipment, nor is the State required to contribute to their maintenance. It is a strong feature to have industrial pupils in the High School; it makes the High School really democratic. This Industrial Course is for the ordinary Grammar School graduate and for boys who have not obtained this standing but who have "gone over" the course.

The Course, and How It Works.

The course outlined is of four years' duration, as is the regular High School course. The first year is spent wholly in school; the next three years the boys alternate weekly between shop and school, and are thus "steadied down" from the age of 15 to 18. In a boy's growing time he is made stronger by this plan, as it is a sequence of short vacations or changes, and also ensures that he will come under male teachers.

The manufacturers take the boys in pairs, so that by alternating they have one of the pair always at work, and likewise the school is provided with one of the pair.

Every Saturday morning the boy who has been at school that week goes to the shop in order to get hold of the job on which his mate is working, and be ready to take it up Monday morning, when the shop boy returns to school for a week.

Shop work consists of instruction in all operations necessary to the particular trade.

Earnings for Shop Work.

Students, in the second year and after, get 20 weeks in school and 30 in shop yearly. They receive pay for their shop work as follows:—

	Per hour	Per week	Per year
Second year	10 cts.	$5.50	$165 00
Third year	11 "	6.05	181.50
Fourth year	12½ "	6.87	206 25
Total for three years (each student)			552 75

The 60 boys (20 in each class) thus earn in three years a total of $11,055.

Above rates are higher than the former apprentices had been receiving, the manufacturers having of their own accord raised the prices. Hence a boy has strong inducements to continue in school, for he can thus earn more than he could by going out and taking ordinary jobs in stores or offices; at the same time he has an opportunity to contribute to his support when his parents could not have kept him at school, and thus is enabled to continue his education.

In one shop the firm offers prizes for suggestions, and a boy won $30 in one year in this way.

When there is a vacation week in school, work is provided in the shops so that the boy does not have to loaf around the street with his hands in his pockets looking for mischief. These periods are paid for in addition to the amount above indicated as his yearly wage.

"Trying out" Boys—Selection of Courses.

Every candidate is given a trial period of two months after the close of his first year at the High School. If he likes the work and shows aptitude for the trade he takes the course; otherwise he drops out and, if he chooses, takes up some other course in the High School. Thus the boy has opportunity to "find himself." The wage scale becomes operative the first day of July, when the boys enter upon a trial period of two months. Division into pairs is made at the opening of the fall term in September.

What should be taught in such a course as this? Since the school time is only 20 weeks a year, it is evident that only such subjects should be included as are of practical value to the student in the pursuit of his livelihood, of course looking to his advancement in that pursuit. The point insisted upon by manufacturers was that this course be such as would make the boys better mechanics and also capable of advancing to their highest possibilities. Better a little done well than a smattering of a large variety of subjects. The regular courses of High School study were discarded, precedent was ignored, and such subjects were selected as would fit the students to become intelligent mechanics. The courses, and the reasons for the selection of studies are as follows:—

Schedule of Studies.

First Year—*All School Work:*	
English and Current Events	* 5
Arithmetic, Tables and Simple Shop Problems	5
Algebra	5
Freehand and Mechanical Drawing and Bench Work	8

Second Year—*School and Shop Work:*	
English	* 5
Shop Mathematics, Algebra and Geometry	5
Physics	4
Civics	2
Mechanism of Machines	5
Freehand and Mechanical Drawing	6

Third Year—*School and Shop Work:*	
English	* 5
Shop Mathematics	5
Chemistry	4
Physics	4
Mechanism and Machines	5
First Aid to Injured	6
Freehand and Mechanical Drawing	6

Fourth Year—*School and Shop Work:*	
English	* 5
Commercial Geography and Business Methods	2
Shop Mathematics	4
Mechanism of Machines	4
Physics, Electricity and Heat	4
Chemistry	6
Freehand and Mechanical Drawing	5

* The figures show number of periods per week, each period being 40 minutes.

English.—Throughout the four years, in order that the boy may speak and write intelligently, he is given forms of business papers, shop terms and spelling. Familiarity with shop terms and their significance is an important feature of this work, also current events and industrial history, the daily happenings in the industrial world, the history of the iron industry, factory system and labor problems, new inventions, and reading of mechanical journals to keep in touch with mechanical affairs. The boy gets interested in the history of industry, and learning of its heroes. He "straightens up."

Mathematics.—Beginning with simple propositions in mensuration, fractions, metric system, circular measure. General shop mathematics dealing with problems on cutting speeds and feeds, belting, gearing, strength of materials, general cost figuring.

Algebra.—To give facility in using the formulae so common in trade journals and handbooks, and leading up to simple practical geometric and trigonometric formulae.

Mechanism.—Treats of construction and uses of various machine tools that every shop contains. The names and uses of every part are learned in the school as well as in the shop.

Physics.—Study of laws underlying all mechanics, study of working examples being emphasized.

Chemistry.—Nature and qualities of metals and salts, tests that can ordinarily be applied to fractured metals, hardening and tempering processes.

Commercial Geography.—Study of sources of supply of various industries, preparation and methods of transportation, cost of materials, etc.

First Aid.—Knowledge of how to care for those injured in accidents.

Drawing.—The "sign language" of the mechanic. A large share of the drawing period is given to freehand work, beginning with simple objects, then machine parts. During the last two years the boy draws with instruments to scale. Boys sometimes get into the drafting room at the works.

Civics and American History.—Careful study of city and state government for intelligent and progressive work.

Business Methods.—Study of organization of shop systems, including receiving materials, laying out work, tagging, inspecting, and routing work through shop; also general office systems. The workman sees the dependence of one department on the other, the necessity for the co-operation of all to secure good results. He gets an idea of the great responsibilities of the employer. This will help solve the labor and capital problem.

Better Apprentices Better Students.

Mr. Hunter, who is Director of the High School Studies, and also acts as correlator, adds that this plan gives the manufacturer a better class of apprentices, boys who will make thinking mechanics, able to read a blueprint and go ahead, and not mere workers who require all the foreman's time and attention explaining every little detail of a drawing. Foremen on every hand speak in the highest terms of the work. The boys are three years ahead of the ordinary High School graduate; they are working in the plant where they would have to apply for a position if they wanted work; the men know what they can do, and when they become journeymen (which Mr. Hunter claims they do on graduation) there is no kick about paying them good wages.

The worker is by this plan given an opportunity to continue his education; to get the educational value of work with his hands under competent direction; to be a better citizen as the result of his acquaintance with the civic operations of his community and their relation to the worker; to be a contented and happy workman because he can see beyond his daily task into the great storehouse of the literature and history of his trade that has made possible the rise of the nation, and continue his supremacy as the artisan. Boys taking this course are not looked upon as inferior by the pupils taking the academic courses.

Conditions of Apprenticeship.

The following is a summary of the rules and conditions under which special apprentices, taking the 4 year co-operative industrial course, are received for instruction at the works of manufacturers as set out in printed form of agreement signed by employer, apprentice and the latter's bondsman. (The boy's relative or guardian signs an agreement consenting to the employment, and to the payment of wages direct to the boy).

The applicant for apprenticeship must have satisfactorily met requirements for entrance to this course at the High School.

The apprentice is to work for the employer continuously, well and faithfully, under such rules and regulations as may prevail, in such capacity and on such work as specified (unless changed by mutual agreement) for the term of approximately 4950 hours (3-year shop term), divided into three periods of approximately 1650 hours each, and with wage scale as follows:—

First period, 10 cents per hour; second period, 11 cts; third period, 12½ cts.

This wage scale begins the first day of July preceding the apprentice's entrance upon the first year of shop work.

The apprentice to report for work every alternate week when High School is in session, and on all working days when School not in session, and to be paid only for actual time at such work, but to have vacation of 2 weeks each year without pay during school vacation.

The employer reserves the right to suspend regular work wholly or in part at any time deemed necessary, and agrees to provide under ordinary conditions other work for the apprentice during such period at the regular rate of pay.

Should the conduct or work of the apprentice not be satisfactory to employer or the High School authority, he may at any time be dismissed or suspended for a time by the employer without previous notice. The first 2 months of the apprentice's shop work are considered a trial time.

Lost time shall be made up before the expiration of each year, at the rate of wages paid during said year, and no year of service shall commence till after all lost time by the apprentice in the preceding year shall have been fully made up.

The apprentice must purchase from time to time such tools as may be required for doing rapid and accurate work.

In case the apprentice violates in any way the terms of the agreement, or these rules and conditions, the bondsman agrees to pay $100.

On the satisfactory fulfilment of contract the School Board of Fitchburg confers on the apprentice at graduation a diploma, bearing the signature of an officer of the Company with which he served his apprenticeship.

The employer agrees to furnish the apprentice, during three years, work and supervision suitable and proper for him to learn the specified trade, during the regular working time of its shop, provided he shows reasonable capacity and ability to do the work given him; also to faithfully instruct the apprentice in said art or trade in their shops during said term.

How the Plan Works.

From observations made by the Commission and statements made by others, who had examined this system, it is not manifest that any special attention or instruction is given by the various foremen or others while the boys are working in the shops.

By weekly visits to the shops, and by inquiries of the boys during their school week, the Director keeps in close touch with their work. If a boy feels that he is not getting just what he ought he makes the fact known, then a talk with proprietors and foremen discovers whether a change should be made. A written report of the work in the shop is also passed in on Monday morning of the school week, and is inspected and filed for reference. This furnishes a good exercise in observation and composition, covering hours worked; kind of work (lathe, planer, chipping, blocking, weaving, etc.); description of work (size, color, kind of metal, etc.); description of machine (sketch of parts; particular features); tools used, facts learned (speeds, feeds, time, etc.); comments.

Every opportunity for questions regarding shop work is encouraged in the school, and these questions are of a most intelligent nature. Many problems are dealt with that the shop has not time to consider, and interchange of ideas and methods in different shops broadens and helps all the boys. While this course was intended for those who wanted to become mechanics, it forms an excellent foundation for a technical course. With another year at High School studying a foreign language and a few other college-required subjects, a boy is exceptionally well prepared, and can pass off his shop work and a great deal of drawing, so that he gains instead of losing.

Friendly Attitude of Manufacturers.

Alluding to the fear expressed that manufacturers will control the schools, Director Hunter says there is little foundation for it; that the manufacturers have insisted on but one thing—that the course be practical; that a practical shop graduate be the supervisor. They have enough to do to run their own business, and expect that the school authorities know what is wanted. Business men and manufacturers, instead of standing aloof criticising and complaining, have turned in and helped to provide what they want and need. As manufacturers are among the largest taxpayers, Mr. Hunter asks why they should not get what they need.

Mr. McDonald, President of the Fitchburg Iron Manufacturers' Association, says he does not take apprentices any other way now. He added that this plan gives a boy something the mere shop apprentice has not got, and he becomes a faster workman. The boy from the home of the not-too-well-off gets a chance of an education.

Another manufacturer claimed, as a point in this course superior to trade schools, that these boys generally stay to the end, while it is said 80 per cent of boys in trade schools fall out before the end of the course. Also, a boy in this plan has his place, with his feet in it for future employment, while the other boy has to look for a place. Ability to do real work develops responsibility, just as a boy, who knows that what he writes will be printed exactly as he writes it, will be specially careful.

Mr. McNamará, foreman of Fosdick Engine Works, which has 12 boys besides 3 graduates from the school, said their men looked on the boys as a good feature. When boys get through they are not specialists, but machinists—the men that are wanted for the future. The boys work one year and a half on lathes, making pistons and piston-rods and pins for cross-heads. A boy who was working stated to us, "You can keep your interest more by week-about; otherwise you would be more likely to lose your interest in the shop or in the school."

An advantage of week-about as against half-day is that the boy has separate clothes for school and for work; this helps to maintain his dignity. The close contact, between the work in school and the reality (accuracy) in shops, makes the boy's education real and living, and the boy fills his place as a real unit in society. The local authorities, teachers and manufacturers, were much impressed with the system, and they seemed to think that it was meeting the local needs.

Quality of Reports Written by Students.

Our Commission inspected the reports made by students from shops, and noted the good hand-writing and clear English, also the freehand drawing used to illustrate their ideas when necessary. Compositions, well-written and illustrated, gave descriptions and sketches of machines, mandrils, taps, micrometers, calipers, gang-planer tools, reamers, saws, grinders, sprinklers, high-speed lathes, etc. Others dealt with the growth, decline and possibilities of the apprentice system; opportunities of a machinist at a local factory in which the boy worked: migration of machinists; automatic machinery; manufacture of shot for special caliber guns; iron industry in America during the Colonial period; wireless telegraphy, etc. There were also series of business letters asking permission to use the name of a firm as reference; permission to open a business account; asking references of firm; reply favorable to men opening business; ordering goods; acknowledging order and containing invoice; concerning damaged goods; remedying damage; letter containing payment; letter acknowledging payment, etc.

The boy who has been in the shop all week must on the following Monday morning bring in a written report on the previous week's work. He must also bring in writing a synopsis relative to some one book, selected from general literature, that he has read during his shop week.

SECTION 4: THE BEVERLY HALF-TIME INDUSTRIAL SCHOOL.

"One of the most important features of the welfare work at the factory is the industrial school for the boys who will one day be the inventors and the trained mechanics of the Company. In conjunction with the State of Massachusetts and the city of Beverly the Company has established the first school of its kind for mechanics in this country. There is nothing else quite like it in the world." Thus speaks the United Shoe Machinery Co. in a pamphlet describing its factory at Beverly, Mass. The Company, which has about 3,000 employees, has invested $25,000 in shop equipment for this educational experiment, sufficient for 25 boys at a time.

The origin of this school is interesting. For several years evening class instruction in mechanical drawing had been given in Beverly. In October 1907 the Massachusetts Commission on Industrial Education, co-operating with the Beverly School Committee, established an Independent Evening Industrial School with courses in machine drawing, architectural drawing and engineering mathematics. In the following year this work was systematised, attendance largely increased, and freehand industrial design, industrial applied science and shop mathematics were added. The State Commission afterwards appointed a local commission to study the needs of Beverly in the matter of Industrial Education. This Commission represented the varied interests of manufacturing, organized labor, agriculture, commerce, industries for women, and school authorities. After many conferences and full investigation the Commission reported in May, 1909, and in August the school opened with 50 pupils.

What the School Does.

The school aims to give elementary instruction in the machinist trade to any boy who can qualify for entrance; it is hoped other departments will be added as conditions warrant. Candidates must be 14, and must have completed sixth grade elementary school work or equivalent. Many of the pupils have attended High School for a year or two.

The number admitted is at present limited by shop capacity to 50, and there is a waiting list. These 50 are divided into two groups, A and B, who alternate between the Beverly High School and the factory, one week at a time in each place. This was considered the most advantageous division of time. School days are 8 hours, with Saturday holiday and no home lessons; factory hours are 9 for 5 days, and 5 on Saturdays, with discipline the same as for regular employees. Each group is under the general charge of a thoroughly trained and experienced machinist instructor or co-ordinator who teaches his own group at both school and factory (an assistant shop instructor giving all his time instructing in the shop). These 3 give all the purely trade instruction, while 3 regular High School teachers give the academic subjects. By thus learning the needs, aptitudes and peculiarities of each of his 25 boys, the instructor can more closely correlate the school instruction and factory work, while the experience in both places makes the instructor himself broader and more efficient, the shop work keeping him from being too theoretical in his instruction at the school, and his experience and observation there making him a better teacher at the factory.

In the High School building the work of the Industrial School is carried on in one of the laboratories, which has been assigned for its exclusive use. Other laboratories and classrooms are used in afternoons when not occupied by regular High School classes. All the work is carried on in separate classes, with different hours from the regular High School, with a course of study distinctly its own, with a corps of part-time specialists who teach science, business practice and civics to suit the specific needs of the classes.

What the Factory Does.

The boys are given individual instruction in setting up work on the various machine-tools used in the Company's shops, in running machines to the best advantage, and also in bench work. The instructor keeps a record of each machine-tool on which the boy has worked, so that he will not be kept too long on any one machine. It is found that one week is usually sufficient to master an operation. The practice shop uses no so-called raw-materials; pupils work upon machine parts (castings) brought directly from the Company's foundry for certain operations as shown by blue-prints and drawings furnished by the Company. Under the direction of the instructor each boy performs several different operations upon a casting. This work, as well as machinery manufactured, is inspected by regular factory inspectors and goes into regular stock of the Company. The boys are said to like the factory work better than the school work, because they build something useful and sell it to the Company, thus enjoying in early life the gratification that comes from profitable and expert toil. 8 of the pupils have been passed out into the regular work of the factory, and earn from \$13 to \$14 per week. The Director of the part-time work has advised these boys to "go slow," and not to arouse hostility on the part of the older workers because of their earnings.

Course of Study.

At the Factory.—Operation of different machine tools on various classes of work, and later specializing on machine tools for which special aptitude is shown. Each pupil makes a freehand mechanical sketch and writes a description in note-book of the various articles manufactured by him.

At the School.—(a) Drawing—mechanical sketching with all necessary dimensions, working drawings, perspective, industrial design, machine design, blue-print reading. (b) Shop Mathematics—arithmetic, algebra, geometry, trigonometry, with shop tables and the use of micrometers and other instruments of precision. (c) Machinists' Literature, current and historical and modern machine shop practice, explanation and records of shop work, shop talks. (d) Science—mechanics, electricity as applied to machinery, chemistry of materials and their manipulation. (e) Arithmetic and business practice; business and social forms and practices; personal, social and civic duties; industrial economics.

The course of study in the school has been modified from time to time, but speaking generally it covers above subjects. As this school is in an experimental stage, the course of study is not definitely formulated beyond the first year's work. In general it is thought that two years will be given to the introductory course. It is probable that one or two years of more advanced work and specialization will be offered at the end of this period. It is planned to have boys ready to enter on regular apprenticeship at close of course, and for the Company to introduce in the near future some scheme of apprenticeship regulation.

Drawing Emphasized.

The drawing at the High School is based on the mechanical sketch (not to scale) with all necessary dimensions marked on. All drawings are from the objects or mental picture; never copied from other drawings. The pupil makes the necessary measurements from the objects, and in the mechanical sketch records all the data necessary for the completion of the regular scale drawing. Great attention is paid to mechanical sketching in other ways. Each pupil keeps a note-book recording the work done at the factory. In this the operation is described, and a mechanical sketch of the article manufactured is made to illustrate the description. In the development of the work in drawing, all the parts of a simple machine are drawn and then an assembled drawing of the whole machine is made. These in some cases are colored to show the different materials used.

How Expenses Are Met.

The expenses of the school are borne jointly by the public school authorities and the Company. The school is eligible for State aid to the extent of a refund of one-half the maintenance cost incurred by the city. The full salaries of the 3 High School teachers, and one-half those of the 2 shop instructors are paid from the school funds, the other half being paid by the Company, which also furnishes room, equipment, material, and the Director of the system.

The Company keeps a separate account for the practice shop, debiting it with all cost of maintenance, and crediting it with full value of product accepted. The boys are paid one-half the price which would be paid to men for the same work under the factory's efficient piece-work system. The other half of the price goes toward the expenses of the school. Boys earn from 85 c (given as one instance) to over $7 a week. The yearly deficit between the earnings of the practice shop and cost of maintenance ($1,800 the first five months) is made up by the Company. It is hoped the deficit will be reduced as the system is perfected. Should any profits accrue they will belong to the school and be distributed to the pupils in increased wages, or in whatever way is deemed expedient by the Board of Trustees.

Co-Operation of School and Factory.

"Only the union of pedagogy and industrial competency can produce the new type of industrial education that is desired"—this is the key-note of the Beverly movement.

The management of this school is independent of both the factory and the High School, though having access to both and sharing in the facilities both offer in equipment, organization, established standards of discipline, workmanship and general efficiency. The Trustees argue that to be closely associated with a school and with a factory with established standards is of the greatest value and importance in an undertaking of this character, which must necessarily be experimental. The High School system is the net result of the best educational practice; the factory system is the net result of the perfected methods of dealing with actual conditions of successful manufacturing. The Industrial School, to properly fulfil its function, must measure up to both standards; pedagogically it must be a good school, and industrially it must make efficient workmen. In an industrial school maintained wholly in a factory it is difficult to establish and maintain the legitimate standards of the school in equipment, methods, scholarship and general pedagogical efficiency. On the other hand, it has thus far apparently proved next to impossible in an industrial school maintained as a school solely, apart from any manufacturing establishment, to produce workmen having sufficient skill combined with sufficient productive ability to render them industrially efficient and practical. Hence neither party can afford to ignore the other.

Various Views of Beverly Plan.

A Commission from Wisconsin, after investigating the Beverly plan, reported:—

The remarkable point and the safe point, both from the standpoint of capital and labor and also from the standpoint of true industrial education, is that the arrangement is controlled entirely by a committee composed of five members of the school board, and one or more citizens of Beverly appointed by the mayor. Every factory has a representative appointed by the mayor upon nomination of the proprietors of the factory. As an additional safeguard, the whole is under the control of the Massachusetts Commission on Education, and state aid is given the city of Beverly to carry on the work. This seems a good combination, but unless the factory is as large as the United Shoe Machinery Company at Beverly, the shop instruction will not be adequate. It is not often that firms are found who will see matters in as broad a way as the United Shoe Machinery Company of Beverly. If such co-operation could be successfully carried out it would provide a means for making the high school a real factor in the life of every community.

The United States Commissioner of Labor in his report on Industrial Education (1910) says:—

It would appear that one of the greatest handicaps of the Beverly school is its complete dependence upon one manufacturing concern. The United Shoe Machinery Co. furnishes such material financial aid that should the company choose to withdraw its co-operation the school might be compelled to discontinue its work.

SECTION 5: THE BEVERLY AND FITCHBURG PLANS COMPARED.

The co-operation between the school and factory and the week-about periods are the same in both cases, but otherwise there are many variations.

The distinguishing feature of the Beverly plan is that the Machinist-Instructors accompany their boys both in school and shop, whereas in Fitchburg the boys are under the academic teachers at High School and are instructed by the foremen in the various shops. The Fitchburg Director, however, acts as Correlator, and endeavors to arrange so that school and shop co-operate in the matter of instruction.

In Beverly this scheme is run with only one shop, whereas in Fitchburg there are various separate workshops. The single factory makes the complete Beverly plan more workable as to instructors and cost; but when the system is extended, if each group of 25 boys must have a special teacher, the Beverly plan will be more expensive than that at Fitchburg. The limit in Beverly to one factory is only temporary, as it is planned to extend it to others, but meantime the danger to the entire scheme is commented on, because of it being dependent wholly upon one business concern.

Different Apprenticeship Features.

The two plans differ radically in the matter of apprenticeship. In Fitchburg there is a written agreement for 3 years' apprenticeship, accompanied by a bond for $100 in case of failure, and this is looked upon by the Fitchburg manufacturers as one of the strong points of the scheme, because it holds down restless boys; whereas in Beverly there is no apprenticeship indenture, and the pupil is free to leave at any time if he thinks it advantageous to do so.

In Fitchburg boys may select a trade from among a large number, whereas in Beverly they can take up only the machinist trade.

In Fitchburg the number of boys is only limited by the number of factories in the city, whereas in Beverly the capacity is limited to 50.

In Fitchburg the work of the shop is the ordinary work of the regular apprentice, whereas in Beverly the shop work is systematized from the instructional standpoint, as well as being closely correlated with the school work.

In Beverly the instructor keeps a record of each machine-tool on which the boy has worked, so that he may not be kept too long on one machine.

School and Shop Instruction.

In both places, however, the school work is specially adapted to meet the needs as they develop in the shop work, and in both cities specialist teachers are engaged in the school.

In Beverly the Assistant Shop Instructor gives all his time to instructing the boys in the shop, and their work is done under the sole direction of the Machinist-Instructor who teaches them at the school.

In Fitchburg the school instructors spend as much time as possible in the shop observing the work of the pupils, and the shop foreman gives as much instruction as is necessary. Pupils may appeal to the Director if kept too long on one job.

The school authorities at Beverly are responsible for the training at the work shop as well as at the school.

In Fitchburg boys are paid by the hour, whereas in Beverly they work by the piece.

In Fitchburg the school instructors are paid entirely by the school, whereas in Beverly the expenses are apportioned.

SECTION 6 : APPRENTICE SYSTEM OF THE GORHAM MANUFACTURING COMPANY, PROVIDENCE, R.I.

This Company has instituted a system of training for its apprentices, in co-operation with the school system of the city. Apprentices spend one week in the shops and the next in the High School. This system of training applies only to the manual arts, and does not attempt to educate the boy beyond his particular trade. The boys are encouraged to attend evening schools for design, etc.

Mr. Lawton, the Superintendent, believes that the movement towards co-ordinating the school system of a city with the apprenticeship systems of the larger industries, in order to make it possible for boys to continue their education in a broader sense than they now do, will rapidly become general. He did not think the plan of allowing the boys to spend alternate periods of 6 months continuously in the shops at practical work and then 6 months continuously in the school was feasible except in a few trades. He said the chief difficulty in educating boys was to provide sufficient variety in the work to keep them keenly interested and enthusiastic the whole time.

SECTION 7: THE TRADE SCHOOL, WORCESTER, MASS.

Information obtained from "Conversation" with MR. E. H. FISH, *Principal.*

The city of Worcester met the entire initial cost of the school, $125,000. and has since given about $2,500. The city put in $33,000 for land, $30,000 for equipment, and the balance for the buildings, including power plant and heating. Although the city contributes to the running of the school, there is an independent Board of Trustees not controlled by the city. The State pays half the cost of the maintenance if the school meets with its approval. The State pays a certain percentage on the condition that all teachers receive their State certificate before being employed. In the present case the State and the city of Worcester each pay half of $24,000, the amount required for maintenance of the Day School. The net expense for the Evening Classes is $5,000 to $6,000. These sums include labor and actual material used. The revenue from the Day and Evening Schools is about $15,000.

Many come in the evenings who are not connected with the Day Classes. The boys work eight hours per day. There is a special apprentice class on Saturday mornings, attended by 40 boys. They take two hours theory and two hours practical work, and also attend one hour weekly in the evening.

STAFF, TERMS OF ADMISSION, ETC.

There are 14 full-time instructors, 3 of whom are for woodwork and 3 for machine work; and in addition there are 4 men who divide their time between shop and school work in what is called instruction work. The school has 4 electrical men outside, and 4 for machine work.

There are 160 day pupils, which is about the number provided for in the equipment, but 180 could be taken. Under the State law, no pupil under 14 may be admitted. This stipulation works hardships sometimes, as in the case of a boy who is head of his grade and wants to come in; it seems a shame to keep him out, but he can come in on his 14th birthday. The age limit for graduation is 25, so that a boy cannot come after 21, and as a matter of fact very few come over 19, as they do not like to be with younger boys.

This school admits a boy in the expectation that he will make good, and only gives a formal examination, which includes questions to be answered, and a talk with the authorities of the school, from which a great deal more is expected than from the examination. It might be called a combined written and oral examination, only that more attention is paid to the impression gained from the boy himself than from the paper examination.

In the evening school there are about 300 pupils. Questioned as to whether as administrator he foumd any embarrassment through the use of the plant for evening classes, Mr. Fish replied, "You are running there across the trouble that the day gang always blames the night gang for any accident that happens, and *vice versa.* It is impossible to place the blame properly, and I don't know but it is safest to say each set is doing the best it can, and let it go at that." The real embarrassment in the use of the plant amounts to so little, in proportion to the total expense, that it is not worth mentioning. The material damage to the plant itself does not amount to more than \$25 or \$30 in a season from evening use.

School Trains Better Than Shops.

As to whether men, who got through this school, were as well equipped in every way as those who had served apprenticeship in a shop, Mr. Fish said it was his belief that the school shop could make as good workmen out of them in 3 years (4,500 hours) as the Worcester machine shops make with their regular 3 years' apprenticeship (9,000 hours). Besides shop work the pupils have class-room work, so that the work in the school shops has to be twice as intensive as in the Worcester shops.

The school takes work just as a shop does, and if a man has an order to give for work that is desirable, it is taken, with the stipulation that the boys shall have all the time they want, so as to give each boy practice in what he is fit for, as the school has no object in exploiting the boy. Otherwise the order is refused, the reason being explained, so that the man will come with his order next time.

The school is trying to get in the line of manufacturing a regular article. They would prefer that to general custom work, though the latter brings in about \$3,000 revenue in a year, and will no doubt increase. In addition, they are making equipment for themselves.

Should Boys Receive Wages?

The school is free, and the boys get no wages, though Mr. Fish said he thought the payment of some wages would be an economy in running the school. He believed these boys should do enough work to pay their wages and considerable besides, if they could only be paid. Of course there would be the danger that they would be so anxious to make the wages that they would try to get the instructor to give them work at which they could make good pay, but Mr. Fish considered that this might be the lesser evil, though he admitted that it was a danger.

The Labor organizations have always favored the school, and two Labor men were on the original Commission that worked it up, one being still on the Board of Trustees and one on the Board of Instructors. Everything is wide open, and several men who belong to Labor organizations attend the evening classes. The President of the Electrical Workers' Union is one of the under-instructors in electrical work in the evening; so that they can see just what is going on. The school simply says to them, "Here, gentlemen, we are going straight ahead to teach a trade, and mean to make the course long enough so that there will not be any triflers, or any danger of throwing out scabs at the time of a strike;" and there have been no dissensions at all.

Selling Products.

The Labor men do not object to the school selling goods, and the authorities of the school have been pretty careful to maintain market prices. The point is that the boys should know that the machines they build are going to be inspected by someone outside. If the school has an order for 4 lathes and actually sells one, the boy does not know which one is to be sold, and both he and the instructor have to make them all up to the standard, so that selling even one would gain the point.

If there is any range or variety at all it would be better that the boy should have the benefit of it, because it is a help to him and to the instructor, and makes it easier to keep the boys contented. A boy does not like going back to work he has long finished, but at the same time, if he has not advanced sufficiently for the better work, it can be pointed out to him that he now has to do it himself, without help, and thus he would go over the same ground without being discontented. Boys such as these compare notes with their fathers and relations who are doing the same kind of work and getting paid for it.

This is a manufacturing town, and the school deals with the local industries, the largest of which is machine work, the next largest being building trades. There are about 20 trades which ought to come in, and the next will probably be electric industries, foundry work, and so on.

The manufacturers are in sympathy with the work, and back up the school for anything it wants. The one thing that Mr. Fish deplored about industrial education in Massachusetts was that the manufacturers are not really handling industrial education. They have had their chance, and might as well have done it. This school in Worcester is really an industrial school. The others are working through the school committees, which are not elected with any idea of handling industrial education.

Continuation Work.

The school is running a little continuation work, mainly to get the run of it and find out what there is to deal with. The conditions here are somewhat different from those in Munich, so that they have to work out a scheme of their own. There is a class of 45 boys, from 8 different shops, who come on Saturday mornings from 8 to 12. It was found that simple class work does not hold their attention. They come from so many different shops and are in so many different stages of development, that it is quite difficult to arrange a course to suit them all. It was found that, although they were supposed as apprentices to be moved from one machine to another, they were not being moved as they should be, so that they were put at half-time in the school shop. The fellow who is on a lathe at his shop and sees no chance of getting to a milling machine, is put on a milling machine here. He has already acquired dexterity on the lathe, so he does not require practice for dexterity on the milling machine, but is put to a variety of jobs, spiral gears, bevel gears, etc., which he has to cut out on the milling machine, and learn the mathematics of it. The object is to teach them that they must have mathematics, and by putting them in front of a milling machine, they are ready to go to the class-room for mathematics.

The boys get the time for school on Saturday and their employers pay them, which is equivalent to raising their pay. If this plan becomes general, it will ultimately work out that the pay will be the same for the actual amount of work done, regardless of the number of hours they are in the shop. In addition to these 4 hours on Saturday, these boys are persuaded to come into the evening school, which means another 5 hours per week. There are no means of compelling attendance.

They want to go to the shop and get hold of a handle and turn something. They would sooner come to turn a lathe than to a class; they want to see the wheels go round. They cannot be induced to do abstract work; they have to have the concrete thing in order to handle it at all. Mr. Fish said he had never run across a place where that was so marked as here. It seems to be a condition that has to be met.

Evening Courses.

The courses in the Evening Classes are,—(1) Machine Shop work, divided into planer, lathe and milling machine work, grinder, gear-cutting and some copying work; (2) Woodworking, including cabinet work, pattern making, house work, house framing and estimating. Drawing is partly blue-print reading and partly jig and fixture design. The class in gasoline engine practice is a popular one, a drawing card, though it does not amount to much for a mechanic unless he is able to indulge in an automobile, as some of them do. It is not an automobile course, but one in adjustment and trouble of gasoline engines.

The evening class students are boys of 17 or over, engaged in actual work, and they come to learn some different part of their trade from what they do all day in the shops. These men are the most valuable to their employers, as they can turn to different machines when required. Some of the day teachers teach in the evening, and a good many of the instructors in the shops work in the evening school, which has also outside instructors. The woodworking instructor in the day school has classes in the evening for estimating.

The evening class meets 5 nights a week, and the accommodation (for 200) being insufficient for all at the same time, some attend 3 nights one week and 2 nights the next, and *vice versa*.

Practical Instruction.

The school aims to make the work as practical as possible. In teaching about levers, they take first the pure lever, with examples from machines they are using to show what the levers are. The boys spend a week in the school and a week in the shop. The latter is part of the school building; a good deal of commercial work is done in it.

Mr. Neal, one of the teachers, speaking from his observation, said that the boys when they leave this school, if they have paid any attention to their work, ought to be skilled journeymen workmen. In the machine shop they have two years of 48 weeks and 8 hours a day actual working on a machine under an instructor, so they ought to know a good deal about these machines, and be able to do everything on them. They get more variety of work in the four years than they would be likely to get in a shop, and use various kinds of machines.

THE "SERIES OF EXPERIENCES."

Referring to the Worcester Trade School, Mr. Chas. R. Allen, Agent of the State Board of Education, said that the series of experiences the boy goes through in the day school might be illustrated thus:—

	A		B		C		
Age	14	to	16,	16	to	18	

If we draw a horizontal line to represent his progress through the school, he would enter at A. Then through a period of the time to B he would be put into the shop and given individual jobs of a character which he could handle. In the carrying out of those individual jobs he would be required to learn to do the necessary planning, drawing, calculation, stock data reports, etc. When the product turned out is held to be of a commercial grade, a great deal of time is sacrificed from shop-training to bring in this related work on the job, the primary object being to educate the boy rather than give him mechanical technique, although as far as he is trained he is trained to turn out commercial product. After having given him some grasp of how to do these things, he would pass on to B and enter the second phase. In the first phase if he did any drawing he did it at his bench; if he did any arithmetic he did it on a scrap he picked up; if he wrote a report he would sit down in the shop and write it.

After B there is a division of time between class-room and shop. During a portion of his time the boy, in company with others about the same age, meets the teacher in the class-room outside the shop, but the time is devoted simply to working with the teacher on the particular problems involved in the job on which he is working in the shop. If it be the drawing class, he does what drawing is necessary; if it be a report, he is dealing with English, etc. Here the teacher is dealing with each boy on the individual basis, though doubtless while he is in the shop he is dealing with shop phases.

In the third phase, at C, this boy is taken into the class-room, where a deliberate effort is made to organize all the information he has had; that is, he would be given a definite course in mechanical drawing, or arithmetic, or what not, which would not necessarily be related to his mechanical work at the time. In the shop at the same time he is placed on a commercial basis, and is put on work that requires a certain number of repetitions for the purpose of giving him speed. In short, in the first two years you would stop him anywhere along the line to give him further training; in the last two years he is right on the job.

School uses Student Labor to Educate, not to Earn.

Dr. Snedden said that in practice that third stage would be reached by relatively few students; by those who had the most persistence and the capacity to reach out into the region of more abstract thinking—those who would become foremen. In order to prevent possible misapprehension, he added that while the terms commercial work and productive work had been used, his own view was not that money would be made out of that work, but the idea rather was that when a boy put his hand to an exercise he should do the work under commercial conditions, with a commercial aim; otherwise they would get back to Manual Training conditions, which are removed from actual life. The net effect of it all would be that in the shop schools—the printing school or any other—there would not be any output that would disturb the market at all, so there would be no occasion for trades unions or other producers to be afraid that the competition would be at all severe.

The primary aim being education, the authorities simply had to nail their flag to the mast on this particular matter—that when a boy goes into the shop to do a piece of work, that particular work must be got out as a piece of functioning work, as having a place in the commercial world, and not to be thrown upon the scrap-heap. It has been found that a considerable portion of the output would be absorbed in providing for the schools—additions to the machine-shop equipment, and all sorts of things. In fact in many cases they started the work in these schools by remodeling the building.

Schools Help Labor Market.

Mr. Chas. R. Prosser said that the difficulty in the matter of productive work arose when the schools came to sell these things on the market. Most of the schools can find a market for wood and metal in the school itself and in public works; but in such fields as textiles and shoes, hats and dresses, this cannot be done. Two things would probably have to be dealt with pretty strongly. One was the trades unions, who look askance at the saleable products, but who should be shown that most of those pupils would otherwise have been out in the producing industries, and would produce more there than under the limitations which the school has when they work in it. The second point is that experience seems to show that the schools themselves are really creating a market for workmen. Mr. Fish, of the Worcester Trade School, thinks that the boys will contribute about $5,000 worth of labor, which is $1,000 a year for 5 men. But there are 8 men who are trade unionists employed in that shop as teachers; hence to provide 8 men with employment the products of only 5 will be on the market. In the Girls' Trade School the production amounts to $3,000, which would deprive 6 women of work at $10 a week for 50 weeks; but on the other hand that school gave employment to 22 teachers of machine work, millinery and dressmaking, who are being paid more inside the school than they would have been paid outside.

Growth of the School.

The report by Principal Fish shows that on the morning of 10th February, 1910, 52 boys started work in the school; 7 more classes, each averaging 28 members, have been since admitted. Many have fallen by the wayside, for the present registration is 166.

Up to the first of December, 1911, 323 applications had been received for admission; 73 were refused because of apparent non-adaptability to the work or on account of previous bad records for behavior in the public schools. Of the remaining 250 who were admitted, 166 remained. The other 84 left, in almost all cases on their own account, there having been practically no expulsions from the school. Their reasons for leaving may be thus classified:—

To go to work at the trade for which the school was training them, 2; to go to work in skilled trades which the school could not offer, 8; to go to work at unskilled occupations, 7; to go to other schools 5; sickness, 1; discontented through having been set back a class, 2; moved from city, 1; insubordination, 11; lack of necessary effort, 47.

How the Pupils are Lost.

The report adds:—

From this it will be seen that the number who have been drawn to follow the trades for which they were being trained here is negligible. It is particularly significant to note that the two boys who have left for that purpose are with us in the evening classes, and one is also in our continuation class.

The fact that there are only 8 who have found themselves better suited to some other trade than that which they were able to learn here, in the main indicates that the work of the school has been interesting to those who are willing to be interested in anything mechanical.

The first three groups, comprising those whose primary object in leaving was to go to work, with a total of 17, indicate that less than 10% have felt a pressing need of wages, though the figures do not give any indication of the number who are barred from applying for admission to the school by reason of need.

The few who have left to go to other schools are boys who have shown ability which clearly indicated a capacity for higher education, and who are preparing themselves to get it.

By far the largest loss has been through lack of effort. The larger part of these cases are discovered early in their course, but new cases crop up from time to time as boys are led away by other thoughts. There are few cases of inherent laziness both mental and physical; there are cases where boys have felt a longing for more pocket money, but where their parents have tried to keep them in school; in fact it may be said that the largest part of the lack of effort comes from families where the parents are trying to oppose the wishes of their children as to their lifework. No matter how commendable it might be for us to assist these parents to train their children in some particular path, we ought not to thereby neglect those who have a settled aim in coming here, nor to injure the discipline of the school in so doing.

The withdrawals of pupils seem to follow a curve which would tend to show that at the end of the third year from the entrance of any class, we may expect to have lost about 40%, and at the end of 4 years 70% of its numbers.

SECTION 8: THE TECHNICAL HIGH SCHOOL, PROVIDENCE, R.I.

This school now receives factory apprentices (32) on alternate weeks in its vocational co-operative course for machinists and jewelers. Boys who have successfully completed one year's work in the High School are eligible for work in shops alternately. Before the completion of the first half year in the High

School, boys who wish to take this course are placed in a separate division where their work differs somewhat from that of other classes, thus affording some special preparation for the work in the industry without causing loss of time in school should they not succeed in the shop trial. If the trial is satisfactory to all concerned, the boy agrees to work as an apprentice in the shop under the half-time plan for three years, and the employer agrees to give the boy every possible chance to learn the trade. The actual time that the boy is to spend in the shop each year is 26 weeks of 56 hours. The wages will be uniform in all shops and will amount to about $550 for the three years.

The desires of boys and their parents are consulted as far as possible in deciding at which shop a boy shall work. The shop teachers are the foremen and workmen of the shop, and the apprentices are treated the same as any other workers in the shop, except for the alternation with the school.

In addition to the shop work, and of equal importance with it, are the studies in the school, which not only help boys with the trade work but give a general knowledge of the world's history and development such as every well educated man should have, and include, in addition to many of the usual High School studies, special studies designed to help jewelers. In place of the foreign languages of the regular course there are courses especially related to the trade, together with courses in Industrial History. English, Physics, Civics, and Applied Electricity are taken as in the regular courses; while Chemistry, Free-hand Drawing, Design and Modeling are studied for a longer time than in the other courses, and with direct reference to the jewelry trade. There are also series of lectures by practical men on shop subjects.

SECTION 9: THE HIGH SCHOOL INDUSTRIAL COURSES, CINCINNATI, OHIO.

This school in 1910 began industrial courses for boys and girls, which in the third and fourth years are to be co-operative on the half-time plan. In the first two years of this course the boys take all the shop work and drawing that are given in the 4-year Manual Training course. During the first year double time is given for Manual Training, taking Wood-turning, Pattern-making and Cabinet-making. In the second year they have work in the forge, foundry and machine shop. Mathematics and science are applied to their shop work as specifically as possible.

In June of the second year the boys decide what shops or trades they desire to enter as apprentices, the head teacher of the department assisting them to locate. If in the following September they prove worthy, an arrangement is made for them to take week-about in shop and school for the last two years of their course, being paid half-time for their shop work during the last two years and getting their trade in real shops working under ordinary industrial conditions. This course is designed to give the boys in the first two years an opportunity to select a trade intelligently, and to begin it at 16 under the most favorable conditions for becoming intelligent and expert workmen.

The plan is similar for girls, the purpose being vocational training for self-support or the management of a home. During the first year instruction is given in Sewing and Dressmaking, Applied Art, Cooking; second year, Millinery, Dressmaking, Dietetics, Household Arts, Applied Art, Chemistry. Girls are placed in commercial shops for the summer; then in September they continue their school work on the alternate week plan, or at night school, making the school work closely fit their needs.

The new Ohio compulsory-education plan, which went into effect in May, 1910, requires that all children not otherwise employed shall remain in school until 16; also that all who have not reached the eighth grade shall continue their schooling until 16; hence the Board of Education is authorized to establish part-time day schools for those who are at work, and then may require all who have not completed the eighth grade to continue their schooling until 16. Those who are at work may be required to attend school 8 hours weekly between 8 a.m. and 5 p.m. Those not at work may be required to attend until they are 16 regardless of the grade reached.

SECTION 10: THE CINCINNATI CONTINUATION SCHOOL FOR APPRENTICES.

This school, which has met with marked success, having at the end of its first year nearly as many pupils as are in all the regular trade schools of the United States after 30 years' effort, is an original creation, and not copied after any other school. Its basic principle is that the determining factors of a youth's productive power in a shop are (1) his attitude towards his work, his fellows, his employer and himself, and (2) the intelligence he brings to his work.

In 1909 the Cincinnati manufacturers and labor organizations and the school authorities decided to shorten the hours of labor of apprentice boys by one half-day weekly without decreasing their pay, this half-day being spent in a school-room under educational and cultural influences. The plan meant a loss of over $6,000 a year to the machine, pattern, drafting and printing trades, by payment for time of 250 apprentices when not producing; while the loss of production meant to these firms considerably over $25,000 (including overhead expense but excluding loss of profits). The task before the teachers, therefore, was to so develop the boys' mental attitude and so increase their intelligence that they would produce an additional $31,000 worth of work in the shorter week. It has been noted that thus far no loss has been charged up to the shorter week.

The cost of the school, including salaries of 3 teachers, supplies and equipment is about $5,000 a year, entirely borne by the Board of Education. About 18 men lecture to the classes without pay.

Skill and Attitude are Vital.

The apprentice is first taught the difference between knowledge and skill; "the most vital part of his apprenticeship is lost if he completes his time with barrels of knowledge but without the skill to produce a day's work." The apprentice who develops a journeyman's skill gets full scale wages on finishing, instead of waiting a year or two. He is also taught that his attitude to his fellow-workmen determines his progress, because the trade exists only in the men who follow it, and cannot be acquired from books or schools; hence the boy must draw out the experience of the workmen and learn from them. This can only be done when the men are friendly and willing; hence he learns that to get along with his fellow-workmen is the bigger half of learning the trade. The apprentice's attitude to himself is also considered a subject of school concern, in order to preserve the previous development of the boy and make his transition easy from school to shop-work. "Growth into manhood is assured the State by half a day's contact each week with veterans of the struggle who are in a position to render tempered sympathy and strong stimulus." These the boy finds in the continuation school.

Boy's Attitude Towards Manufacturer.

The attitude of the apprentice towards the manufacturer has much to do with his successful development. He must be taught the difference between the production and distribution of wealth. He is apt to think of the "boss" as a non-producer, and class him with mere distributors of wealth, forgetful that "in a manufacturing community the producer of wealth is the man who buys raw material in a foreign market, and after it has been wrought into a finished article sells it again in a foreign market, thereby bringing wealth to the community." The apprentice is more than likely to overlook this phase of the matter. The public school, being concerned primarily with the preservation and development of the State, is the agency best fitted to present these subjects to the boy's mind; and the best time for so doing is when he is learning his trade and is under actual shop environment.

Intelligence Brings Efficiency.

The second element that determines the industrial efficiency of the apprentice—his intelligence in his work—is easier to develop than his attitude, because more tangible. He is taught spelling by use of a special spelling-book for each trade, composed of pictures of shop articles, such as screws, belts, wrenches, etc., with their names and definitions. The mathematical course in this school is the nearest approach yet made to a direct application of mathematics. Instead of a text-book, the instructor gives each pupil a catalogue of a drill press, and after using this as a reading lesson, the boy gets a blue-print of part of a machine. Blue is a shop color, and blue-prints have more attraction for the young mechanic than the finest page ever printed. The boy is taught to read the drawing. But the same catalogue and blue-print contain a lesson in complex fractions—though not in text-book form. The boy is taught to figure the speeds of pulleys, and when he has a $9\frac{1}{2}''$ pulley driving on to a $5\frac{1}{4}''$ pulley he has a real complex problem in fractions. The machinist apprentice is taught the machine application along with the principle; so with other trades.

Freehand Sketching, Mechanical Drawing and the reading of drawings are carried out on a scale corresponding to their use in shops, the greatest amount of time and energy being placed on the making of freehand and mechanical sketches to scale on rectangular and isometric co-ordinate paper. The mechanic must "talk with his pencil," and the apprentices are all taught to do lots of that kind of talking.

Unique Geometry Method.

The unique method of teaching geometry in this school by using cardboard protractor and rubber bands has been commended by mathematicians everywhere. The protractor is simply a copy of a gear wheel with 72 teeth—one at each 5 degrees; the rubber bands are placed in the notches between the teeth and make the various angles and polygons. These bands, by passing one end through the small hole in the center of the protractor, may be made to represent an angle with its vortex at the centre; this, of course, can be measured by counting the degrees on the circumference between the lines; or the bands may be so placed as to bring the vortex of the angle on the circumference; or the bands may be made to intersect either within or without the circle. In every case the method of measuring the angle is made clear. The same protractor is equally valuable in all polygons, and in calculating from them data for shop use.

The Reading Problem.

American history is studied, and in connection therewith, the development of the iron industry, with the story of Washington playing around the fires of his father's furnaces on the opposite side of the Potomac, the story of the great chain across the Hudson; the discovery of iron ore in the Lake Superior region—these are better romances than any dime novel ever printed. The science of iron has proven a delightful and profitable study.

Magazine publishers supply free copies of their publications, one sending enough to supply each apprentice. These are used for reading lessons, then taken home. There is, however, little demand for books—a branch public library having been discontinued after a year—or for school pamphlets, as it appears the apprentices have not the ability to obtain much from the printed page. Their capacity ranges from two or three who could not use the second reader to those who have completed High School.

Apprentices are admitted to the school without a question as to previous training, their acceptance by the shops being the only requirement. New pupils start each week.

The first effort of the school is to hold the apprentice to the trade until he has become immune to the discouragements of the environment and imbued with the possibilities offered.

Methods and Results.

The class work for those in the 11 trades known as the Allied Printing Trades is made applicable to their trade requirement without being exclusively practical. The same general conditions as in the machine trades are met with, and the corresponding compromises are made. No machine work is done in the school; the boys get that in their shops, and in the Evening School machine shop, which many voluntarily attend.

An effort is made to carry out the following course for the machine trades, but no self-condemnation takes place in the event of failure. The question asked each week at the close of school is, "What has been the *attitude* of the apprentices ?"

This school opened September 1st, 1909, with an enrolment of 198, and the average attendance during the first 4 months was 186 per week and 21 per class, 9 classes weekly. Reports from manufacturers, foremen and students are decidedly favorable to the method of operation of the school and the effect on the boys. In most cases the output of the boys in the shops is greater than when they worked full time. Their attitude toward employer, foreman and machine is wholly changed. In school the boys show commendable progress and a remarkably earnest and serious spirit.

The scheme as originally outlined was as follows:—

SCHEME OF COURSES.

The course shall in general be technical, with as close application as possible to the shop work of the boys. It shall be the aim to develop continuous courses along the following lines:

(1) A period each day for general shop questions, shop practice, economic questions and civic questions. This work may be either individual or class discussions.

(2) Shop Arithmetic and other Mathematics.

(3) Mechanics, beginning with the simple elements of the machine. Mathematics and mechanics to be taught together as far as convenient.

(4) Freehand Drawing, Designing, Drafting.

(5) Practice in Spelling, Writing, Reading in connection with the story of industries.

It shall be the aim to develop a course in each of these subjects that shall proceed connectively to definite ends. A series consisting of all the lessons in each subject shall be carefully preserved by at least one student of each group to form a basis for inspection and for a course of study. It is expected that the course will be of 4 years' duration, corresponding to the 4 years of apprenticeship, but advanced students may complete the course in less time.

The first duty of the instructor shall be to classify the apprentices into groups, according to their general attainments, getting each group as nearly homogeneous as possible in proficiency, so that the general character of the work of the pupils of a group shall be somewhat the same. In the first course noted above (shop questions), individual instruction and much freedom are expected. In the other courses definite results are expected, and necessarily much more uniformity of work, but not to the exclusion of individual instruction where the instructor is able to give it. The progress of the pupil must be looked after individually in all subjects.

Sessions are from 7.30 to 11.30 a.m.; afternoon from 1.30 to 5.30; no Saturday afternoon session.

The school shall continue 48 weeks in the year, 5½ days a week, providing the attendance justifies it. Groups of students should as a rule contain 14 as a minimum and 20 as maximum to one instructor.

The instructor shall be granted two half days a week to visit shops upon pay. He shall report to the employers, upon blanks prepared, the attendance of his sudents each day; shall keep a register of the same for the inspection of the Supervisor of Manual Training; and shall make such reports as are required by the Superintendent.

Classification of Students.

The chief difficulty encountered was in the classification of students. Originally the apprentices were classified according to service, those older in service being assigned to the latter part of the week. The objection to this plan was that the shops could not well spare all the boys of a department at the same time. Hence it became necessary to follow more or less an individual system of instruction, each group containing older and younger boys in the service. This caused an exhausting strain on the energy of the teacher, and a re-classification is going on, based upon a course covering four subjects:—Mathematics, Science, Shop Practice, General Culture.

FIRST YEAR apprentices study Mathematics, Shop Arithmetic, Science, Geographical Relations of the Shop, Civics, and get much Reading, Spelling, Composition.

Shop Practice—Making and Reading of Drawings.

SECOND YEAR apprentices study Mathematics, Objective Geometry, Science, Iron—its manufacture and founding, Blue-prints, Mechanical and Freehand Drawing.

Shop Practice includes shop conventionalities and their necessities, much composition on observed facts in shop life, and reading of lives of the world's improvers: Civics.

THIRD YEAR apprentices study Mathematics, Algebra, Science, Physics.

Shop Practice—Foreman's Question Box, Drawing, Culture, Economic History, Literature, Civics.

FOURTH YEAR apprentices study Applied Mathematics, Trigonometry, Shop Chemistry, Science, Physics.

Shop Practice includes the shop sense of proportion, visiting of industrial plants and discussing observations, especially of economy and waste; Culture, the man as a wage-earner and a voter; Debates.

SCHOOL WORK APPRECIATED BY ALL.

No machine work is done in the school. The boys get that in the shop 5 days a week. Most of the apprentices are scrupulously conscientious about their school work, and appreciate the opportunity. The boy just entering this apprenticeship appreciates it least, but a few weeks of shop life change his attitude towards the school, as with the older boys a few weeks of the school change their attitude towards the shop. The apprentices soon form friendships with the boys of the shops, and all the conversation one hears concerns methods of doing work in various shops.

When the boys return to their shops they are quizzed by the workmen and foremen, and the lessons given in the school are quite generally discussed in the shops. Many of the workmen express a desire to have the advantages of such schooling. To the foremen especially is the school indebted. They have taken keen interest in the experiment. They have seen to it that the cost sheets in the shop have not been affected by the absence of the apprentices and have shown the greatest good will towards the school and the teacher as he makes his visits.

The teacher, a most capable instructor and an experienced shopman, visits shops for two half days a week, consults with foremen, and gathers practical shop problems. The manufacturers themselves have been generous of their time, have gone into the methods of their business, have furnished sets of blue prints and catalogs, and have sought to strengthen the school in every way possible. The number of manufacturing plants now co-operating is 18.

CONTINUATION SCHOOL EXTENSION.

An extension of the Continuation School is contemplated. There are at least 15,000 young people under 20 years of age now at work in commercial and industrial lines in Cincinnati who would be greatly benefited by having an opportunity to continue their schooling. The evening schools reach about 5,000; hence at least 10,000 others need looking after.

The Women Teachers' Club has a capable committee at work to see what can be done for girls, and a Continuation School for young women in stores and factories is planned. So deep is the interest in the Continuation idea that the General Assembly (Legislature) of the State of Ohio now requires Boards in cities to provide part-time day-schools for those who go to work, and to require employers to permit the attendance of their young employees during certain hours in the week. School Superintendent Dyer says:

> So far from such a law working hardship to employers, I believe the service of the young workmen will be of greater value because of their more serious attitude towards their work and the increased power their educational training will give them. The expense to the city will not be commensurate to the good that will be done, for in part-time schools one teacher can care for at least 150 students, which is four times as many as in ordinary schools.

PART-TIME COURSES ELSEWHERE.

Other schools and institutions, such as the David Ranken, Jr. School of Mechanical Trades, St. Louis, Mo., The State Trade School, Bridgeport, Conn., The Mechanics' Institute, of Rochester, N.Y., and others provide part-time courses in day-time somewhat like the German Continuation Classes given at the Day Middle Technical Schools.

CHAPTER LXIII: TRADE-TEACHING SCHOOLS AND SCHOOLS FOR APPRENTICES.

SECTION I: FROM MR. A. D. DEAN.

Information obtained from MR. ARTHUR D. DEAN, *supplementary to what has been presented under Chapter LVI, Section 4.*

The work of preparing our youth for vocations is not completed with either of the schemes proposed, for two reasons. (1) The general industrial school, which is a feeder to the apprenticeship system or to a Higher School, is based upon the supposition that somewhere a door is open to its graduates. One of these higher schools is the vocational school course in the High School; the other is the Trade School. (2) In order that there may actually be an open door it is necessary that the school system make provision for those who desire further education but do not care for, and it may be presumed cannot successfully maintain, the academic standards of a course of study which parallels in any way the regular High School.

There are some very definite principles in the organization of Trade Schools which need to be considered.

1. Pupils enter these schools with a well-defined purpose. The period of trying-out is finished. They are there to learn a specific trade to the full extent that is possible in any school plan.

2. This type of school absolutely abandons any specific instruction in the so-called liberal studies. This may seem harsh, but we must remember that the pupil has enrolled for one purpose, and it is fortunate that the school has even one thing, narrow though it may appear to be, to offer him. The pupil of a Trade School is not the type than can be held in school through any liberal studies, which are frankly apart from his pressing needs as he sees them. We must recognize that he is 16 years old, that his school days are numbered, and that, if his participation in the educative process for 8 years before coming to the school has not done something in the way of liberal training, it never will.

TRADE SCHOOL ORGANIZATION.

The Trade School organization requires a very different method than is now, or is likely to be, in vogue in other types of vocational training. The intermediate and secondary vocational schools have in their organization a number of teachers, some on the shop and some on the book work side. The shop work and book work are closely correlated, but this is brought about through co-operation between two kinds of instruction, one primarily vocational, the other primarily liberal and disciplinary.

But the Trade School organization is on a very different basis. Here the particular trade represented forms a school unit in itself. There should be no departments of History, English, Mathematics, Drawing, etc, in this type of school. These subjects, or others which are necessary to trade proficiency, must be taught by the teacher of the trade. He is the master craftsman who knows what is needed to prepare pupils quickly and effectively for the craft which he represents.

The Trade Schools must keep longer hours than the present schools. In this respect, as in many others, they must approach shop conditions. They have no connection with other schools; the pupils do not recite any subject with others. The Trade School is the professional school for the industrial worker, and it presupposes that it is his final schooling place, and that he desires to make his time of attendance as short as possible, consistent with all-round trade training. He is there to reduce his time of apprenticeship, and every hour counts. If he was not in the school he would be in the shop or factory working 54 hours a week, and it will not be any hardship to provide longer school hours for him.

Continuation Schools.

Mr. Dean contends that the school system should furnish as many jumping-off places as possible after the primary or elementary education. At present there is only a jumping-off or leaving place at 14, and another at the end of the High School course, with the diploma. The new plan or system provides several leaving places or points of departure to enter the industries with a fair qualification to succeed well in them. The Continuation School idea in New York State has not been realized to any great extent as yet, but it is being developed in many parts of the United States. Ohio has passed a Continuation School Law, and has a measure of compulsory attendance; Wisconsin has legislated for the organization of a Continuation School system; Iowa has appointed a man at a salary of $5,000 to study the Continuation School system and plan.

Industrial education needs to extend to the still smaller industrial communities. It should relate itself in some way to specific trade needs. It is safe to assume that the only solution open for these small places by which they can provide definite instruction in trade lines will be for them to establish day Continuation Schools which provide for an equitable distribution of the responsibilities for instruction between the shop in which the youth is employed and the school in which he may be excepted to attend for a few hours a week. All the bookwork in the schools applies directly to the business in which he finds himself, when the trade at which he is working calls for any special knowledge, while the shop itself supplies the trade atmosphere. In this way the boys and girls in the smaller industrial centres will be receiving vocational training and will not be neglected, as they necessarily will be if the State considers a scheme of industrial training which includes only general industrial vocational courses in High Schools and Trade Schools.

Evening Schools.

Schools now open their doors to children in the evening; but evening instruction for the child between 14 and 17 is not effective when he is fatigued in will and body. Primarily evening schools should be for young men and women, for those who know what they want through the hard school of experience. No note of disparagement is intended of the value of evening schools for those who are old enough and physically developed enough to do the work. But the pace of the modern shop or department store makes it hard indeed for the growing boy or girl to do good evening school work after a long, hard day spent at a machine or at a bundle counter. Germany has largely superseded her evening schools for young apprentices by the more effective day Continuation School. England has built practically her entire scheme of industrial education upon the evening school phase, and is now seeing her mistake.

SECTION 2: PORTLAND SCHOOL OF TRADES, PORTLAND, OREGON.

This school was organized in 1907 to meet the demand for more skilled mechanics, and to give greater opportunity to young men wanting to learn trades. According to the school prospectus,

> Apprenticeship is not dead, as some say, but owing to our complex social life, new conditions have arisen, and the State must assume new obligations. Through the public schools the State has taken up the work that formerly the parent held as his particular duty; but in large cities the parent is too much engaged, the family life is much more complex, hence the State is essaying to assist the parent. No doubt there will be many trade schools in the public school system in the future.

The school building was formerly used for ordinary school purposes, but has been adapted to meet the new requirements. The courses taught include carpentry, cabinet-making, machine pattern-making, electrical construction, plumbing and gas fitting, architectural and mechanical drawing, bricklaying and plastering.

Students must be 14 years of age and have the equivalent of the Grammar School course in education. There are no tuition fees, and no charges except for necessary books, overalls, drawing instruments and waste material or damaged tools. The full course takes 3 years, the work being half practical and half academic.

As a foundation for the course at the Trade School, the manual arts are pursued in the public schools. This training is devised to supply the framework on which the tool teacher will use his art as a means of bringing to the surface all that is best in the boy. During the shop hours the pupil is being familiarized with the elements of mechanical drawing, and learns by easy stages to make working drawings of many of the models before construction.

SECTION 3: THE LICK SCHOOL AND THE WILMERDING SCHOOL OF INDUSTRIAL ARTS, SAN FRANCISCO, CALIFORNIA.

These are entirely separate schools, maintained by separate endowments, but they co-operate so closely that they should be considered together. Both are under the same Director, they are situated on contiguous sites, and all duplication of work is eliminated. The California (or Lick) School of Mechanical Arts offered a strong course in the machinery trades, so when the Wilmerding School was established it offered courses in the building trades. Students at the one school are given full credit for all work done at the other, the Lick School stressing the academic side of the work and the Wilmerding School the practical side. The object of the latter school, as set forth by the founder, was "to teach boys trades, fitting them to make a living with their hands, with little study and plenty of work." The Lick deed of trust, on the other hand, states as the object of that school "to educate males and females in the practical arts of life, such as working in wood, iron and stone, or in any of the metals, and in whatever industry mechanical skill now is or can be hereafter applied."

The Lick School.

The only limit on attendance at this school is that the pupil shall have been born in California, and shall have had a Grammar School education. The capacity of the school is limited, so the admissions are allotted to the various counties of California according to the population. If there are more candidates from any county than the quota allows, admission is determined by competitive examination.

The school provides a 4 year course in each of the following trades: pattern making, forging, machinist. There is no fee charged for tuition, but pupils in trade courses are charged $12 a year for materials used.

During the two preliminary years of the course instruction is given in academic work for 15 and 16 hours per week respectively, and in shop work for 11 and 9 hours. At the beginning of the third year specialization begins, and 22½ hours are given to shop work and 7½ to academic work; in the fourth year the shop practice is increased to 26 hours and the academic is lessened in the same proportion, and confined to heat calculations, boiler and engine tests and electrical calculations.

The Wilmerding School.

This school is open to any earnest, industrious boy who wants to learn one of the building trades as an integral part of his education and preparation for life. Any boy who has completed the Grammar grade is eligible for admission. The maximum age of admission is 21 years. The length of the school year is 40 weeks, and the daily program includes 8 periods of 45 minutes each. Durng the first two years 4 periods per day are spent in the shops and 4 are devoted to academic instruction. During the last two years the academic instruction is gradually discontinued. The school furnishes all material.

SECTION 4: WILLIAMSON FREE SCHOOL OF MECHANICAL TRADES, NEAR PHILADELPHIA, PA.

This school was founded to afford an opportunity for poor and deserving boys to receive the rudiments of a good English education, and instruction in mechanical trades or handicrafts. The benefits of the school, including board, instruction, clothing, etc., are entirely free.

The number of pupils in 1909-10 was as follows: bricklaying, 55; carpentry, 54, stationary engineers, 27; machinist, 54; pattern making, 42. In the selection of candidates for the school preference is given in the first place to indigent boys, then to boys born in Pennsylvania, more particularly in Philadelphia and surrounding counties. Candidates must be able-bodied healthy males, 16 and under 18 years of age, with ability to pass the entrance examinations, Pupils are indentured to the Trustees, and are graduated as journeymen mechanics. They find no difficulty in obtaining employment—in March, 1910, there were 160 requests from employers for the 51 graduates—and the records of the school show that the majority rapidly advance to executive positions in their trades.

The property of the school consists of 24 buildings located on 230 acres. The eight buildings used for trade purposes are valued at $115,000 and the industrial equipment at $51,000. No outside financial assistance is received by the school, the sole support of which is the income from the endowment fund of $1,575,812. All school books and apparatus are furnished free of charge, and the product of the school, although up to the commercial standard, is not sold, the school authorities believing that a "commercial object" in the work would result in pupils being kept on such processes as they could best execute without regard to their thorough training in all phases of their trade.

SECTION 5: THE DAVID RANKEN JR. SCHOOL OF MECHANICAL TRADES, ST. LOUIS, MO.

This philanthropic institution, founded and liberally endowed by Mr. David Ranken, jr., exists for the purpose of "training and fitting boys and men for the mechanical or manual trades and occupations." Mr. Ranken stipulated that the instruction to be given must always be practical, "having in mind the need of the community and the State for practical workers in mechanical trades, who shall be skilled in their respective trades and occupations."

While not intended primarily to train superintendents and foremen, it is expected that within a few years after graduation many of the students, by virtue of the training they have received, will be enabled to rise to positions of responsibility or go into business for themselves.

The instruction offered in the day classes at present covers carpentry, pattern-making, bricklaying, plumbing, painting and steam-fitting. In the evening classes instruction is offered in these and in other subjects according to demand.

The regular course is open to boys of 15 years or over who have completed the work of the sixth grade in the public schools or its equivalent, and who show aptitude for trade instruction. Applicants who have had experience in a trade may be admitted with less schooling, and these will be assigned such preparatory instruction as will enable them to carry on the regular work of the school.

No set time is assigned for the completion of any one of the courses, the work being almost wholly individual, and a student's progress depends entirely upon his previous education and experience and his diligence. The average student should be able to complete the work in any trade in two years. Special attention is given to mature students who have already made a beginning at a trade before coming to the school and can remain for only a portion of the year.

No work is turned out for sale, but the boys are allowed, on paying for raw material, to make pieces of furniture for themselves. No material used for class purposes is charged to the student, even if wasted.

The average cost per student is $228 per annum, of which the students contribute $30.

A co-operative arrangement has been made with the St. Louis branch of the National Metal Trades Association for the instruction of apprentices in the Machinists' and Pattern-makers' trades. The apprentice is trained in the shop by his employer in the use of tools for machines, and attends the school two half-days a week for instruction in applied mathematics, applied science and drafting. The employer pays the boy his regular wages while in school, and also the tuition fee. The agreement provides that no employer shall make use of any apprentice student under this arrangement to take the place of any striker in the shop, although he may insist upon the apprentice continuing to perform his regular functions in the shop should there be any period of labor disturbances.

SECTION 6: THE HEBREW TECHNICAL INSTITUTE, NEW YORK CITY.

This school was established in 1883, and is supported by its endowments. The curriculum is determined by the demand for workmen in the local trades of building, metal and wood-working. The Institute was visited by the Commission in company with the Principal, Dr. Edgar S. Barney, from whom the following information was obtained.

Most of the boys are aged about 17, coming here when they have completed the grammar school course. The time is divided approximately thus: one-third to English, Mathematics and History (academic); one-third to Science and Drawing; one-third to Shopwork. When boys leave they are considered as advanced apprentices; they are ready to take hold of the trade, and become pretty skilful at it in a short time; after the thorough course they have had here in the handling and use of tools they advance faster than other boys. The great majority become superintendents and foremen of shops.

The school gives complete courses in Pattern-making, Tool-making, Electrical Construction, Instrument-making, Freehand, Architectural and Mechanical Drawing and Designing. In the first two years the instruction is general for all trades; then in the third year a boy is allowed to specialize, and devotes two-fifths of his time to Shopwork and the rest to Drawing, Science, English or Mathematics allied to that special work.

The teachers are skilled mechanics; superintendents and foremen of shops of fair education who have been trained here to teach. Dr. Barney believed they got the best results in that way, because the teachers know the practical shop side.

In the *Electric Laboratory* boys work at machines, testing, plotting efficiency curves, etc., and a considerable amount of the machinery and instruments have been made in the school—all except the measuring instruments. All articles made here are for real service, and just as good as could be bought elsewhere. Dr. Barney pointed out a switchboard put in by the boys when the building was enlarged, which had been in use for 15 years, remarking that they could do it better now, the standard of work having improved noticeably in every department since the school was first started.

In the *Senior Machine Shop and Tool Room*, boys work for a few hours a day, as they are taking mainly Mechanical Drawing, working from 9 to 11 every day, and giving the rest of their time to Mechanical and English work, with some science. They come here to get a sufficient knowledge of machinery to make them efficient draftsmen. The boys who make machines here make them entirely, preparing their drawings and tools, etc.

In the *Senior Woodworking and Pattern-making Room* lathes are manufactured. Dr. Barney said that they would have no electrically-driven machines, as they were liable to get out of order and require outside assistance to adjust them.

The *First Year Woodworking Room* was fitted with single benches, while the senior room had double benches. The arrangement was necessary on account of the light, but Dr. Barney expressed the opinion that double benches are best, even for beginners.

Specimens of work done in the *Freehand Drawing* department were shown on the walls. Some boys take architectural drawing, and come here for freehand in the afternoons, drawing flowers and objects, etc. For home work they draw from life out at the Bronx "Zoo" and other places.

The *Joinery Room* has light on both sides, and double benches, and hence is a nearly ideal shop. Oil stones are on a separate table near the window, so that individual boys do not require to get out the stone. There were book racks for the boys, and seats near the teacher's bench, so that boys can be called up for verbal explanations. This room is the result of several experiments, and is now nearly perfect.

In the *Instrument Making* department there are lathes and benches for chipping and filing. The latter process is considered good training for the younger boys, to teach them how to use their hands and the hammer and file, whether they become filers or not. The same with wood-turning; though few of the boys may become wood-turners, pattern-makers have to understand it. The principle followed is that they must learn by doing. Boys were making surveyor's transits, and had turned out dynamos and motors and a 4-cycle gasoline engine which ran well. All work is done under the direction of a skilled mechanic, and is required to be up to commercial standard, accurate to a thousandth-inch. It is rare to find a third year boy unable to work up to this standard.

Machine Drawing. Men in the trades come here for mechanical drawing, but may take only the drawing for their own trade. There are evening classes, which are very successful.

In the *Forge Room* machinery is repaired.

An electrical clock made by the boys was shown operated from a storage battery. It cost only $3.50; it had been running ten years.

All Graduates Become Reliable Citizens.

"This school has graduated 1,100 boys in 27 years, and every one of them, without exception, is leading an honest, straightforward, reliable, respectable life," said Dr. Barney, who expressed the opinion that bringing boys in contact with tools, materials and concrete thing helps to make them honest, industrious and upright, and is the best kind of training for good citizenship. Most of the boys stay at the trade for which they have trained, and Dr. Barney's experience shows that Jews make quite as good mechanics as other boys, though their natural tendency is always to go into business for themselves eventually.

Comparing the ordinary trade school with such a school as this, Dr. Barney expressed the view that the former may do well in a limited centre for a particular industry, but that in a large centre like New York and other great cities, a school like this is best, it being impossible to equip boys for every trade. If they have learnt to use their tools and understand practical drafting, they soon adapt themselves to any kind of shop work, hence this is the best type of school to have. "Since 95% of the people of the United States (and presumably Canada) earn their living by their hands, the education of the future must teach boys to use their hands."

Dr. Barney said he thought this school had exercised its influence on the public schools, and it was looked upon as a pattern of a Technical High School or Technical School, though some of the others had not gone as far as this school.

There is a dining room upstairs at which boys can buy luncheon.

None of the products are sold by the school, Dr. Barney's view being that when a boy can make an article which is saleable, it is time for him to be moved to some other branch of work, so as to get an all-round training.

At the time of the Commission's visit, a gymnasium had not been established, and no regular physical training was undertaken, but Dr. Barney was expecting to open one in a new building.

Educational Excursions.

The boys are taken for educational excursions to places of industry near New York, such as the Brooklyn Navy Yard, or for a geographical trip out to the country; to industrial shops, Natural History Museum, Art Museum, etc., where the teachers take a particular section and give the boys a talk on that subject. They have to take notes and write them out afterwards, and marks are allowed as in other subjects. This is a very important part of the school's work. These visits to establishments in the city are fortnightly, each boy getting one a fortnight. Each visit occupies half a day—from lunch time till 5 or 6 o'clock. The managers of the industries are not averse to the arrangement, and the boys behave well, as they are old enough to realize the importance of their work, and are sincere and industrious.

As most of the boys have hardly ever been outside of the city, excursions are arranged for parties of 10 boys at a time in the summer, to go out 100 miles, e.g. to Trenton, where they visit the brick yards and pottery works; to Delaware Water Gap; to the zinc mines at Franklin; to the slate quarries of Pennsylvania, etc. They walk perhaps 200 miles, starting at 8 or 9 miles a day and getting up to 20. They see the country, which most of them have never seen before, and also see something of industries.

School Mortality Negligible.

The school mortality is negligible, as very few boys drop out, and if a boy is found to be unsuitable, he is recommended to take some other kind of course. The figures show that 8% voluntarily withdraw in a year's time, exclusive of graduates. There is a long waiting list, which makes it possible to select boys. The school is non-sectarian, and in the evening school nearly half are non-Jewish. There is a simple entrance examination in English, but it is not formal. As this is practically a High School, and the percentage of withdrawals is so low, it would appear that if work of this character were put into the High Schools and made effective, it would reduce the "mortality."

The school has an excellent follow-up system. Twice a year letters of enquiry are sent to all graduates, and many who are in or near the city constantly come in. Out of over 1000 graduates, only about 60 or 70 failed to reply. While the plan entails an immense amount of detail work, it really pays, for it spurs the boys on to do their best, and also enables the school authorities to see whether they are working on right lines.

SECTION 7: NEW YORK TRADE SCHOOL.

(67th STREET AND FIRST AVENUE)

Information gathered from "Conversation" with Mr. H. V. Brill, *Superintendent.*

This is an independent endowed institution providing day and evening trade instruction to beginners and to men already at work. The work of the trade courses is not considered as a part of an apprenticeship, but in a shop where no regular apprenticeship obtains the graduate is regarded as a handy man who is in a position to learn his trade well. The trades taught are plumbing, electrical work, painting and decorating, sign painting, cornice and skylight work, bricklaying, carpentry, steam and hot water fitting. The length of the day course for each trade is 16 weeks. In the evening school the full course extends over 3 or 4 years.

There is no academic work; a young man has to attend some evening school to get that. The school authorities felt that there was plenty of opportunity for young men if they wanted to brush up on those subjects, and thus the school devotes its facilities only to trade work. If a boy had left the school and was fairly handy in the use of tools it would be possible for him to secure a place as improver; he would have his own tools and would make about half the ordinary rate of pay.

When the school is in full operation there are about 800 day and evening pupils; two thirds in the evening, one-third in the day.

Trades Unions Antagonistic.

The Trades Unions are antagonistic to the trade school idea; they keep the number in the trade as few as possible. Their argument against the trade school is the increase of the number of workers; they have no argument as to the efficiency of the school. The Union regulations restrict the number of apprentices to very few; that makes it difficult for graduates of a trade school to get a foothold in the trade. The School has a waiting list in most of the departments. If a man has aptitude for mechanics, and applies himself earnestly, he will finish the course provided in the 4 months, but if he thinks he has not enough instruction in that time he can stay another period.

The School would like to keep the young men longer than 4 months, but as a rule they belong to poor families and cannot stay. Only some half-dozen come at night after attending the day course.

There is a trade school now in connection with the New York public school system, and the choice between that school and this would depend a good deal on results to be obtained from each.

How Students are Held.

The trust deed of this school prohibits the giving of free instruction, but a merely nominal tuition fee is charged, about one-third the cost of maintenance. The founders felt that a young man who contributed towards his education would appreciate it more than if he got it for nothing. That has proved true in every instance with boys of poor families who came and paid their way. It is a problem with all the institutions that provide good instruction how to hold the young men. The plan here is that as evening students take 3 terms of six months, 3 nights weekly, to complete the full course, the first year they pay the full rate, $12; if they make satisfactory progress during the session and are not absent more than 10 nights they secure admission the following term at half rate. That has had some effect in improving the regularity of attendance and punctuality, but Mr. Brill would like to see it better than it is. In the day school, tuition for sign painting is $25 per term, for plumbing, $45, and for all other trades $40.

Evening Classes.

In the evening classes in plumbing about 70% are young men at the trade; in bricklaying and plastering nearly all are; in the electrical division perhaps 25% are at the trade. The time in the 3 years' evening course just about equals that time in the 4 months' day course. The school formerly took pupils as young as 15, but it was found they had more interest in baseball. The average age now is from 17 to 20; by that time a fellow begins to think about the future, about the value of a trade, and puts more earnestness in his efforts to master it. The work here is a little beyond the physical strength of a boy around 16 years—building scaffolds, swinging heavy sledges, etc.

A visit was paid to the School. *Painters and Decorators* were doing work for a Civil Service examination. *Plumbing* work is done by the students. *Pattern-making and Carpentry* done by the students was shown. There was a miniature house built by the students in the latter part of the course. A row of 2 storey houses had been erected by students on a property owned by the founder of the school, and they had also built a carpenter shop and bricklaying shop. *Steam and Hot Water* work are separate from plumbing; boys come one year for Plumbing and the next for Steamfitting. *Sign Painting* is separate from Decorating. In *Sheet Metal* work the student makes his own drawings, cuts out the metal and builds up the design, which belongs to the school. *Electrical Wiring* is practically taught, telephone and house wires being laid under the floor of a skeleton house. Lectures are given every other night, the professor explaining the reason why the work is done in a particular way. In the *Printing* class, type is set up three nights a week from MS., typewritten and printed copy. Drawing is taught by a special teacher, and a different section of the class is taught each evening.

The school uses any available finished product for exhibition purposes. Nothing is sold, the policy of the school being against any attempt to utilize the product of students for revenue.

SECTION 8: APPRENTICESHIP COURSES.

Of the various apprenticeship systems in vogue in the United States a number have been selected as typical of the others. The aim in every case is the same, viz., the maintaining of a supply of well trained and competent mechanics who will be capable of adequately filling vacancies which occur from time to time in the ranks of employees of the firms in question. Among the courses investigated by the Commission were those established by the New York Central Railway Lines; the Santa Fé Railway Company; The General Electric Co., West Lynn, Mass.

New York Central Railway.

The Department of Education for Apprentices in connection with this Railway System is at New York and the Company has established schools for apprentices at important points on the system. The central organization deals with the general problems affecting apprentice work, outlines different courses, looks after educational work, organizes new schools, and keeps in close touch with existing schools. The system provides for close supervision and instruction of apprentices by competent apprentice instructors in properly and adequately equipped buildings.

The schools are conducted during working hours, the apprentice being paid for attendance time. Mechanical Drawing is taught in a practical way and the youth is thoroughly trained in his future life-work by a course of carefully graded problems arranged so as to familiarize him with fundamental principles. The instruction in the trade proper is given in the shop by a special instructor who devotes his whole time to the work and who is responsible to the local shop management.

The method of instruction differs radically from the ordinary methods of teaching in the following points:—Text-books are not an essential part of the plan; there is no subdivision into subjects; all principles are clothed in problem form; there is no arbitrary standard of the amount of ground to be covered; no examinations are held.

The apprentices are given 2 periods of 2 hours per week, and the course is intended to cover 4 years. The progress and marks of the apprentices are based on the close personal touch maintained between the instructors and the apprentices.

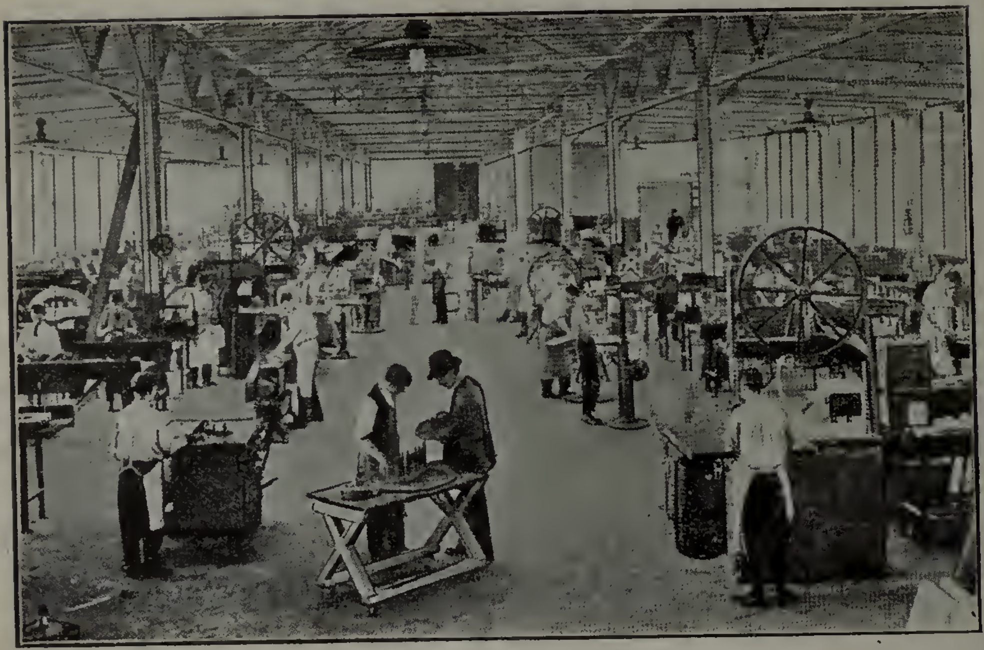
Santa Fé Railway.

The system inauguraated by this Railway is based on that of the New York Central Lines with characteristic features suited to the distinctive conditions and purposes of the road. Systematic instruction is carried on continuously in two phases—on the shop floor and in the shop school under regular instruction during the whole four years of apprenticeship, the boys being paid from the beginning according to a graduated wage scale. Cigarette smokers are not employed, and any apprentice acquiring the habit is dismissed.

General Electric Company.

The system of this Company at West Lynn, Mass., is very complete. All apprentices receive class room instruction during working hours without deduction of pay. They are required, however, to devote sufficient time daily to study at home to prepare for the class-room work. Every graduated apprentice receives a cash bonus and a suitably inscribed certificate which states the time devoted to practical training. They are all encouraged to remain in the employ of the Company.

TRAINING ROOM FOR MACHINIST AND TOOL MAKER APPRENTICES, GENERAL ELECTRIC COMPANY, WEST LYNN, MASS.



TRAINING ROOM FOR PATTERN MAKER APPRENTICES.

"PRACTICAL TALK" IN THE CLASS-ROOM, GENERAL ELECTRIC COMPANY, WEST LYNN, MASS.

Class room instruction is based on a grammar school education, and includes (in addition to the regular shop work) Arithmetic, Algebra, Geometry and Plane Trigonometry, Physics as it concerns simple machines, Power Transmission, Strength of Materials, Machine Design, Magnetism and Electricity, Mechanical Drawing.

The school was established in 1902, when the management of the Company came to the conclusion that special training was necessary for the apprentices. It was found that the ordinary foremen in the shop did not as a rule take any interest in the training of apprentices, owing to a number of causes, chiefly the fear of having costly machinery injured by inexperienced boys. The boys were consequently kept working in a more or less narrow groove.

The apprentices are now trained by expert instructors and are then drafted into the various departments as competent workmen. The Company has proved conclusively that this system pays, and although they are now expending $20,000 a year in wages to boys for school time, they are quite satisfied with the results. While other manufacturers get the benefit of these boys to a certain extent, the Company has succeeded in retaining from 65% to 85% of the boys so trained.

Brown & Sharpe's Apprentice School, Providence, R.I.

The apprentices of this firm spend an average of 3 hours weekly in the school during their 4 years of apprenticeship. The school work covers shop mathematics, and the boys get the habit of expressing themselves by talking or writing or making sketches, so as to become interested in and understand mechanical matters. They are constantly urged to attend evening classes while apprenticed, in order to improve their academic knowledge.

The school course is laid out to take up study according to the boy's progress in his shop work. The two things are closely correlated all the way through. In the matter of examination papers the endeavor is to keep to shop methods, and academic terms are not used. A boy of the advanced class inspects the work of the class next lower, writes his opinions of its merits, and initials it precisely as would be done with the actual work in the shop.

Geometry, Algebra and Trigonometry are all taught, not as such, but so far as they are related to the practical work of the boys, who are shown the use of each (without calling it such) in order that they may do their work with understanding.

The boys are paid the regular rate for the time they spend in the school, and learn so rapidly that they very often take positions as sub-foremen in the shops before their apprenticeship is finished.

North End Union School of Printing for Apprentices, Boston, Mass.

This school was established in 1900, at first as an evening class. For the last 6 or 7 years it has been worked as a day school as nearly as possible under shop conditions but without taking outside orders. The school prints several publications, including one of its own and one for the Employers' Association; these giving sufficient practical work for the boys.

The only machines in the school are 2 foot-presses and a press motor—just sufficient for press work as done in a small job printing office.

The boys spend a year in the school and 4 years in the shop. The school is not only for the benefit of the boys, but is in the interests of employers also, who are anxious to get good boys into the trade. There is no fixed course. Each boy works at a frame precisely as a journeyman would, the only difference being that the Instructor is there to tell him about the work, which is graduated according to the boy's progress. Another feature in which the school differs from the shop is in the fact that the boys are taught Drawing in connection with Art Printing. In anything different from a straightaway paragraph the boy must first make a sketch of the work.

The tuition fee is $100, which pays about half the expense, the deficit being made up by the Employers' Association. There is no scholarship or bursary system, but some person who is interested in a boy will sometimes pay his tuition fee, and occasionally an employer will send one of his apprentices to the school.

CHAPTER LXIV: TECHNICAL HIGH SCHOOLS.

SECTION 1 : INTRODUCTORY.

A wide divergence of opinion exists in the United States as to which type of High School will best serve the community and prevail in coming years. Five distinct types at present exist. These may be termed the Academic, Technical, Commercial, Household Arts, and the "Cosmopolitan" or Union High School. The latter includes in some cases all the others as departments of one school. The following is a brief summary of opinions expressed to the Commission by the leaders in education in the United States.

Dr. David S. Snedden, Commissioner, Massachusetts Board of Education, says that the Technical High School has been occupying a false position. The ratepayers who furnished the money thought the Technical High School was to be a high-grade Trade School. While the public supposed the Technical High School was training high-grade artisans, it was really preparing pupils for the Institute of Technology. The High School proper should offer only courses of a good strong nature for boys going on to college; on the other hand, the Vocational Schools will differentiate themselves into special schools as clearly distinct as a mining school does.

Mr. Chas. A. Prosser, Secretary of the National Society for the Promotion of Industrial Education, is of opinion that where the Technical High School includes both the academic and the technical in the one institution, it does not succeed very well in either. The limited shop work is not enough to qualify for industrial life, and the limited or specialized mathematics does not qualify for admission to college.

Dr. T. M. Balliet, Dean of the School of Pedagogy, New York University, thinks the only way to make High Schools thorough successes in a large city is to differentiate them. "Put a man at the head of a Technical High School who has a thorough technical education and appoint a faculty in sympathy with the whole aim and character of that sort of work; in the Commercial High School place a man who has had a superior commercial education and some practical business; and have a corresponding faculty for the literary High School. In the combination High School such as they have in the west, the principal nearly always has an "A.B." and perhaps "Ph.D." attached to his name, but he knows very little about commercial or technical education, hence these commercial and technical sides are not developed as they should be. The development of commercial or technical education can be neglected in that way."

Dr. Balliet advised that in starting new technical departments in High Schools in Canada it would be better in a big place to have a separate building where that can be managed. He thought a shop for Manual Training a very good thing for a classical High School, because it is a good thing for all boys to do some Manual Training, but that is a different thing from a technical school, where a lot of industrial handwork is wanted. In Stuyvesant High School, N.Y. and in Springfield High School, they teach about three-fourths of a trade, and the students can go out and do better work than many journeymen.

Prof. F. H. Sykes, Director of the Extension Department, Teachers' College, Columbia University, is of opinion that in the small towns the Cosmopolitan or Union High School would be the type. Perhaps when the time comes for building a second school, many towns will differentiate, reserving the one school for academic work and devoting the other to technical work. In two years 30 High Schools in New York State which were formerly purely academic have taken in agriculture. A further development will be by the High School taking in Household Arts, using parts of existing buildings to do so.

Prof. G. D. Strayer, of the Columbia University Extension Dept., cited the cases of St. Louis and Cincinnati, where Cosmopolitan High Schools are doing just as good work as any Technical High School, with the added advantage of the richer school life through the students in all the departments having much in common and helping to educate each other.

In this connection the following information obtained from Dr. Charles R. Richards, Director of Cooper Union for the Advancement of Science and Art, New York, is pertinent:—

The United States has a very large High School population. It differs from that of the elementary school by greater resources, which allow children to go longer to school, and also by higher ideals in the family home which are communicated to the children. Thus a selected class is sent onward beyond the elementary school. There is the deeply rooted ideal and ambition of the middle class homes of the United States and down to the poorer homes as far as it is possible to do it, to send their boys and girls to the High School. They will make sacrifices for that. That being the fact, and it being so deeply rooted, how is vocational education going to affect the High School?

Manual Training vs. Technical High School.

The Manual Training High School, to Dr. Richards' mind, is only a transitional phenomenon—neither fish, flesh nor fowl. It came into the educational system 20 years ago, but in those 20 years two things have been realized (1) that the artisan class, the class of handworkers, do not go to or through the High School, which therefore cannot be depended upon to train that class of workers; (2) that the Manual Training High School curriculum is very hard to defend as a collateral training. On the basis of culture it is very hard to defend its extensive equipment and teachers; and on vocational grounds, it is very much harder to defend because the small measure of manual and technical work it gives does not amount to very much vocationally.

As a matter of record, the Manual Training High Schools have not supplied in any sense the skilled handworkers of the country. The percentage is negligible. A great many have gone into engineering schools; quite a number into drafting rooms, but not into trades.

Of late years the most significant movement in the United States in this particular situation seems to be the movement towards the Technical High School —using technical in a real sense, in the true sense—a movement which it has been hoped might reach the Manual Training High School and result finally in its change into this new type of school. The typical school which represents that idea is the School of Mechanic Arts in San Francisco, sometimes called the Lick School, which has been going for at least 15 or 16 years, and the program of which has been practically copied by the Cleveland Technical High School, and is to be pretty well copied by the new Technical High School in Jersey City. A certain number believe in trying to develop the Technical High School, though not many feel entirely confident as to what it is going to do, because such a school faces the problems of training for the industries by giving a training superior to the Trade School—more science, more mathematics, more technical material—and preparing the graduates ultimately for a superior kind of position. But it is also evident that the graduate cannot step into that superior kind of position immediately upon graduation; so he is asked to go directly into the trade and work with his hands, and it will only be ultimately that his training will serve him for the purpose of carrying him onwards.

Direct Training for Vocations.

The Englishman does not believe in that sort of thing; he says the only way to develop foremen out of superior men is to catch them after they have had experience and then put them to school. What this new Technical High School in the United States is going to produce we must wait to find out. Dr. Richards does not know, but he believes that type of school is a thing to be pushed and developed, and he looks to see all these Manual Training High Schools develop into that kind of school, and be frankly made into Vocational Schools that will train men for the industries.

As to whether this shall be a special school or part of a regular High School Dr Richards thinks the consensus of opinion in the United States is rather strongly towards the organization, wherever possible, of separate schools for vocational purposes, so that the atmosphere of the school may be as thoroughly as possible that of the particular vocation or industry represented, everything in the school being made to centre and focus upon that line of work. Of course it is not always possible to do that, but he thought the separate school would enable pupils to be taken younger.

The idea of the Technical High School has been a high school of standards for entrance parallel to the usual High School. The idea so far is to maintain this High School standard for Science and Mathematics in those Technical High Schools, consequently to hold on to the same requirements for admission and to carry them along in an intensive technical course. It is a thoroughly differentiated scheme. The starting point of it is a differentiated scheme, but about the matter of standards the idea has been not to lower the usual High School standard.

Part-Time Plan Good Where Workable.

In consideration of the part-time plan wherever that is possible, Dr. Richards thought it likely that a Technical High School of the kind he had outlined or the Preparatory Trade School would be a suitable place to carry on the public school end of that plan. He added that of course there was another school which should be spoken of in connection with the problem just discussed; that is the co-operative school of the Fitchburg type. He thought that was more likely to be a solution. It depends very much, however, on a sympathetic community and a good deal of a specialized community too. They are trying it in Cincinnati and Fitchburg, and there are other communities where it could be made very successful and lots of others where it could not.

The co-operative school and the part-time plan are two of the most interesting developments in industrial education in the United States at present, and he thought them both very far-reaching. He thought a clear distinction would be made if the term" part-time school" was used where boys are already in work and come from work to school; then call that a co-operative school where boys are in school and go once a week to the shop.

Co-ordinated University Plan.

In Cincinnati when they applied the co-ordinated University plan to the High School they stepped on different ground. In the University you have a selected group of men who have chosen their professions; they are fairly mature fellows; they go into the shop and use common sense, not making nuisances of themselves, and they fit into the scheme of shop work, can acquit themselves pretty well, and take back the lessons of the shop to the schoolroom, and so on. But when you come to the High School you have rather a different proposition. In the first place, if you have a general High School you have not got your selected group. The question of having definitely selected a vocation is almost at the basis of that whole scheme of work because then the boys go forward with enthusiasm and interest. They go into that shop with certain definite objects in view. If you start with a special Technical High School you are all right, but you have lessened the number of students, and it is not going to be so easy to work the co-ordinated High School as the University.

At Cincinnati they are giving them 2 years in the High School before they select their vocation. The division of time afterwards is the same—half and half. The actual shop work there with the co-operative High School is not yet started. They are in their second year now. Next year they will begin their actual shopwork on the shopwork basis. The feeling is growing that there is a considerable period required, not for the gaining of manual skill, but for the thorough assimilation of the shop atmosphere and shop conditions and shop methods of work—much more than we have brought into practice in the past.

Dr. Richards thought the co-operative plan had a great deal to commend it for the American people as compared to the German scheme. In the German Middle Technical School there is a requirement of practical work before entrance, both in the lower and middle form, the German way being to get your experience first, then come from your work and get your science and technology, etc. The Germans are beginning, even for entering the Technical Hochschule [Technical College], to put the emphasis on previous practice. In America he did not think they could bring about for a very long time the practice of getting practical experience in shops before experience in the engineering school.

SECTION 2: COSMOPOLITAN OR UNION HIGH SCHOOLS.

Only the main features of a few typical schools are mentioned; and then a more extended report is given of two schools, The Technical High School, Providence, R.I., and The Hollywood Technical High School, Los Angeles, Cal.

(1) STUYVESANT HIGH SCHOOL, NEW YORK CITY.

This is an improved Manual Training School, the Manual Training being cultural and informational ("for future use", as the Principal put it). The majority of the boys do not go to trades, but to engineering and higher institutions, or to train for professions. There are 2100 boys in attendance, about two-thirds being foreign born.

The course covers 4 years, being general for the first year, with 6 periods weekly devoted to Manual Training, including visits to factories. It is hoped to make the last 2 years largely optional, enabling students who have taken a subject for 3 years to specialize and qualify for positions.

This school has a very special course and equipment for Physics.

The rooms and equipment are used for evening classes, attended by 600 or 700 students, the instruction at these being purely for trade purposes. The Principal said that he selected those pupils and then gave them some kindred supplementary work so as to increase their field of ability, and in some cases to qualify them as foremen.

(2) THE MANUAL TRAINING HIGH SCHOOL, INDIANAPOLIS, IND.

This school combines the curriculum of the ordinary High School and the Manual Training School. The course is a 4 years' one, students being allowed to select (1) *The Mechanical Course*, including Drawing, Science and Mathematics; (2) *The Commercial Course;* (3) *The Academic Course.*

This makes it possible for pupils to fit themselves either for going into some business immediately on leaving the school, or for continued study in any desired line. The Manual Training course may be stressed for 2 years by taking shop-work, and then the pupil may pass on to either the Trade School or complete the Academic Course.

The courses are made elective as far as possible, as the vocations taken up by the boys are so varied that specialization is impossible. All pupils must select some Science subject for their 3rd year, and pupils who have had 2 years of shopwork take Physics and Chemistry in their 3rd and 4th years.

All the teachers but one are graduates of Technical Schools who take summer practical work in some allied industry.

Perdue University allows credit for 1 year for shop work to graduates of this school taking Manual Training.

(3) THE HIGH SCHOOL, CINCINNATI, OHIO.

The Cincinnati High School has 4-year Industrial Courses for Boys, the last 2 years of the course being taken week about in shop and school. By this system the boys have 2 years of general training during which they can decide upon a trade, and start in it at 16 with better prospects of becoming expert. A feature that is especially noticeable is the "Corporate Spirit" of the school. The school authorities work hand in hand with the University of Cincinnati in the selection of teachers and their training, with the result that a high standard of teaching is secured.

The school provides an opportunity for a series of courses:

(1) *Academic Course*, with such groups of studies as have hitherto been offered, and the privilege of electing Manual Training or Domestic Science (Household Arts) as one unit of the 4 or 5 required. This course gives a general cultural education, or leads to a College of Liberal Arts, Law School, Medical College, or College for Teachers.

(2) *Industrial or Technical Course for Boys*, with a group of studies closely related to industrial activities, and in the last two years of the course, with strong emphasis upon some particular phase of industry with applied drawing, applied science, and applied mathematics. The last 2 years of this course might also be offered on the co-operative plan, week about in shop and school.

(3) *Domestic Arts Course*, giving strong emphasis in the last 2 years to industrial work for girls.

(4) *Commercial Course*, with a group of studies large enough to allow some selection, but all having positive value in many phases of commercial activity, and leading either to commercial pursuits or to colleges of commerce.

(5) *Art Course*, for students who in the past have decided to devote themselves to art,and instead of attending High School have attended the Art Academy exclusively. To meet the educational needs of this class, a High School course has been arranged, with the advice of the Director of the Art Academy. It permits the students to give their afternoons to the Academy, and credits them with the work done there the same as if it were done in High School. The course

given in the High School consists of the group of studies which will be most useful to one who makes Art a specialty—mathematics for a knowledge of perspective and designing; botany for intimate knowledge of plant form and detail; French, the language of most value to the artist; history, with especial attention to art and architecture. Students who take this course must register at the Art Academy and pay the regular fee of that institution, $25 a year, which for an institution so celebrated is remarkably small, but if students, of unusual artistic ability and otherwise deserving, are debarred by this fee, their cases will be specially dealt with.

Prominent among the causes for the excellent work and fine spirit among the teachers is the fact that Cincinnati has the most liberal salary scale in that section of the country, hence nothing but an excellent High School could be expected and that is what was found.

(4) THE SOLDAN HIGH SCHOOL, ST. LOUIS, MO.

This is a type of Cosmopolitan High School doing as good work in its Technical Department as any Technical High School in a separate building. The opinion held is that a specialized High School does not approach so nearly the conditions of society as one in which all the courses are offered, and where there is no social distinction due to a different choice of studies. The average attendance is 1400. The plan of the buildings is a hollow square, with workshops at the rear, the latter being well equipped with all necessary appliances. The school has Library, Music, and Lecture Rooms, Rest Rooms, Gymnasiums, Baths, etc. and is tastefully decorated.

Altogether, the appointments of the school, the appearance and bearing of the pupils, and the evident spirit of earnestness of the teachers left nothing further or different to be desired.

(5) THE TECHNICAL HIGH SCHOOL, PROVIDENCE, R.I.

This school offers a combined Academic and Manual Training Course. To meet the requirements of those students who do not intend to complete the 4-year course, such students are allowed, after consultation with parents and teachers, to omit certain studies, so as to take the minimum of academic and the maximum of technical work. This results in their remaining longer at the school.

The school is centralized around the idea of intellectual growth and attainment, and lays various trades under contribution to accomplish this end. More regard is paid to the educational than the vocational value of tool work. The present facilities and equipment do not admit of making the trade interest the primary one, even if it were desirable. Students may be prepared here for higher institutions, and yet have a sound foundation for industrial and commercial life immediately on leaving school.

All students take Drawing daily. Music is taught for one hour weekly to the whole school.

The course at this school has been pronounced excellent for girls who become teachers. Most of the 4th year students go on to higher institutions.

The Evening Classes are so dovetailed in with the day work that it is necessary to have both under the same control, and as far as possible the day teachers are used in them. The Evening School divides the time equally between theory and practice, each shop having a co-ordinated course of Theory, Drawing and Mathematics.

The attendance is 1023 day students and 645 evening.

List of Departments.

1. English.
2. Mathematics.
3. Physics.
4. Modern Languages.
5. Chemistry.
6. History.
7. Mechanical Drawing.
8. Freehand Drawing and Design, with Applied Design in Modeling, Carving, Art Metal Work and Jewelry.
9. Botany and Biology.
10. Domestic Science.
11. Domestic Art.
12. Smithing.
13. Wood Turning, Pattern-making and Foundry.
14. Machineshop Practice.
15. Carpentry and Joinery.
16. Electrical Engineering.

Shop Work.

Boys:

Carpentry.
Forging (elementary).
Forging (advanced).
Clay modeling.
Wood carving.
Sheet metal work.
Wood turning.
Pattern making.
Moulding.
Chipping and filing.
Machine work and construction.

Girls:

Carpentry.
Basketry.
Clay modeling.
Wood carving.
Metal work.
Vase forms and tile work in clay.

A brief course in elementary woodwork and basketry is arranged for the girls. The laboratory work in physics and chemistry is the same for boys and girls, but while the boys are employed in the shops the girls are at work in Cooking, Plain Sewing, Dressmaking and Millinery. Girls' courses also include Modeling, Pottery, Wood Carving and Hammered Work in Copper and Brass. The course in Botany and Biology is arranged for girls only.

The school now receives factory apprentices (32) on alternate weeks in the vocational co-operative course.

It is an imitation of the Fitchburg, Mass. course.

Co-operative Jewelry Course.

As Rhode Island has over 300 jewelry factories, and about 12 silversmithing establishments, all of which require trained men in every department, especially foremen and superintendents, the leading manufacturers co-operated with the school committee to establish a Co-operative Jewelry Course. After 1 year in the High School, suitable boys may arrange to work in the shops during alternate weeks. For 6 months prior to starting on the co-operative course, these boys are separated from the rest, and given special instruction, so that they may be prepared for the industry. An agreement is entered into between the boy's guardian and the employer, stipulating that he shall serve 3 years on the half-time plan, for 26 weeks each year for which he is paid. In the shops they are instructed by the foremen, and in the school they receive a general education, with special trade studies in addition, the subjects being English, History of Art, Drawing and Design, Physics and Chemistry, Current Events and Shop Arithmetic in the 2nd year; Industrial History, Chemistry and Metallurgy Modeling and Commercial Geography added in the 3rd year; and Applied Electricity, Commercial Law, American History and Civics, Advertising and Transportation in the 4th year. The work of shop and school is correlated wherever possible. The whole object of the course is to give to all boys who wish, a chance to become educated, competent workmen without loss of time and in the best possible way.

(6) HOLLYWOOD TECHNICAL HIGH SCHOOL, LOS ANGELES, CAL.

This institution is in a suburb of the City of Los Angeles, and consists of 3 magnificent buildings—(a) the original High School building, (b) the Science building, and (c) the Art and Domestic Science building and Auditorium. They are under the direction of Dr. Snyder, a graduate of Harvard, and an experienced teacher from Worcester, Mass. They exhibited all the features of the latest culture in schools from Boston. There is a staff of 25 teachers. The attendance was 458.

In the *Main Building* ordinary cultural subjects are taken—also Manual Training for boys.

The new Science Building just being completed and partially in use is a 3-storey structure with most complete and up-to-date equipment. The following rooms will give some idea of the work being undertaken in this building:—(1) Horticulture, (2) Agriculture, (3) Gas and Steam Engineering, (4) Dynamo and Electric, (5) Woodwork room, (6) Chemical store room, (7) Advanced Business room, (8) Elementary Physics room, (9) Apparatus room, (10) Reception room, (11) Agriculture Laboratory—3 years of Agriculture required, (12) Physical Geography—including Geology, (13) Zoology and Botany, (14) Advanced Reception room, (15) Practical Chemistry, (16) Chemical store room, (17) Chemical lecture room, (18) Balance room, (19) Practical Chemistry, 2 rooms, (20) Photography, (21) Astronomical room, on roof.

Art and Domestic Science Building:—(1) Laundry, (2) Drying room, (3) Sewing room, (4) Fitting room, (5) Stock room, (6) Elements of Nursing room, (7) Cooking room, (8) Pantry, (9) Bread-making room, (10) Reception room, (11) Drawing room, (12) Household Economics room, (13) Pottery and Metal-working room for women. Five other rooms (14 to 18) make up what is called "The Model Flat." They consist of a kitchen, drawing room, pantry, bedroom (including bath room) and dining room, along with appropriate closets, etc. The system of using this model flat is as follows: Every week during session, 3 female students are detailed to take charge of and manage the whole flat. They have to buy supplies for an evening dinner, do the cooking, lay the tables, do the serving, and also manage the whole domestic decoration, and they are compelled to leave the whole flat at the end of their week in a thoroughly clean and orderly condition for their successors. A regular committee of the staff inspects their work and gives marks for the week. The whole of the furniture of these rooms (with the exception of the bed room) its chairs, tables and decorations were made in the Manual Training Departments of the High School.

The most notable part of the Art building, as to decoration and completeness, is the Auditorium, which has well-fitted-up stage, galleries, and a seating capacity for 1,100. Here the entertainments, public meetings and general lectures of the institution are carried on. On each side are two large rooms which, though closed off by doors, can be thrown into the Auditorium when required. A particularly valuable feature is the air space which prevents sounds from going from one room to the other. One of these side rooms is called the Oratory room and the other the Music room. A course of 4 years in Music, involving all the various departments of a high class training, is given.

Courses and Equipment.

The Hollywood courses comprise Matriculation, Engineering Mathematics, Scientific Course, English, Commercial, Language and Music, Home Economics, Art Course, Manual Arts.

Two general examinations are held yearly, in addition to monthly tests and daily records. The pass standard is 75 per cent. Daily Report slips are filed with the Principal in the case of a pupil's class work not being satisfactory to the teacher in charge.

There are 8 periods daily, with a break of 20 minutes between the 4th and 5th. Three of these intermissions are devoted each week to a general assembly of all the students for a program of singing and speaking by students on selected topics. One of the remaining periods is set aside for debate, and the other for School Society matters.

The Dynamo and Electric Room is to be fitted along lines to illustrate chiefly the method of using such apparatus.

The Domestic Science and Art Building is arranged in old Colonial style. The Laundry Room equipment comprises ironing boards, provision for heating the irons either by gas or electricity—for gas, a large gridiron surmounts a dozen or more burners. The Drying room is gas heated. The Cooking room accommodates 24 pupils. The tables were made by the Manual Training boys. It is provided with a suitable store-room, commercial size bread-mixers, enabling the pupils to make large quantities of bread, which are sold to the Cafeteria Committee.

A Teachers' Rest Room is found on each flat.

The Drawing Room is fitted with Washburn tables made at the Washburn shop, Worcester, Mass., and with a filing cabinet for each student, having an interior space of about 8″ x 36″ (vertical) divided vertically into two sections one of which is subdivided, the longer space being used for drawing board, etc.

Opposite the *Metal Working Room* where work in brass hammering and stippling is carried on, is a *Craft Room* for leather work.

The Commission was shown a working model made by the Manual Training Class of an old Swedish loom to be used by next year's class.

In the Model Flat 3 girls take charge for the week and spend 2 periods daily, with such additional time as they may choose, after hours. Meals served must have 5 courses and cost not more than 25c. a plate, and girls may invite friends. One girl acts as hostess, one as waitress and a third does the serving. The arrangement of the furniture and decorations, including menu cards, is judged by the Art teacher, while the dinner in its three aspects and cost is judged by the Domestic teacher. Points are allowed, and count as part of the course. All used linen must be laundried by the 3 girls. The result aimed at is "To Dignify Household Duties."

The Commission was greatly impressed by the entire Hollywood equipment. The following features were outstanding: (1) The separation into three buildings (to which the fourth for workshop is to be added), in addition to the large auditorium building, give a character and impressiveness rarely seen.(2) As detailed by the principal, the scheme of government is less democratic than that of the other schools of Los Angeles, combining as it does a section of the teaching staff with representatives of the various classes of students. (3) The system of administration and dealing with absences, of personal supervision of each scholar, and the reports on each scholar by the teachers to the principal, were very notable and complete. (4) Evidently the class of pupils in this residential suburb of Los Angeles have a high appreciation of the value of the most modern kind of education.

SECTION 3: DISTINCTIVELY TECHNICAL HIGH SCHOOLS.

Only the main features of the Technical High Schools at Buffalo and Cleveland are mentioned; and then a more extended report is given of the Polytechnic High School, Los Angeles, Cal., the High School of Mechanic Arts, Boston, Mass., and the Technical High School, Springfield, Mass.

(1) THE TECHNICAL HIGH SCHOOL, BUFFALO, N. Y.

This is a free public institution maintained by the City of Buffalo under the jurisdiction of the Superintendent of Education. It accommodates about 500 students. While it exists primarily for those whose education will not continue beyond the secondary school, and whose future activities will be along industrial lines, it yet makes ample provision for those intending to enter higher institutions. Evening classes held in connection with it supply the needs of those who are already at work.

Pupils have unusual opportunities of observing practical applications of the principles studied in the class-rooms, through visiting industrial plants under the guidance of the teachers, trips being carefully planned to suit the needs of students.

Two 4 year courses are offered:—

(1) *The Industrial Course*, for those not intending to go to higher institutions, comprising general and industrial subjects, and shopwork.

(2) *The Technical College Preparatory Course*, for admission to schools of engineering and scientific and professional schools requiring preliminary technical training.

(2) THE TECHNICAL HIGH SCHOOL, CLEVELAND, OHIO.

The Technical High School had been in operation 4 years, and a new one was in progress of completion, at the time of the Commission's visit.

The course covers 4 years, or students may take 12 quarters in 3 years, as preferred. In all the schools of Cleveland the arrangement is followed of dividing the year into 4 quarters of 3 months, so that pupils can move up every quarter, and the same teacher takes the 3 grades corresponding to one school year. This plan has been found very successful and is considered a progressive step.

Teachers may teach all four quarters of the year, though some do not. Teachers taken from the trades have as a rule turned out satisfactorily. Many of the same teachers take evening work.

The attendance was 1500, of whom 1100 were boys and 400 girls, 25 of the latter taking Trade Dressmaking, Millinery and Institutional Cookery. The evening attendance was 450 students aged between 20 and 30, who came for one subject to help them in their daily work. There were 130 students in the machine shop, with a waiting list of 75, for a 6 months' course 2 nights weekly.

One third of the pupils go to higher institutions; the remaining two -thirds to trades, where they get credit for 1½ years of apprenticeship on graduation from this school. In the 3rd and 4th years, students are allowed to specialize up to 25 periods weekly. The classes contain from 25 to 30 pupils each. Some of the classes are separate for boys and girls.

There is a fine gymnasium, with baths and all necessary equipment. All pupils take Physical Culture 1½ hour weekly.

A branch of the Public Library in the building containing 5,000 volumes is well patronized by the students. 2,000 technical works are included in the collection.

Examples of work done by students are exhibited in a special room.

Elementary Industrial School, Cleveland, Ohio.

This school takes boys who are behind with their work at the public school, and who would otherwise probably leave school altogether. So successful has this school proved that another was about to be opened at the time of the Commission's visit. The work is divided equally between general and industrial, the former being related to the latter. The course lasts 2 years. 20 out of 55 graduates went to the Technical High School, the others to industry.

(3) THE POLYTECHNIC HIGH SCHOOL, LOS ANGELES, CAL.

This is a very large building in the centre of the city. It receives pupils who have passed the 8th grade of the public schools for whom room can be found—about 2,000—many having to be turned away. It was observed that the pupils in this school were considerably older then those found in Canadian schools, many evidently being 18 and 19 years of age. This fact was attributed to the advanced grade of technical training given, which retains both young men and women longer at school.

The Course comprises: Commerce, Domestic Economics, Electricity, Mineralogy, Surveying, Art, Mechanical Drafting, Architecture, Normal Course in Manual Training, Dressmaking and Millinery, Forging Foundry, Cabinet-making, Machine Shop, Matriculation Chemistry.

Dressmaking, Laundering and Cooking departments occupy several rooms and are very popular with the girls. Cooking and Sewing are taken alternately by all girls during two periods daily for the first two years. Full equipment was found in use in connection with Domestic Chemistry, supplementing the training given to the girls in the Household Science department.

Complete Machine Shops.

The Polytechnic has thoroughly fitted out machine shops, in two large rooms, with lathes and mechanical apparatus, in which complicated and advanced wood and iron work was being done; also a well equipped foundry room, under the direction of a practical journeyman mechanic, where complex castings were being made, such as would be used in the erection of machines in a machine shop. Not only the castings for large machines, but also the cores, are made by the school, using ordinary beach sand 30 parts and one part of linseed oil. The shop is supplied with cupola for melting pig-iron, and also with furnace for work in brass, etc.

Woodwork is taught, including the making of core-boxes and patterns. The wood-turning room is supplied with 10 double lathes (back to back), separated by wire screening; also 2 bandsaws, 3 planes, circular saw, etc. Special attention is paid to lighting.

Practical Mechanical Work.

All through the school were seen articles of furniture, practical models for automobiles and engines, and other complicated pieces of machinery, which had been manufactured by the boys. In these workrooms as many as 3 instructors to each room are required, the directors in almost every case being men who had had a workman's education in a trade, and in some cases had gone on to trade schools afterwards. It was quite evident that no one but a trained mechanic would be a competent instructor here. Boys are expected at the end of the first three months to make dovetailed door frames.

In this school large night classes, with an additional staff, are regularly carried on, the attendance being about 500. Advanced work in cabinet-making was noticed, the work of an evening class of one year's standing.

The Commissioners observed the good quality of the work done, its advanced character, the regular system on which the work was carried through, fitting one department into the other, and the "spirit of real work" which characterized both the male and female students in the operations in which they were engaged, which were of a most practical and useful character.

System of Self-Government.

Attention may be called to the system of self-government by the pupils, which obtains also in the other schools of Los Angeles. This covered matters of discipline, dealing with questions of absence, excuses and the like. and also showing a sense of responsibility for the general morale of the school. Further, this system extended to the management of the Cafeterias or lunch rooms found in all the schools, which supply lunches at moderate rates from 8c to 20c, and which, in the Polytechnic and High Schools, are managed by the pupils. The lady manager is directed by a School Committee, and money matters, controlled by the commercial department of the school, involve a system of complete audit and business management similar to that required by a large business establishment. The sum of $60,000 was mentioned as the amount involved during the year in these operations.

Music, Art and Architecture.

A strong feature in the Polytechnic and Los Angeles High School is the advanced training in Art and Music, Drawing, Sculpturing, Modeling, Clay Working, Hand Painting, Firing of Pottery; and the successful work of the students spoke for itself. In both of these large schools (the High School having 2,000 pupils also) advanced classes in Music, (theory, harmony, practice both vocal and instrumental) are carried on to a very large extent. Two large music halls in these schools are in constant use in connection with the musical and literary studies of the pupils.

The Art Building contains a pottery room with complete outfit for moulding, glazing and burning. The Commission was shown a class of 20 engaged in making charcoal drawings of ordinary objects, also some articles in pressed leather work, the design, coloring, shaping, etc., being the sole work of the individual students.

Architecture is a very marked feature in these schools, both of which claim to have made full house plans for residences and public buildings among the students, carrying out all the details, plans, blueprints, etc. Class plans for house construction, to the value of $60,000, were accepted locally. Indeed, in the Polytechnic, the latest new building just being used was designed and erected under the direction of the Architectural Department. This is the Art Building, fireproof, having 2 stories and basement, the north side being practically all glass. It contains 24 rooms, and was built at a cost of $68,000.

Evening High School.

This school, held in the building of the Polytechnic High School, is open to all over 14 who have completed the grammar school course, or who by virtue of experience or maturity are capable of doing its work. Tuition is free to all under 21, but those over that age are charged $2.50 per term and are entitled to take as many subjects as they desire. In chemistry a deposit of $2 is required to cover breakage.

The hours are 7:15 to 9:15 p.m., divided into two periods. The classes in English, Mathematics, Languages and Commercial Work are all one-hour classes; those in Science, Art, Manual Arts and Domestic Arts are two-hour classes.

In general, it is recommended that students register for two or three evenings per week, using the other evenings for study or recreation, but where the nature of the subjects or the employment of the student during the day warrants, many register for four or five evenings. Registration for one hour only is not encouraged, except in case of students who can not come for the first hour.

The evening High School offers regular High School credit for all work completed which in the judgment of the instructor warrants such credit. The school will also recommend to the commercial world such students as merit this.

The subjects and methods of treatment are selected with special reference to their immediate practical value. All classes are maintained only as long as the attendance justifies. Work in other subjects is offered as soon as the demand is sufficient to warrant forming classes.

(4) THE HIGH SCHOOL OF MECHANIC ARTS, BOSTON, MASS.

This school takes boys of about 14½, who have graduated from the Grammar School. The usual High School courses are given in addition to the special instruction. Its courses are worked out so as to give emphasis to the practical learning of the work—practical in such a way as to call for a higher order of thinking. It aims to prepare for some form of industrial occupation with a view to a supervising position. The course covers 4 years, 2 shop periods of 2 hours each being given each day. The Principal stated that the school provides courses suited to every class. The instruction is free, and therefore within the reach of all, whilst the richest man could find no better place for his son.

Dr. Palmer stated in the course of a 'Conversation' that the plant was used for evening classes, under the supervision of one or more of the day teachers, it being too valuable for him to allow it out of his control.

Information obtained in "Conversation" with DR. PALMER, *Principal High School of Mechanic Arts, Boston.*

Graduation to this school is from the Boston Grammar Schools, or equivalent training in case of pupils coming from outside places Boys who come here are more or less consciously aiming at some form of industrial activity. In general boys are taken here when they are prepared to enter High School. They leave the Grammar School in June and come here in September. They can graduate from the Grammar School when they are through, but as they cannot go to work until 14, if a boy graduates at 12 he must go for 2 years into some other school; at Continuation evening schools he would not be accepted until he is 14.

Boys have a choice of either coming to this school or of entering a High School in the city. Ordinarily it would not be profitable for a boy to go to any other High School and then to finish here. Dr. Palmer thought it conceivable that he might find it profitable to go to High School for English, although here he gets the usual High School Course in addition to the other instruction. A boy with a distinctly commercial turn of mind would more naturally go to the Commercial High School, while a boy with a literary turn would attend a literary School.

BOSTON'S LARGE HIGH SCHOOL POPULATION.

Dr. Palmer said that in thinking about Boston it was desirable to keep in mind that that city is giving High School instruction to a very much larger number of pupils per thousand inhabitants than any other city in the country —indeed, he thought he would be perfectly safe in saying than any other city in the world. Boston's High School population per thousand inhabitants is rather more than twice, nearly three times, as many as Philadelphia and considerably more than New York.

A plan is under consideration for taking boys from the Grammar School, or perhaps before they leave there, and giving them the elements of a small number of trades as rapidly as possible, or anything elementary looking distinctly towards a trade.

EQUIPMENT ATTENDANCE AIM.

The best equipment has been furnished with a view to making efficient instruction less expensive. 1500 can be accommodated without serious crowding, and 1450 are in attendance. The course of study is, roughly speaking, what may be found in the typical American Manual Training High School worked out so as to place very much more emphasis on the practical bearing of the work. There is no thought of making a place for the dull boy to get along easily, but the aim is to make the very best place which a boy of poor parents and fairly good ability can attend, and, at the same time, such a place that the richest man in the city cannot find a better one for his son.

The first year boys have Algebra every day, and on alternate days take English, History, Drawing and Elementary Science. The science is a combination of the elements of Physics and Chemistry with no particular text book, elementary experiments being performed by the teacher so as to bring out fundamental scientific facts having a practical bearing. The boys then write an account of this in their notebooks, the purpose being to make an interesting field for subject matter for English composition, to give them some notion of scientific facts of value, so that they will be more interested later on.

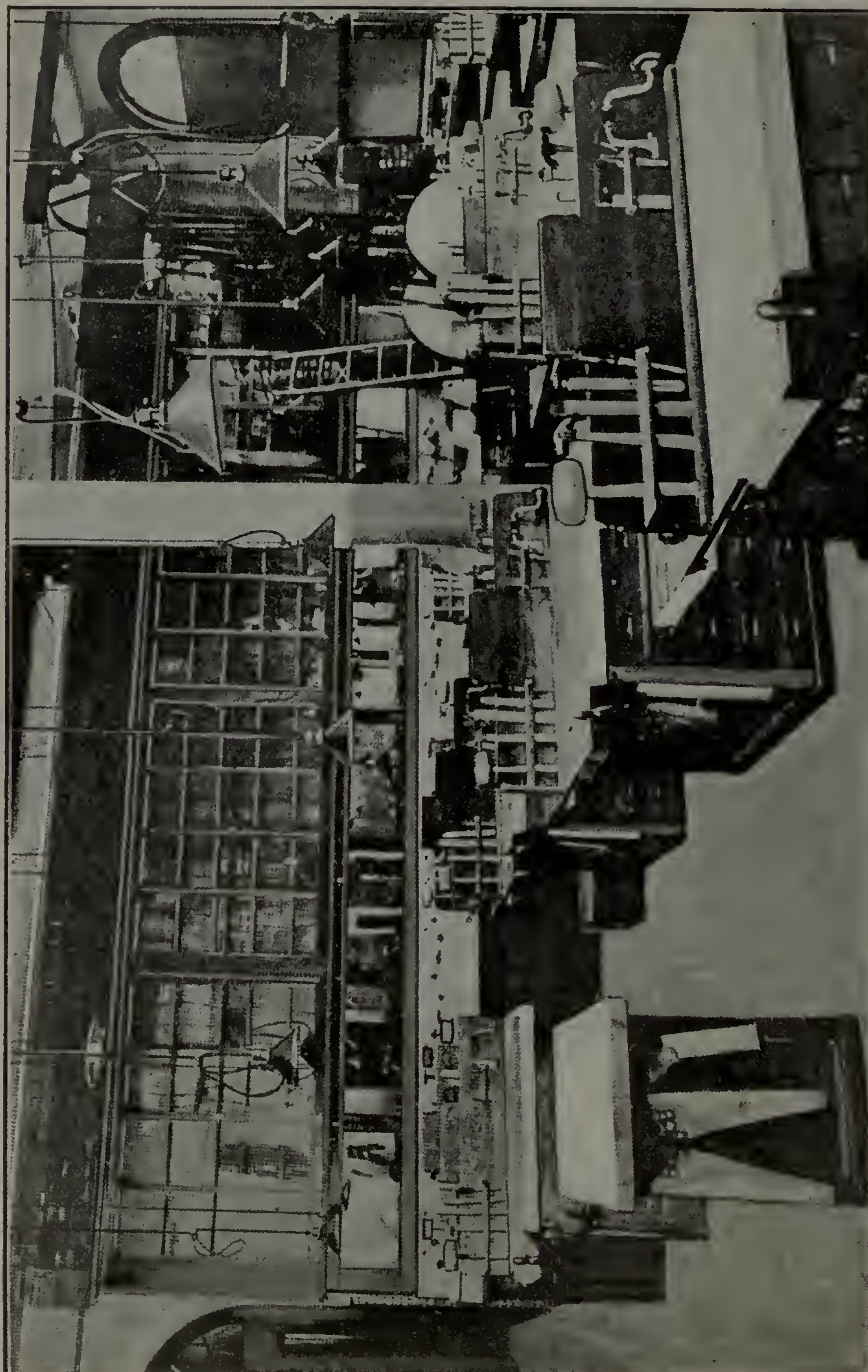
METHODS IN PHYSICS.

In the higher Physics laboratory a good deal more emphasis is put on the industrial and practical applications of the things the boys do. Here there are a good many experiments on a somewhat larger scale than is usual in High Schools and not exactly of the customary type, the teacher working out a course of his own. The general attempt to cover Physics systematically does not apply here. Mathematics are learned in the other school. The aim is to get the drafting and the shop work and the moulding work more intimately connected with the scientific work. Dr. Palmer added that it was one thing to aim to do this and another to do so actually.

The Commission found the boys plotting curves, reading three-tenth divisions on a scale, obtaining the simple formula to find the forces coming in, supporting an object by two cords, to give them four solutions that might possibly apply; then the boys pick out those that are correct.

SHOPWORK ROTATION AND METHODS.

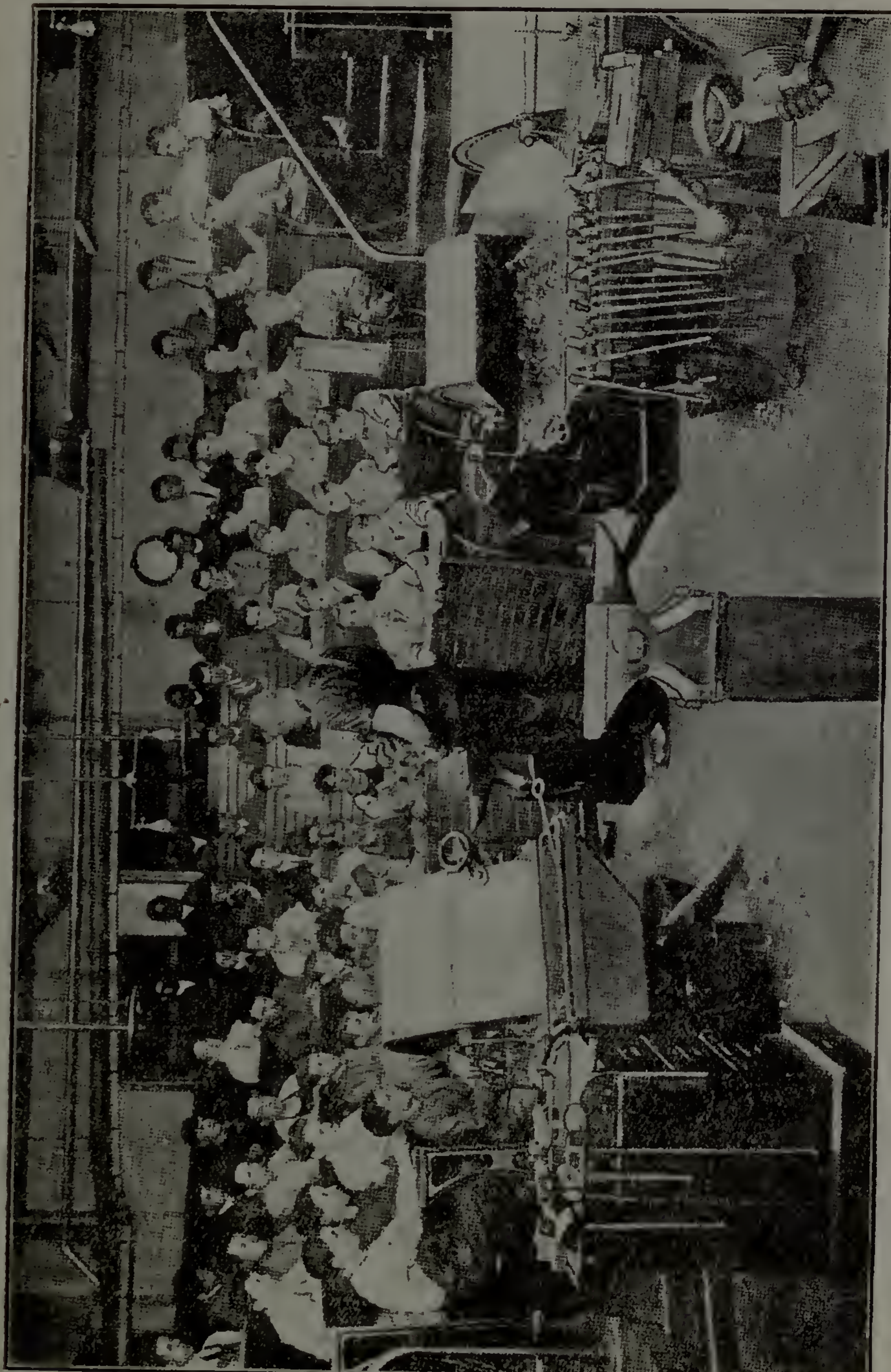
The boys get 2 shop periods of 2 hours a day. There are 4 daily shifts, taking 144 boys each time, so that in a day the 576 boys of the first year are cared for. They are all doing substantially the same thing in this department which consists of pattern-making. Every piece of wood-turning the boys do has some relation to the pattern. The machine shops apart from the pattern, making occupied 3 rooms in which 90 boys could work at a time, and with 4 shifts this allowed for 360 boys to pass through each day. Some of the boys work only on alternate days.



WOODWORKING SHOP, MECHANIC ARTS HIGH SCHOOL: BOSTON, MASS.

WOOD TURNING SHOP, MECHANIC ARTS HIGH SCHOOL: BOSTON, MASS.

Hanging Machinery in Pattern Making Shop, Mechanic Arts High School: Boston, Mass.



Forge Shop Demonstration, Mechanic Arts High School; Boston, Mass.

FORGE SHOP, MECHANIC ARTS HIGH SCHOOL: BOSTON, MASS.

In metal working very much attention has been given to every form of equipment with a view to making the whole of the processes as efficient as possible and so as to be able to handle promptly a large number of boys. The work has been systematized like that of a great manufacturing establishment and close attention has been given to all sorts of details, tending to make efficient the giving of instruction to large groups of boys. For example, under the benches are drawers for the sets of tools supplied to the boys, arranged under a system which makes it possible to know whether any of the tools in daily use are missing.

Dr. Palmer said he had seen nearly all the schools in the country, but so far as he knew there was nowhere to be found a forging shop equal in dimensions and equipment to the one in this school; 72 boys can be taken care of at a time with 2 instructors; 2 boys who have recently graduated act as assistants.

How Luncheons are Supplied.

The Women's Educational Industrial Union has a central plant well equipped and prepares food ready to bring not only to this school, but to all in the city. It is a sort of philanthropic organization in the sense that those who assume final financial responsibility are wealthy persons who receive no consideration for their time or financial risk. The work is intended to be self-sustaining. The prices of food are so adjusted that nobody makes any profit. Dr. Palmer was chairman of the committee of final appeal, composed of three headmasters and three representatives of the schools. A boy can get a fair meal, as good as he needs, for 10 cents. Dr. Palmer said that when he selected a meal for himself he seldom made the order above 15 cents, and often not more than 10c. Very good soup with crackers cost 5c.; a hot dish 5c.; custard 3c.; so that 13c.would purchase all that anybody would want.

There is a large central evening industrial school intended for persons, engaged in industries or drafting offices in the day time, who attend in order to get a further knowledge of a great variety of trades. There are between 300 and 500 evening pupils.

Boys Become Supervisors.

A very large percentage of boys from this school obtain employment in lines of work properly related to the special training they received here, a good many of them being in shops. One of them is in control of 400 men at Brown and Sharpe's factory in Providence, and a dozen or 20 are in large supervising positions; those are men who never had any training at the Boston "Tech." Other graduates of this school, who have been through the Institute of Technology, are scattered all round. The list tapers off from those mentioned to others who were working about the town as street-car conductors or motormen, or doing some pretty poor work. Here and there a man is a locomotive engineer; they are doing all sorts of things; they simply represent the life of a great city, and one cannot generalize about them.

Dr. Palmer said the day teachers taught in the evening on the shop side, and he would be very sorry to have any others, because the plant was altogether too valuable. He controlled the whole thing and could prohibit the use of any machine or supplies if he desired to exercise his authority, but as a matter of fact he never did, because one of his teachers was in authority and represented him. The total value of the plant, property and equipment is about one million dollars. The annual budget is not far from $110,000, and is growing. There are 48 regular teachers and 17 specials.

No Social "Class" Distinctions.

Dr. Palmer remarked that some questions of the Commissioners and of other people who visited the school point to a fundamental misconception in asking "What class of boys do you deal with?" He added: "In Canada you are going to deal with the Canadian citizen; we are going to deal with the average American boy. In this country of ours we have no conditions that approach German conditions, and anything that we schoolmen do that looks to put emphasis on class is a fundamental error in a land as democratic as yours and mine. You don't want to do anything to emphasise the point of class."

He then told how he had seen working side by side at the bench, the son of the man who was at the head of the largest railroad corporation in New England, the son of the then Superintendent of Schools in Boston, and next to him a boy who was obliged to blacken boots to earn money to keep him at school. The one who was then blackening boots now holds the best position. That was a thing which could happen over and over again. He explained that his earnestness on this subject was due to the fact that in all this discussion in the United States and Canada, as he had read it and heard it and thought about it, the German idea had been put into the forefront—an idea built upon traditions and an old civilization entirely different from ours, and he was afraid of it. He thought that educators should set their faces as much as possible against the use of the word "class" as related to society, and insist that that distinction is not wise.

Industrial Training Before Graduation.

In reply to a question as to provision in Boston for the industrial education of boys who did not reach graduation from elementary schools, Dr. Palmer replied that a school of an entirely different sort was being started in the city that would aim to teach the elements of a number of trades, and to get hold specifically and definitely of the boy who would not otherwise complete the Grammar School course. That was an entirely different kind of boy, growing out of the fact that financial limitations prevented some boys from going further. Dr. Palmer thought it probable that some capable boys would get into that school, and later be moved over to this one; and it might happen in the course of the work in this school that some boys would be encouraged to go over there. They would work together in harmony.

(5) THE TECHNICAL HIGH SCHOOL, SPRINGFIELD, MASS.

Information obtained in "Conversation" with CHAS. F. WARNER, *Principal.*

The institution includes 3 separate schools—Central High, Technical High, and Commercial School. All comprise one system, and pupils can transfer from one to the other. Principal Warner remarked that the separation of the schools had resulted in a marked increase of attendance.

Principal Warner had charge for ten years of a Manual Training High School, then took hold of this school when it was unimportant, and has been with it ever since.

The CENTRAL is the old school. The other two, the TECHNICAL and the COMMERCIAL, are branches out of that. The system originated because the old school did not seem to prosper well. Pupils did not, for instance, do training work along the line of Manual Training, which was in existence for years in a department in the old High School, and had received a pretty bad black eye all through its history as a department. When Principal Warner took charge only 13 boys came into the building the first day; in 5 years there were 200 to 300. If the schools had not been separated they would not have had more pupils in technical training in 5 years than 25 at the most. The growth in percentage was enormous; in the first ten years since the opening of the Technical High School, the High School enrolment in Springfield increased about 151%, although in the same period the city population (now 90,000) increased only about 41%. The maximum area of Springfield is 5 miles. Some pupils come from a new section that was admitted. When the city increases to 150,000 the next step will be to form a branch High School, still keeping this central organization for the main High Schools.

Springfield has a strong Trade School with over 400 evening pupils, using the teachers of the Technical High School as far as possible. It is an improving school, to take in mechanics. It is not supposed to be of the same general nature as a technical day school at all. Men 50 years old attend to brush up on their shop work.

TECHNICAL WORK AND METHODS.

The *Technical High School* is a general High School with extra time given to practical work. This means more than the mere addition of practical work; it involves the correlation between Mathematics, Science and Shop-work. The Principal's conception of the word "Technical" does not apply so much to the shop work as to the correlation between the studies and the work. The popular idea of the word "Technical" he considers impractical; its real definition is not so much the practice as the thinking about the practice. Hence this school tries to correlate Shopwork and Drawing with Science and Mathematics and English.

and to a certain extent with foreign languages. Latin is taught, but as a secondary matter, simply because so many people want it and at the same time want the other. No attempt is made to correlate Latin with the shopwork.

The school has a College Preparatory Course, which makes it, so far as that is concerned, a Manual Training High School; about one-third of the pupils are enrolled in that; the other two-thirds are doing what the Principal would call strictly Technical High School work.

There are 650 pupils—200 girls and 450 boys. Very few of the girls are preparing for college; they take strictly technical school work. All the girls are obliged to take some of this technical work; it is not a matter of electing. If they elect this school they elect to take this work, and everybody takes it; it is not a department in a general High School; it is distinctive right through the school; there is not a pupil here who does not have his or her allotment in the practical things, either shops or cooking, sewing, or something of that kind.

Developing Public Speaking.

The Technical High School has a students' committee, and after the English exercises have been set forth in the classes, if any class thinks they have had a good example that morning, the one who gave it is recommended to this committee. Thus every week 10 or 12 pupils appear before the students' committee and give their pieces, and the best are selected for the honor of speaking in the Assembly Hall to the whole school. Perhaps a boy will present a description of how axes are made. He has worked it up originally; he does not read it; he learns it and delivers it; and will illustrate it with drawings if he wants to. He must have it well enough in hand to speak it off. Mechanical subjects are preferred, though they may be historical, or strictly literary, or may deal with political economy; it does not matter. What is wanted is a good thing that will appeal to the school, and a great many technical subjects are thus presented.

Developing Technical Power.

In its own distinctive field, the Technical High School is doing an educational work of much value, by furnishing opportunities for expressing individuality through some form of handwork. The principles of Drawing, Mathematics and Science are applied to the work in the shops and in Household Arts, thus bringing the pupils in contact with realities, and giving a vital meaning to the work. Also, in laying stress upon the value and dignity of the artisan's work, and in furnishing clear ideas of the operation of industrial forces and of the vital relations existing between capital and labor, the school gives the individual a true sense of his economic opportunities and obligations and of his responsibilities as a citizen and an individual. The school, therefore, benefits the individual and the community by developing some technical power; but it concentrates its efforts not so much upon increasing productive efficiency as upon sending out young men and women ready to use their energies and their intelligence for the public good. Art, Music and Science are all taught in a practical manner, and yet in such a way as to bring out the best that is in the pupil.

Securing Teachers.

The first aim is to get some from the trade, but they must have teaching ability and know what they are going to teach. Trained teachers who have also gone out and got the trade cannot be had, so we must start at the trade. Candidates are tested, and if they do not possess teaching ability, they are sent back to the trade. One of the great deficiencies is the lack of a way of teaching them as teachers; they ought to have a Normal School, the Principal said. The Germans had said, "We cannot teach without teachers; so we won't operate these schools until we get the teachers." Then they put the machinery of government to work to make teachers; but that cannot be done here.

Although this Technical High School has been turning out graduates for only about 8 years, six teachers in the local schools are its graduates. When they can get out, these boys are very desirable, and there are so few men fitted for teaching that the boys can get into the High School and compete with their own teachers, and some who have been out only two or three years are getting higher salaries than their former teachers, without having gone to any higher institution, although of course it is better for them to do so. Those boys take a technical course. In a few years the supply of them will be increased.

College Preparatory Course.

This Course prepares for Colleges and Schools of Technology, and advance credit is given by these institutions, enabling boys to save from one year to one and a half of equivalent college work. Every boy has to take 4 years of Mechanical Drawing, together with Freehand Drawing and Design, and from 3 to 4 years in the use of hand and machine tools.

Principal Warner said this School had not gone as far as the Cleveland Schools, which are coming back now a little; for instance, they started out with the idea that they were not going to teach any languages at all, but they had to put in German. They give out to the public that they are not fitting students for college at all, but Cornell has been over there and told them that they will take their pupils into Cornell on their course, so really they are going back to the academic side again.

Technical Course.

This Course has two divisions, in one of which a modern language is required, in the other no language work excepting English. It is intended for boys who do not expect to continue their training in higher scientific schools and colleges, and who on leaving take positions as draftsmen, etc. It gives boys a special opportunity of acquiring practical knowledge of the applications of science and mathematics in the mechanical trades. In the 3rd and 4th years boys may specialize in the work of the drawing room or the shops.

Notes From Visit to the School Shops.

Machine Shop.—Each class builds some machine. (Photographs of machines built in different years). Last year's class built one of the largest machines —a hydraulic press of 6500 pounds. This year's class is going to build a punch press. The school has a regular course, where boys start from the blacksmith's shop and make tools, every man using the tools that he forges down there; then they make something that is useful in the shop; very little exercise work is done. One boy is making on the milling machine a gear which quite frequently breaks in the lathe. A lot of those gears are made, and the same thing is done for every part of the machine which readily breaks out. Lathes are made here for the other department. It is not a very elaborate machine, for there is not time to make such. The most elaborate part is the motor. The school does not emphasize the productive side at all, except as it appreciates the educational side. It is trying to train the boys for positions as foremen or superintendents or designers. They are not supposed to go out of the school and work as machine tenders, but they are supposed to design and erect machines. If they had to fill positions as machinists they could do it; but the other is the most important side that the school is trying to organize. A lot of test tubes for the science department are being made on a factory basis. In this way they bring out the factory idea, which is explained to the boys in a series of lectures on the use and operation of tools.

Exhibition of tools made by the students. Punch and die work, the very highest kind of work; men are paid $7 a day for that kind of work. Some fellows who got their start in this school are now working in the city as die sinkers. Springfield being a great centre for machine work, that is the part the school has to emphasize.

Physics.—Applications are found in mechanics daily. Correlation of scientific work with practical work. Boys' and girls' classes in science are separate because of the different kinds of work they are going to correlate it with; for while a great deal is common, and there is a good deal that everybody ought to know, the kind of science the girl is going to use differs from the kind the boy is going to need.

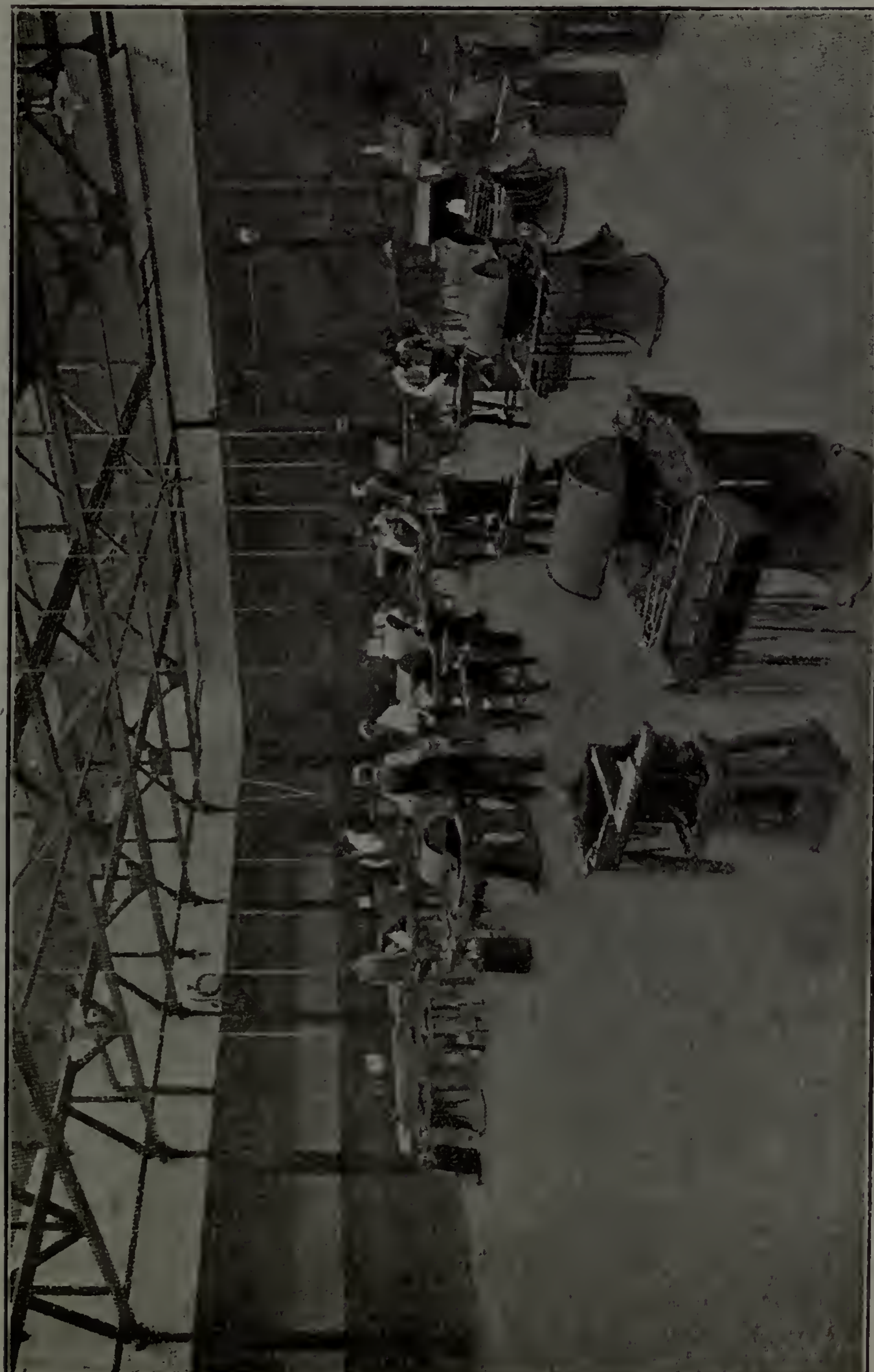
Plant Physiology.—Instead of studying plants merely as items in systematic botany, pupils specialize on the food plants and study them as the sources of food principles as found in plants. Each pupil has a compound microscope and studies the development of the starch in plants, and various changes that cooking makes upon it, etc. Botany as such is thus connected with the applications in Domestic Science. The whole emphasis is thrown upon the utility of the science of botany and of plant physiology. Then they take

ONE OF THE PHYSICS LABORATORIES.

ONE OF THE WOOD-WORKING ROOMS, TECHNICAL HIGH SCHOOL: SPRINGFIELD, MASS.

One of the Drawing Rooms.

The Machine Tool Room, Technical High School: Springfield, Mass.



FORGE SHOP, TECHNICAL HIGH SCHOOL: SPRINGFIELD, MASS.

HOUSEHOLD SCIENCE.

HOUSEHOLD ARTS, TECHNICAL HIGH SCHOOL: SPRINGFIELD, MASS.

up human physiology and learn how the food elements are related to the building up of human tissues. It is not so much genetics as hygiene. The whole emphas isis thrown on the practical side—chemical processes as worked out in plants and animals.

Electrical Department.—Machine shop, automobile construction; hydraulic press; automobile for testing power and speed: transmission; pony brake; the effect of transmission on the road; air brakes from the railroad; these are set up in the Science Department, operated by compressed air and studied in that way.

Forge Shop.—Teacher giving illustration of forging horse-shoe. Boys can then go to their fires and do the work which has been illustrated.

Woodwork.—Lathes; boys turning wood.

Pattern-making.—High grade work. Making a punch press in the school which if bought would cost $500. They make their own designs, drawings, and patterns, and after getting castings from the foundry, make the press in the machine shop, and get an education at the same time.

Exhibition of Pattern Work.—Large gear pattern made by two boys; would cost $75 if the pattern were made in a regular way.

Applied Design.—Principles of color worked out on sheets. Girls design pottery, rugs, copper work, jewelry, etc., as well as their costumes. They design their own hats and make them. They are getting the fundamental principles to apply in the work room.

Exhibition of hat pins with enamelled heads. Pupils do the enamelling. Specimen copper buckles, balls, etc.; tiles; pupils have to gild and burn them. Basketry.

Courses for Girls.

For girls there are 3 Courses, viz., *Technical*, *College Preparatory*, and *Normal School Preparatory*. The teaching in *Household Technology* covers all that pertains (1) to the house itself, (2) to clothing, (3) to foods. Design, both constructive and decorative, especially in application to the interior of the home, is taken under (1); also principles of plumbing, ventilation, lighting, heating, decoration and general repairs. Under (2) comes sewing, construction of garments, design, drafting, cutting and fitting, fabrics and their cost, artistic expression as well as utility being emphasized all through. Under (3) scientific instruction in foods is given, involving chemistry, physics, etc., and much laboratory work, the aim being to teach not only the chemical composition and nutritive value of foods, but the changes produced by cooking and their relation to digestion and nutrition. The ultimate aim of the course is to fit a graduate to supervise the selection, cooking and serving of food for a family or institution in a thoroughly scientific way.

Domestic Science.—They don't teach cooking merely as such, but rather the chemistry of cooking, and the cooking itself is an incident. They don't work by recipe, but they study out and experiment from the point of view of the chemistry of cooking, then apply it in meals. It is not called a course in cooking, but in Domestic Science.

Millinery.—Hand loom for weaving; designing; hats made here.

Kitchen.—The whole school gets lunch here on the "cafeteria" plan. The principal gets a dinner here for 30 or 35 cents that he says would cost him $1.25 elsewhere. Each student handles his or her own food.

Model House.—House designed by the girls, and built completely by the boys, except the plastering; to be run as a model house for the Domestic Science department; girls are here in groups to run it a week at a time; the bedroom to be used as an emergency room; the house is decorated and fixed in such a way that the girls can re-decorate it.

Commercial High School.

This is a separate building with about 400 pupils. They learn commercial subjects, typewriting and those special things. Besides that, they have history and English, French and German elective; mathematics; a little science, not much. Their general work is in the direction of economics and history applied along that line. They have very good banking rooms. It is a four years' course and very thorough. It has been in existence as a department for 13 or 14 years, and is thoroughly organized and well built up, and now the committee has voted to establish it as a separate school in a separate building.

These things seem to develop better, Mr. Warner says, when they are given separate buildings and separate administrations, although the scheme in Springfield is to bring these three different High Schools so near together that they will form centrally one system, and pupils can transfer from one building to another. For instance, some pupils in the Technical High School who elect to do a little commercial work are sent over to that school, and a Commercial High School boy could elect some shop work here if he wanted to. The Principal thought that would be better than one large institution, because possessing the benefits of separate organization and administration, and also allowing of individual cases being handled by transfers between the buildings.

Results of Technical and Commerical Courses.

Evidence of the value of technical and commercial training may be found in the earning power of the youth of Springfield who have received this training. Questionnaires sent out to graduates of both departments show results as follows:

TECHNICAL.

——	Initial pay per week.	Years since graduation.	Present pay per week.
1903	$8 65	5	$21 87
1904	8 35	4	15 90
1905	7 50	3	14 16
1906	9 83	2	15 57
1907	8 90	1	9 90

COMMERCIAL.

—	Initial pay per week.		Years since graduation.	Present pay per week.	
	Men.	Women.		Men.	Women.
1903	$7 01	$6 78	5	$17 14	$11 07
1904	7 03	6 00	4	15 63	10 07
1905	9 95	6 99	3	14 14	9 73
1906	7 03	6 67	2	11 67	8 24
1907	7 55	6 49	1	8 87	6 23

CHAPTER LXV: TWO TEXTILE SCHOOLS.

SECTION 1: THE LOWELL TEXTILE SCHOOL, LOWELL, MASS.

This is a technical and not a trade-teaching school, It was opened in 1897 "for the purpose of instruction in the theory and practical art of textile and kindred branches of industry." Not only did the normal progress of the textile industry require such a school, but through the rapid development of the manufacture of the coarser cotton fabrics in the Southern States a crisis had arrived in the leading industry of New England which could only be met by a wider and more thorough application of the sciences and arts for the production of finer and more varied fabrics.

The present buildings, costing $260,000, were opened in 1902. The equipment of machinery, practically all of which was contributed by manufacturers, inventoried in 1912 at $235,595.53, is most varied for textile educational purposes, and is being constantly augmented. The builders of the various machines installed keep in close touch with the school, adding to the machines such improvements as are made from time to time, and each year some new machine is added by a manufacturer who finds it to his advantage to be represented here. This operates to the mutual advantage of both manufacturer and student. The yearly running cost of the institution is $60,000; number of day students, 150; evening students 600; instructors 29.

The school was established and is managed by a Board of Trustees composed mainly of representatives of textile or textile machine corporations. Associated with them *ex-officio* are several officials of the State and city governments. The State Legislature made a grant of $40,000 for maintenance, $22,000 for boiler house and between $6,000 and $7,000 for equipment; Lowell gives $8,000, which practically pays for the free tuition of evening pupils from that city. The fee for outsiders is the actual cost, about $300 a year. The Trustees have entire administrative control of all school matters, and carry out their will through their committees. It is the policy of the Board that a safe majority of their members shall be persons actively engaged in textile manufacturing, and that the school work shall at all times be in accord with conditions and needs of the local textile industry.

Instruction and Production.

The same instructors serve day and evening classes, thus insuring to the evening pupils from the mills and shops the same able and thorough instruction as the day pupils, for it does not necessarily follow that the humbler youth should have a poorer school. The instructors are all graduates of Textile Schools who have had practical experience in the mills, or else men who have come direct from the mill and have been trained in the school as instructors, but none are now connected with any mill. The school looms are run primarily for instruction purposes, and students buy at cost anything they particularly desire from the products; whatever else accumulates is disposed of quietly in the market. The aim is to avoid as much as possible the commercial side of the work in order not to detract from the training side of the school.

The production of the school in the matter of variety of fabrics equals the production of 20 or 30 mills; however, the aim is not to turn out large quantities of material, but the reverse—to keep the material down and yet give the greatest possible amount of instruction.

The Trade Unions uphold the school because it is not seeking access to the labor market, but rather assisting those already in the market to be better men.

Practical Machine Work.

The school has an arrangement with a local machine shop by which students are allowed to pick out parts of a machine in the rough, cut the key-way and do the filing, and then return the part to the shop. In this way the students are made to feel that they are working on something of real value. Day students also take down the school machines and put them together again.

Evening students are not put to work on the machines, because they are tired of that after working all day long. It is held to be better for them to discuss mill problems and work questions with the teacher; they want to know the why and the wherefore.

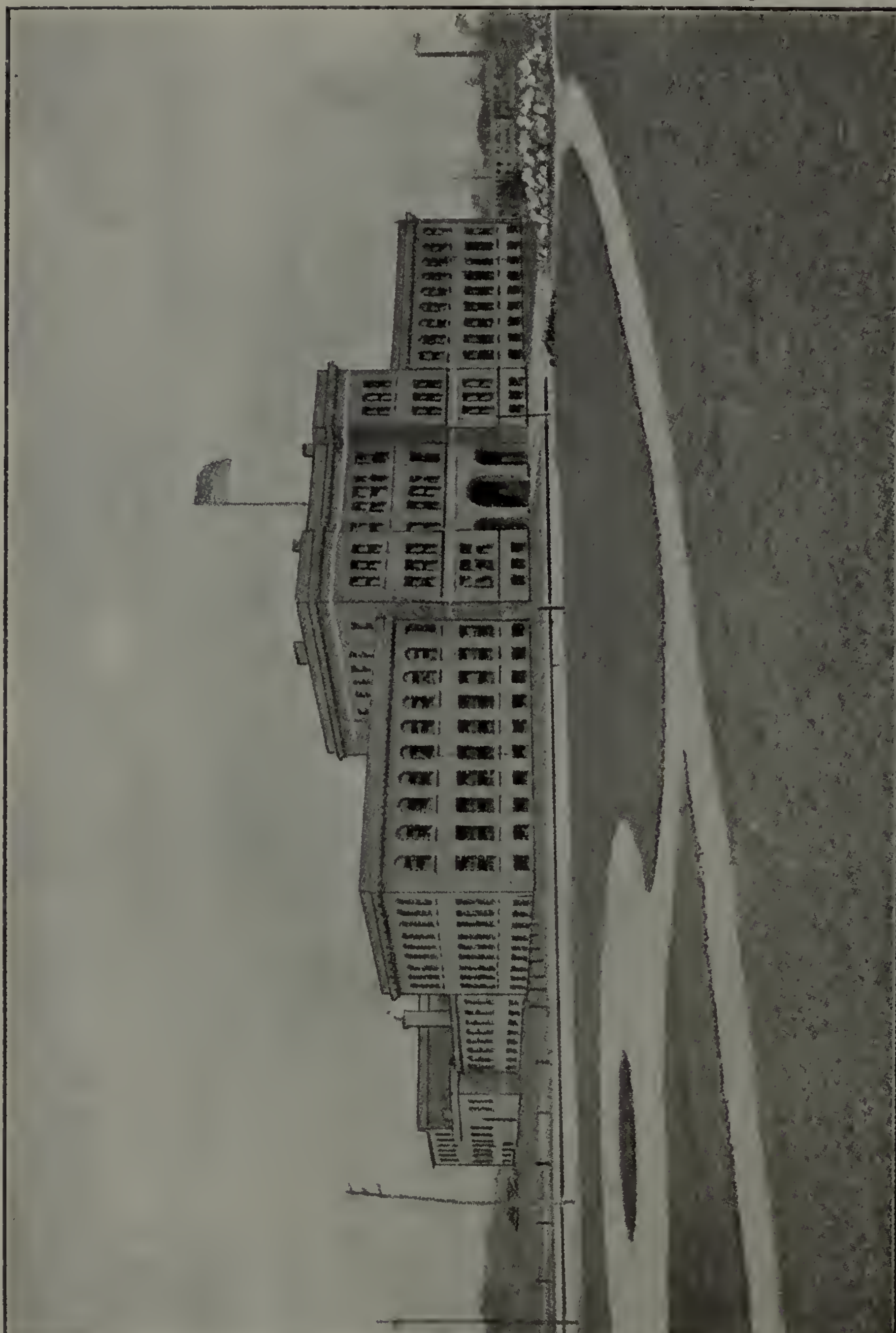
Day and Evening Classes.

Day classes have been organized for those who can devote their entire time for 3 or more years to the instruction requisite in preparing to enter the textile industries. It has been found necessary to require of all such students educational qualifications equivalent to those given by a regular 4-year course of a High School or academy of good standing.

The school has so advanced in the standard and character of its work, as well as the standard for admission to its day classes, that the Legislature of Massachusetts gave permission to the school to grant the degrees of Bachelor of Textile Engineering (B.T.E.) and Bachelor of Textile Dyeing (B.T.D.) upon the satisfactory completion of prescribed 4-year courses.

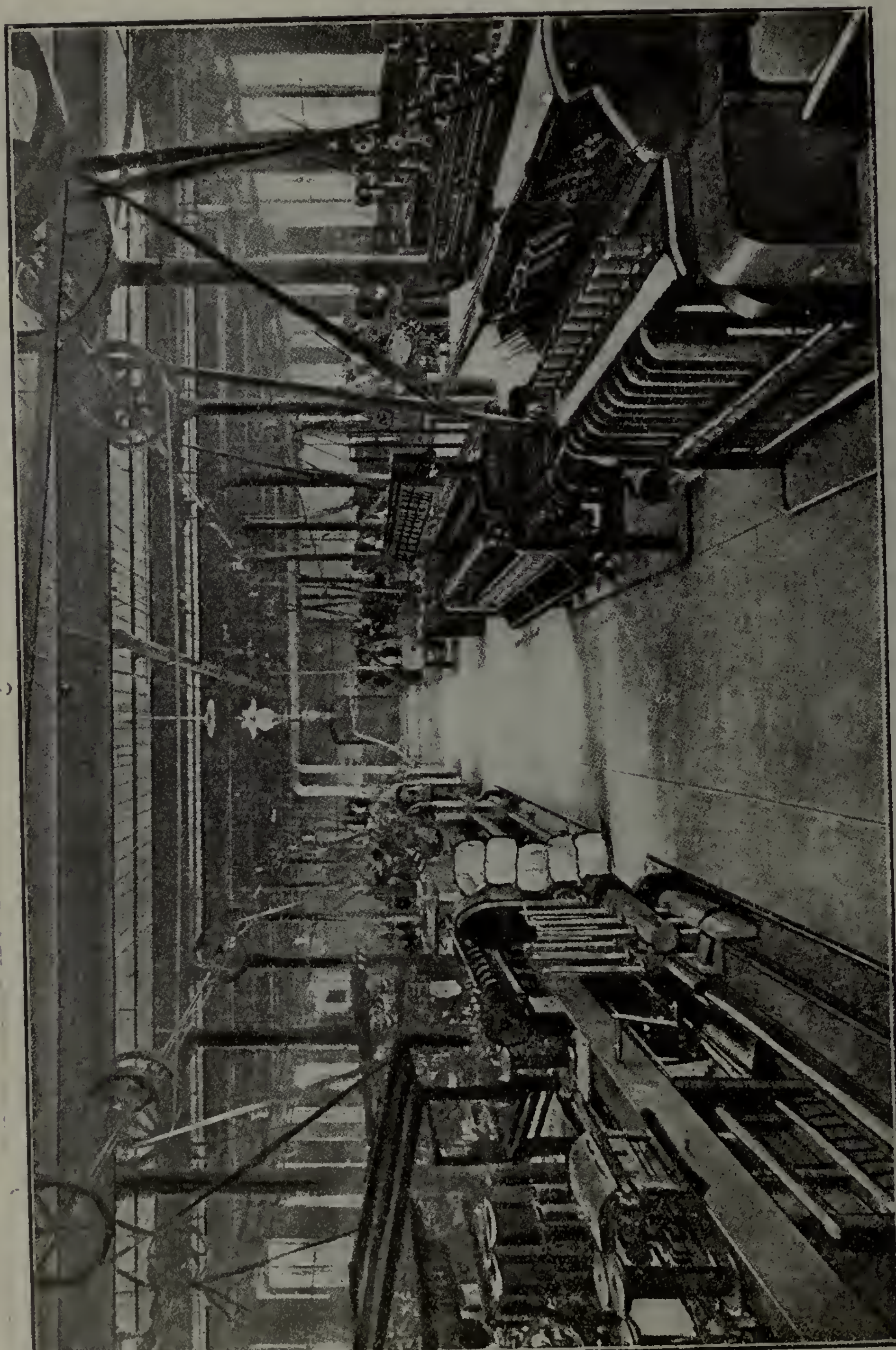
Evening classes are held for about 20 weeks of the year. The courses are similar to those of the day, but are aimed especially to meet the needs of day workers in mills and shops. Those entering these classes should have the equivalent of a Grammar School education.

In the manufacturing of cottons and woollens every portion of the various processes, from the raw to the finishing of the cloth, is carried out in the school, and the students before graduation select raw material and out of it make for themselves enough cloth for a suit of clothes, which they wear on graduation day. They purchase the wool and follow it practically through every process, including the designing, doing the actual work themselves.

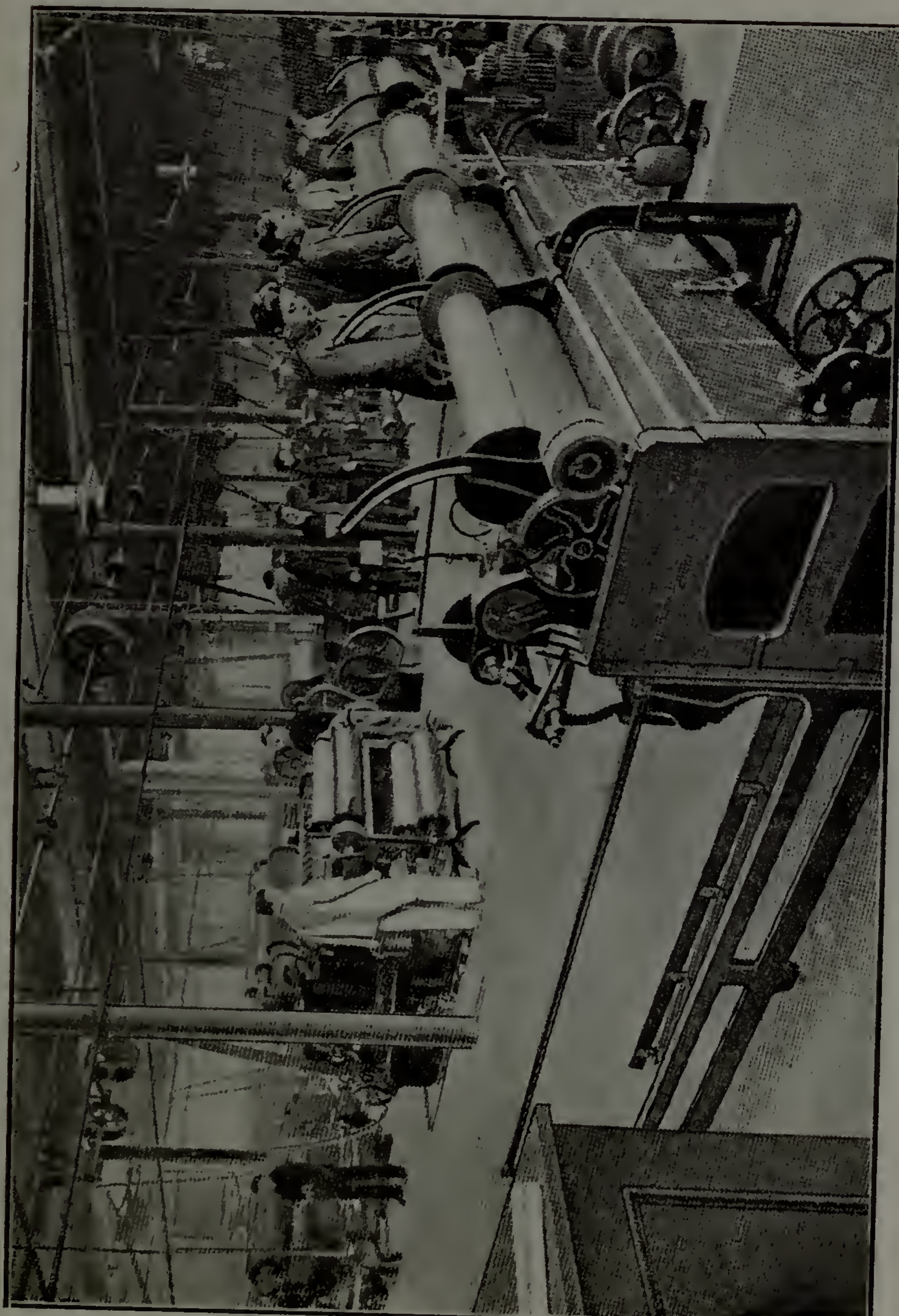


The Textile School: Lowell, Mass.

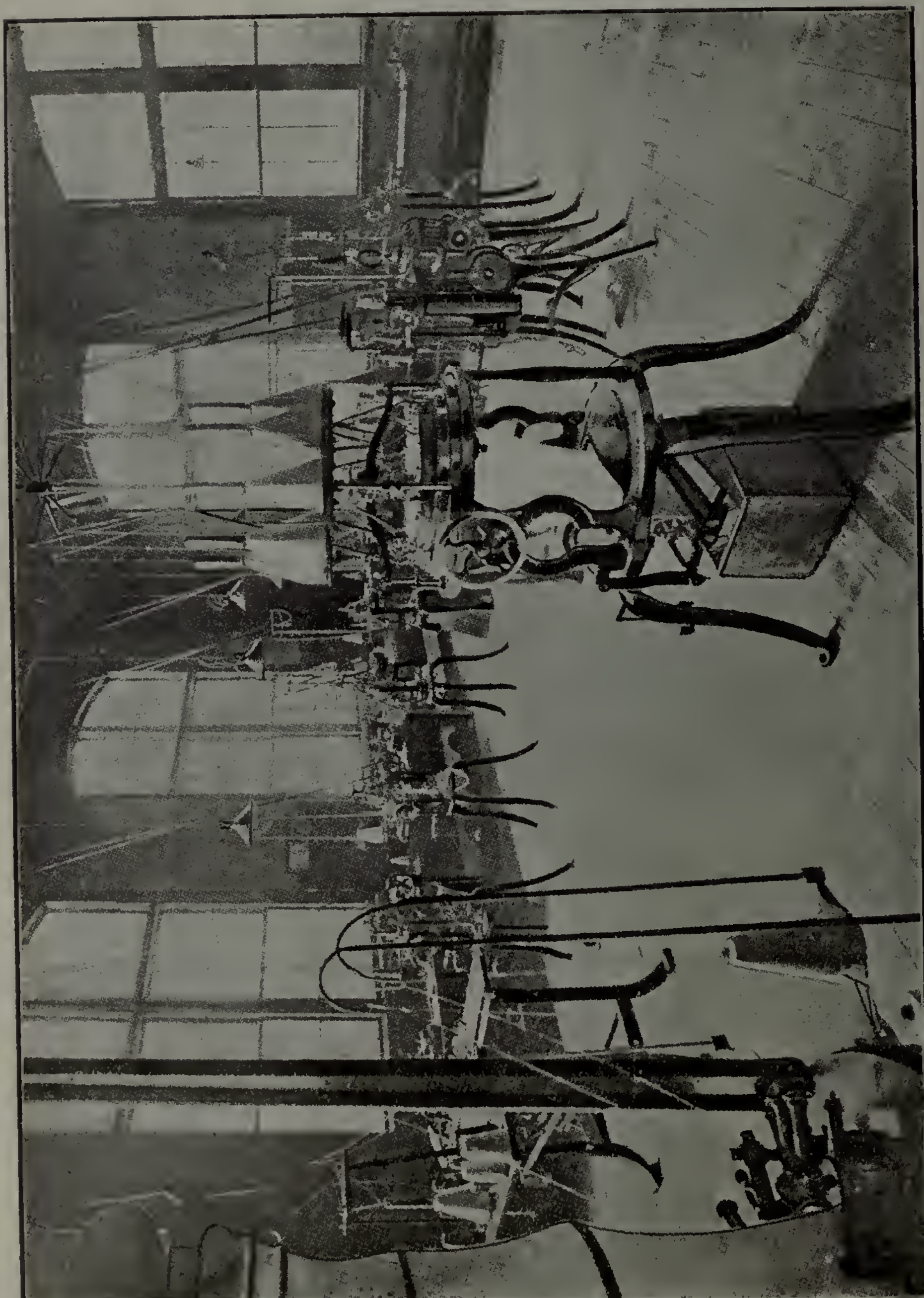
COTTON YARN DEPARTMENT: THE TEXTILE SCHOOL, LOWELL, MASS.



WOOLLEN AND WORSTED YARN DEPARTMENT: THE TEXTILE SCHOOL, LOWELL, MASS.



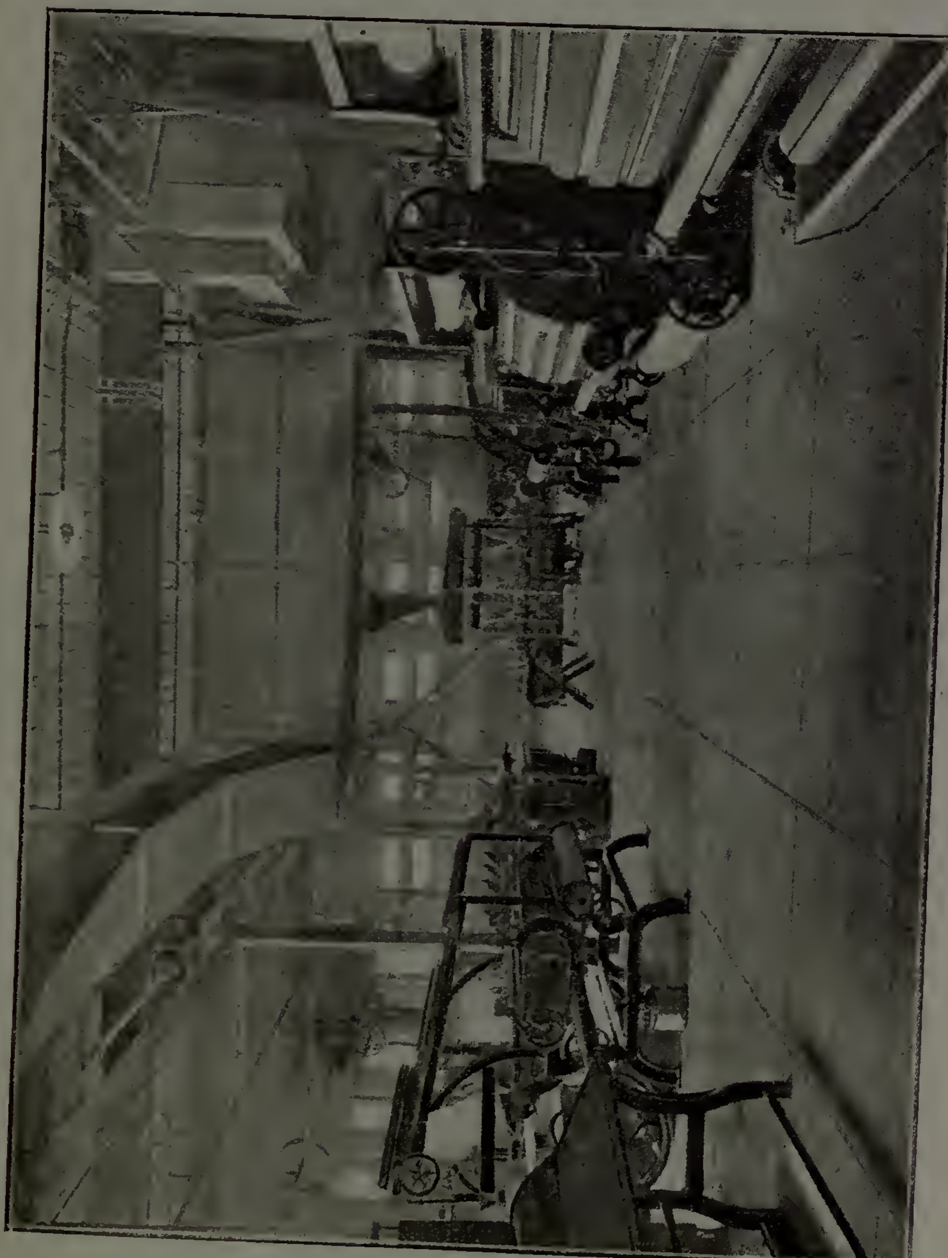
WOOLLEN YARN DEPARTMENT: THE TEXTILE SCHOOL, LOWELL, MASS.



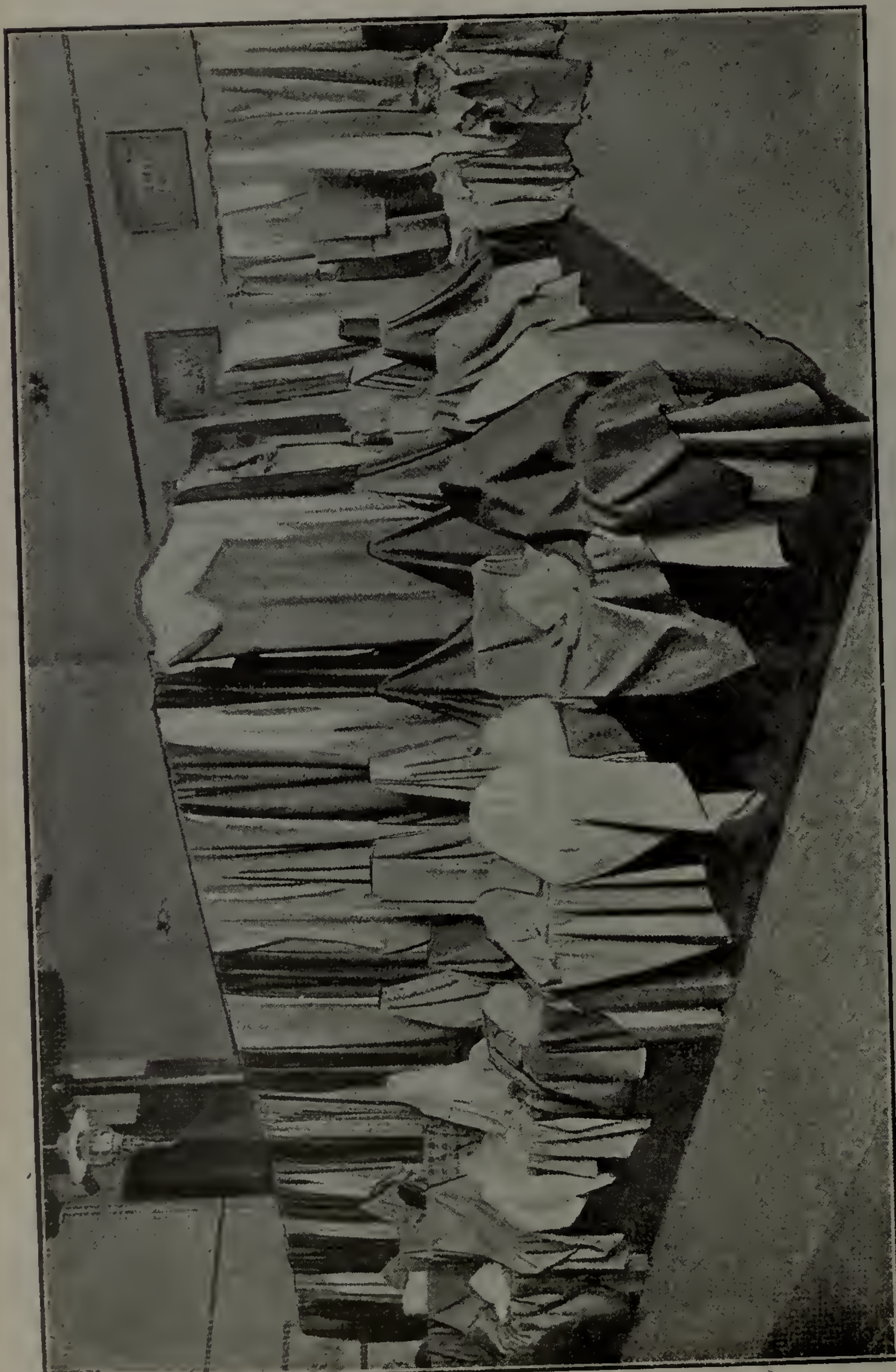
KNITTING DEPARTMENT: THE TEXTILE SCHOOL, LOWELL, MASS.

Weave Room: The Textile School, Lowell, Mass.

Machine Shop: The Textile School, Lowell, Mass.



Finishing Department: The Textile School, Lowell, Mass.



VIEW OF MANUFACTURED MATERIALS: THE TEXTILE SCHOOL, LOWELL, MASS.

COURSES.

The courses of instruction are especially intended for those who contemplate entering the business of textile manufacturing in any branch, and are sufficiently complete to enable one to start without previous acquaintance with textiles. At the same time those who have been engaged in such business and wish to improve their knowledge and experience can with profit pursue a course of study at the school. They include courses in Steam Engineering, Electricity, Mechanical and Architectural Drawing, Freehand Drawing, Machine Designing, Machine Shop work and other subjects related to the textile trades in addition to the textile occupations proper.

There is one year of preliminary instruction which is common to all courses. Students electing the course in Chemistry and Dyeing or the Course in Chemistry and Textile Coloring must make the selection at the commencement of the second term of the first year. Other students are not required to choose their courses until the end of the first year.

The 4-year degree courses are:—

Textile Engineering.

Chemistry and Textile Coloring.

With the former are offered three textile manufacturing options, viz.:—

1. General Textile.
2. Cotton Manufacturing.
3. Wool Manufacturing.

Each of these courses is planned to train one in the fundamental principles of science found to be applicable in the particular fields of Textile Chemistry and Textile Engineering. It is maintained that for one to be successful in either of these important branches of industry, as thorough and broad a training is required as in any of the recognized branches of Engineering or of applied industrial science.

With this in mind these courses have been built of a secure framework of Science and Mathematics, and to it has been added the useful application of those branches in the broad textile field. With the direct purpose of laying a secure foundation in the training, a more extended and advanced preparatory course is first demanded, and subsequently in the school work more subjects of a general character are included in order that narrowness of judgment and observation may not result by over stimulation of the technical development.

Instruction is first given in the principles of the sciences applicable to the textile and textile machinery industries, followed by instruction in the practical art,—the application of such sciences to the processes and machinery of manufacture. The practical and theoretical parts of the work are very closely correlated.

Day instruction offers 5 3-year courses, and a post-graduate year. For evening instruction these are subdivided into 16 courses. All pupils, day and evening, are presumed to enter for the final diploma at graduation, though for the evening pupil— there being but 8 hours available weekly— it necessarily requires a longer time to reach the standard of acquirement than for the day pupil.

All day freshmen during the first half-year receive the same general instruction. At the beginning of the second half-year they are expected to have chosen one of the 5 regular day courses. Each course, however, in addition to the specialty indicated by its name, includes some features of every other course, as it is found that such instruction adds to the efficiency of the pupil in the line he has chosen.

While there are several regular courses offered, they may generally be grouped in 3 grand divisions: (1) Textile Engineering, (2) Chemistry and Dyeing, and (3) Design.

(1) *Textile Engineering* includes the mechanism of all machinery used in all departments of the school, and also machine-shop practice; instruction in the creation, transmission and application of power, whether steam, hydraulic or gas. In boiler and engine testing, for which a very complete and modern laboratory is provided, the engineers and pupils are frequently called upon, or are afforded opportunities for conducting continuous 24-hour tests, without intermission, of mill power plants, including the analysis of flue gases, etc. This division also includes mill construction, cements and concrete, surveying, involving the laying out of plants, shafting, etc.; physics as involved in the testing of fibres, yarns and fabrics; mechanical drawing, plans for and the construction of equipment. The pupil is first thoroughly grounded in the principles of mechanical, electrical and hydraulic engineering before attacking the more advanced and specialized problems. The higher mathematics belong to this group. Here the plans for buildings are prepared, and all construction conducted during the summer vacation by the engineers and pupils who remain for practical experience in this line of work. Instruction is by lectures, with or without models, blackboard illustrations, mathematical problems for solution, and laboratory work and shop work.

(2) *Chemistry and Dyeing* involves a thorough course in Chemistry, followed by an applied course, first in the laboratories, and finally on commercial vats, presses, kiers, dryers, etc., in raw stock, yarns and fabrics. A specia land growing branch is the making of dyes from raw minerals, vegetables, oils, etc. A special laboratory is equipped for testing coal and oil.

(3) *Design* includes (a) instruction in color, conventionalizing of nature forms, historic ornament, etc., fundamental to all branches of decorative art, and then (b) the application thereof to textiles. Included under this head is all fabric weaving and finishing.

Incidental to these general divisions is instruction in English, German, French and Physical Culture.

Diplomas are awarded for 3-year courses in Cotton Manufacturing, Wool Manufacturing, Textile Design (General Textile Course), Chemistry and Dyeing, Textile Engineering.

COURSES FOR WOMEN.

Although all classes are open to women, the courses which have appealed especially to their tastes have been Textile Designing and Decorative Art. Some have pursued courses in Chemistry, and have added to their work in Design some instruction in Power Weaving and Finishing. These special courses have in general been followed for 3 years, and in some cases have led the students to positions either in the mill office or in some commercial lines that have been desirable and have offered congenial work.

SECTION 2: NEW BEDFORD TEXTILE SCHOOL, MASS.

This school, as contrasted with that at Lowell, is intended more for workers and working foremen. It has no finishing department, and of the heads of the 7 departments, 3 were graduates of technical institutions and the others had worked their way up.

There are 30,000 mill operatives in the 60 cotton mills of the town. Day pupils number 40, evening students 800.

The machinery in the school is valued at $75,000, and was contributed mainly by the manufacturers.

The school furnishes a very complete course in cotton manufacturing from the seed-pod to the finished article. The institution is a cotton mill in reduced form, but with all necessary appliances, including full-sized and up-to-date machines. The 7 day instructors, who are heads of departments, assisted by 20 others, act as evening instructors. These assistants are men employed in the mills during the day, who have themselves graduated through the school and have ability to instruct others.

The School Director considers 2 evenings a week as much as men can stand. One evening is devoted to practical weaving and loom-fixing, and the other to theory. For the evening classes the lectures in typewritten form are first distributed to the students and then discussed.

The boys start with plain weaving, some then take fancy weaving and others follow on with design. The day course in designing covers 2 years. In the course for knitting and sewing the machines are on a commercial basis, and are complete in every detail. The Instructor believes the machine is an absolute necessity in teaching an operation.

The city granted $25,000 towards the building of the school, and gives $10,000 annually towards maintenance. The State has contributed at various times sums aggregating $123,000 to the building account, and makes an annual grant of $20,000 towards maintenance.

No fee is charged to students from New Bedford or the State of Massachusetts, but American pupils from outside the State pay a fee of $50, and foreigners $150.

CHAPTER LXVI: THREE TECHNICAL INSTITUTIONS OF THE HIGHEST GRADE.

SECTION 1: COOPER UNION FOR THE ADVANCEMENT OF SCIENCE AND ART, NEW YORK.

Information obtained from "Conversation" with DR. CHARLES R. RICHARDS, *Director.*

Cooper Union has been established 50 years, and has about 2,500 students, its chief province being Evening Class work. There are four Day Courses: (1) School of Technical Science, with 300 students, which is in reality purely a Technical Engineering School without any work in Language, History or culture studies of that kind, with standards at the 4th year about the same as those of the engineering schools of the country; (2) The Women's Art School, with about 275 students, which has been part of the institution almost since its beginning; (3) School for Stenography; (4) School for Telegraphy. The Day School with about 700 students is held more because of having the building and equipment than because the Trustees primarily believe in Day School work.

The Evening work always has been and always will be the important work. It is what Peter Cooper had in his mind when founding the institution and what the Trustees have in their minds. The work there is similar in some respects and different in others from the usual Evening work. It divides into two sides, one called the Art side—not a very good name—which takes in all the classes in Drawing and Modeling. It covers a four year course in Architectural Drawing; a four year course in Drawing which ends with Drawing from the life model; a course in Drawing from the model which ends in Drawing from the figure.

The other side, called the School of Science, is rather unique, being really courses in Civil, Mechanical and Electrical Engineering and Chemistry. They were started as consecutive, co-ordinated courses. Two of them have been going on for about 49 years, which fact makes possible the position they are in today. They are 5 year courses taken 5 nights a week—the man comes an average of 5 nights a week for 4 years.

UNIQUE COURSES EVOLVED.

These courses do not seem to be paralleled anywhere else in this country or abroad, and owe their character first to the fact that somebody had the idea of starting them, and secondly to the fact that they have been going for 50 years. They represent the kind of thing that cannot be developed suddenly. Courses of this kind could not be built up in a few years, for it is only during a long course of years, with the results coming from graduates of successful courses, that the efforts and sacrifices needed for them can be developed in a large number of people.

Students are admitted by examination in algebra through quadratic equations and plane geometry. One course is still called the course in General Science. It used to be a good title in the old days when men came to get that scientific training which their vocations demanded, when some Physics, Chemistry and Mathematics were given; but they have steadily become more and more technical until today they are courses in Engineering. That General Science course branches off in the fourth year to either Civil or Mechanical Engineering.

Persistence in Attendance.

Last year there were 1,500 applicants for admission to the first year, and there came to the entrance examination 550 students, from whom about 175 were taken, plus 25 who repeat or hold over for some reason from the previous year, the entering class thus being 200. The persistence of attendance at these courses is rather a remarkable thing—the first year 200; second 175; third 150, fourth 125, fifth, 100. That is a persistency that is not equalled in any day Engineering School in the country.

The Selective Principle.

Here the selective principle runs all through; first, in the selection of the man; second, in the elimination by the test examinations; then by the wear and tear; so that in the fourth year you have a remarkable body of men, who would do well if they did not have Cooper Union at all.

Once you get a large number of applicants wanting to take a course you can apply the selective principle, and when that bears on the situation you have the biggest influence on all education. Single-subject courses have never been added on the Technical side, simply because those Engineering Courses took all the available room.

A new building is being added just across the street which may be used entirely for the scientific and technical work. When that is completed there will be no effort to increase very largely the numbers in the regular Engineering Courses, but single-subject courses on the Technical side will be added, which will round out the scheme of instruction here in a certain way.

Comparison with Day Engineering Schools.

The total amount of time in the engineering courses here as compared with a 4 year day Engineering School is between 40 per cent and 50 per cent; but the great element of strength about these men (outside of the selective quality of the work) is the fact that they are working during the day-time at related work. That great element of strength allows men with 40 per cent of the time on theoretical work to take positions of responsibility, and to stand up in theoretical work alongside trained men graduating from day schools. While many of those men start in the first year working in the shops, by the time they are in the fourth year of study many of them get work in the drafting rooms, engineers' offices, field surveying, etc. The same qualities that have carried them through the fourth year have been operating in their daily work.

The Cooper Union gives these graduates a diploma, or a degree of Bachelor of Science, which among engineers is just as acceptable as those of the Day Engineering Schools, because its quality is recognised. for it means that a man has been studying 5 years for 5 nights a week. When these men have been out three years they may apply for a professional degree—C. E., M. E., E. E.—by showing that they have had charge of responsible engineering work, or have been solely responsible for the designing of engineering work. They are judged by a committee of 3 men, one a member of the Faculty, and two Engineers not connected with the Institution, and on the recommendation of this committee they are admitted to the degree. Dr. Richards thought this rather a good scheme— to make the degree dependent upon the candidate's experience in work.

While this evening work on its technical side is not applicable, or possible to reproduce to any large extent, in small communities, it seemed to Dr. Richards, after his experience here, and seeing the soundness, strength and virility of it, that it might well be involved in any large scheme of education for certain focal or strategic points. In a large territory, perhaps at a few strategic points, there might well be a development of this kind of thing, which is a workingman's college idea.

Evening and Day Courses Contrasted.

The evening courses do not to any extent become feeders for the day-work, though there are certain transfers from one to the other. If a man finds he has the time and resources he transfers from the Evening School to the Day School, and *vice versa*. Of course the Day School gives more hours of instruction than the other; and it encourages the same type of men as the Evening School—those who have had practical technical experience—and 40% of the most recent entering class would answer this description. It is hoped to differentiate the day-work from the regular Engineering Schools, with which they do not want to compete, and to have it largely fulfil a special purpose.

Asked whether a University or a Polytechnic could not have these Evening Schools and do the same kind of work, Dr. Richards suggested the liability of any University man doing day school University work, who has not somehow or other been inoculated with the real meaning and importance of Evening School work, to look down upon it and make it a very secondary affair, and a measure of much lower standards.

"Sizing up" Students.

On the entrance examination English is used not so much as a test of efficiency as to bar out those who cannot use English with facility. For the Day School there is also a personal examination of the candidate before the Committee of

Faculty, who examine him in regard to his previous experience, whether he is going to support himself or whether his parents support him, his general make-up and character. They also give him a physical examination. They try to "size him up," and attach as much importance to that personal examination, though it counts only one in four, as to written examinations.

The Day Courses are strictly Technical, with no Language or History in them at all, and end, like the other, in a degree. The Day School takes in only 120 students. Last year there were 514 applications for the first year; about 260 came to examination, and out of these 105 were taken, the other 15 being repeaters.

In the newer courses the standard has been raised. While the old courses have been running 49 years, the Electrical Course covers the later developments which have been coming in the last 12 years. There is a remarkable development, and that course is gaining very much upon the older course. Out of the 910 applications for admission last year, only 380 came to the examination, but as only 80 students are admitted in the first year their average grade was very high. The standard has been going up every year because the number of applicants is growing so rapidly.

Where Teachers Come From.

The 5 heads of departments (all degree men, and in all cases with practical experience as well), besides 24 other men, give their whole time day and evening. A considerable additional number attend for evening work. In the School of Science they are mostly working in engineering offices of some kind or other during the day and teach here in the evening. An instructor teaching calculus and geometry is in a civil engineering concern; an instructor in trigonometry comes from a neighbouring institution; a man teaching drawing comes from the civil engineering department of the city; the man next him the same way; the next man teaching algebra and geometry is in a civil engineering office; the next is a graduate student at Columbia, who comes here to teach his specialty, mathematics; another man teaching algebra and geometry is head of a drafting room; the next teaching electrical measurements, who has to teach the theory, is a B.S., graduate from Cooper Union, and is now with the New York Telephone Company; and so on. The degrees are not held so generally by the drawing teachers.

The Society of Civil Engineers applies the same test as Cooper Union applies to these men for the advanced degree, and looks at the degree in the same way as those of the Day School; and a large number of these graduates are in the Civil Engineering Society. The teachers average 4 nights a week, 2 hours a night. The total capacity of the institution for day and evening classes is 3,100. The average age of admission to the Science School is between 17 and 18, but it goes up as you increase, so that in the second year it is higher than 18 to 19. The mature men seem to hold on better; the younger men drop out more.

REPORT OF THE DIRECTOR.

The disproportion between the number of persons applying for admission and the accommodations of our present building is even greater this year than in the past. Figures for the year are as follows:—

Night School of Science	3,159
Night School of Art	1,947
Day School of Technical Science	490
Woman's Art School	196
School of Stenography and Typewriting for Women	191
School of Telegraphy for Women	50
Debate and Elocution	190
Civics and Economics	138
	6,361

In addition to these new applications, there were 1,940 students promoted from the classes of the previous year qualified to take up work in the institution, making the total demand upon the classes at the beginning of the present year amount to 8,301 individuals.

The Cooper Union Free Day School of Technical Science affords opportunity to pursue the branches of study which lead directly to the practice and profession of Engineering.

A 4-year course of study is provided which is designed with reference to the needs of students who intend to follow either Civil, Mechanical or Electrical Engineering.

The instruction is given by lectures, recitations, and laboratory work.

The daily sessions of the school are held between 9.45 a.m. and 3.15 p.m.

Outdoor surveys in the Civil Engineering Department may be continued beyond the hour above mentioned.

Degrees and Diplomas.

Students who complete one of the above outlined courses in Engineering, receive the Degree of Bachelor of Engineering. The Degree, however, is conferred only on those students who have been members of each and all of the classes of one of the courses for the last two years of the course, who have been regular in attendance upon all the exercises of those classes, and who have passed the examinations of the same.

Advanced Degrees.

The Degree of Civil Engineer, of Electrical Engineer, or Mechanical Engineer, is conferred by the Board of Trustees upon graduates of the Cooper Union, who have had, after graduation, three years of engineering practice, which shall have included the designing or responsible charge of engineering work.

The higher degrees are conferred upon those who have first earned the Degree of Bachelor of Engineering.

Scholarships.

There are six scholarships of $100 each, for the benefit of students of the Day School.

To obtain one of these scholarships, a student must have a high standing in his class; but other things being equal, the scholarships are awarded to students most in need of assistance.

The scholarships are granted for one year, but by re-applying at the proper time, holders of scholarships will receive preference over new applicants, providing their work during the year has been equal to the standard required for the granting of scholarships.

A student who wishes to apply for one of these scholarships must submit a statement giving such information as will enable the Trustees to award the gifts to the best possible advantage.

FREE NIGHT SCHOOL OF SCIENCE.

There are four distinct courses in this Department:

A 5-year course in General Science.

A 5-year course in Chemistry.

A 4-year Course in Electrical Engineering.

A 3-year course in Mechanical Drawing.

Each applicant for admission must be at least 16 years of age. Residence in New York City *is not* a necessary condition of admission.

Women are admitted to any of the classes in the Scientific Department for which they are fitted.

Pupils are enabled to purchase at the school all the text-books and drawing materials they require, at prices considerably lower than the retail rates.

Free Night School of Art.

Students in the class for Modeling—whether from casts or from the figure—in those for Decorative Design, and for Architecture, have been brought to realize the value of Free-hand Drawing as a preparation and aid to progress in their special work, and are more frequently taking preliminary or parallel courses in Drawing with the regular classes.

In various reports reference has been made to the difficulty of eradicating a tendency, too frequent among our students (fostered no doubt by the demands of their daytime occupations), to expending the greater part of their time and effort in the production of highly elaborated work rather than to the acquisition of a ready and truthful rendering of form, proportion, and action. By dint of insistence upon the more vital qualities of Drawing and by the discouragement of superficial finish and attention to detail, higher aims and a better practice have been established.

In effecting this improvement the institution of our Life Class was of immediate and general service, as it was the consummation of the hopes of years. The somewhat narrow space available offered no ideal opportunities, but by the introduction of partitions, the installation of suitable lights, etc., the necessary physical conditions were provided for a class in which twenty or more students have been working from the living figure, earnestly and with decided success. The impetus given to the lower classes is marked.

Subjects include Decorative Design, Modeling, Modeling from the Living Figure.

Free Art School For Women.

Applicants must be at least 16 and not over 35. Residence in New York is not necessary for admission. Applicants for the Class in Decorative Design should be at least 18 years old. Applicants for the classes in Oil Painting, Drawing from Life, Illustration, and the Advanced Antique, must submit drawings from life or the full length cast. Applicants for the Classes in Miniature Painting and Decorative Design must submit drawings either from the head or from an ornamental form, in cast. The class in Modeling is only for pupils well advanced in Drawing, and the applicant must submit Drawings to demonstrate her fitness. This branch of Art is essential to students preparing to teach Art in the public schools.

Diplomas are awarded only to those students who have three first grade certificates. Each diploma will state for what classes the certificates were given, and every additional first grade certificate will be added to the diploma.

Report of the Art Director of the Woman's Art School.

The Modeling Class has been active as heretofore in its various branches. The present class being largely composed of new members, the exhibition of a high degree of ability cannot fairly be expected in the work of the year.

The lectures on Anatomy, Perspective, Composition, and on the History of Art have been well attended. The latter course embraced visits to the Metropolitan Museum of Art and the writing up of their notes by the students. The other lectures also demand more from the students than mere attendance; in each subject notes are taken, problems solved, or compositions offered for criticism, and, in some, examinations are held.

Free School of Stenography and Typewriting for Women.

The term begins the second of October and ends about the middle of May.

The school hours are from 9 a.m. to 1 p.m. every day, except Saturday. Applicants must be at least eighteen years of age and not over thirty-five. Application for admission may be made between August 1 and September 1. Applicants must be prepared to pass an examination in penmanship, spelling, composition and writing from dictation. Munson's system of stenography is used. Graduates of one term are qualified to take positions. Number of students admitted, 56.

Free School of Telegraphy for Women.

The term begins the second of October and ends about the middle of May.

The school hours are from 9 a.m. to 1 p.m. every day, except Saturday. Applicants must be at least sixteen years of age and not over twenty-four. Application for admission may be made between July 1 and October 1. Applicants must be prepared to pass an examination in penmanship, spelling and writing from dictation. Number of students admitted, 25.

SECTION 2: CARNEGIE TECHNICAL SCHOOLS, PITTSBURGH, PA.

These comprise 4 separate schools, in all of which both day and night courses are given. A student enters whichever school offers instruction for the particular vocation he has chosen.

The School of Applied Science.

This school is for the training of young men who wish to become Electrical, Chemical, Civil, Mechanical, Commercial, Metallurgical, Mining or Sanitary

Engineers. The aim is to equip the student with the scientific principles underlying his chosen field, and at the same time to train the reasoning faculties and develop the power of applying abstract theory to practical operations so that he may be able to utilize in industrial fields the knowledge acquired in the schools. Energy, initiative and individual capacity are recognized as of paramount importance, and emphasis is laid upon the necessity of forming habits, character and associations which will make these traits of permanent productive value.

The School of Applied Industries.

This school gives instruction to three groups of students:

(1) Regular 3-year industrial courses for those young men who desire broad industrial education equipping them to become foremen, inspectors, assistant master mechanics, assistant superintendents, etc., in the manufacturing and building trade industries.

The Day Industrial Course, departing from the usual custom of emphasizing skill alone, is outlined to include a broad general foundation for habits of observation, initiative and thoroughness. It endeavours to train the mind and give a knowledge of processes, leaving the acquirement of exceptional skill to the student's after career in gainful occupations. Special emphasis is placed on the necessity of the graduate becoming a good citizen, having those principles of right living, personal hygiene and a knowledge of the general industrial conditions of the country at his command to enable him to become resourceful in the event of necessity. The plan of instruction contemplates courses which comprise a group of correlated trades and industries so that the graduate may have a wide range of opportunity when seeking employment.

(2) *Special Short Courses* (one year) in which thorough instruction in a single trade is given to those mature enough to profit by it. These courses are particularly advantageous to young men approaching their majority who, having served the larger portion of their apprenticeship, wish to enter the field of skilled workmen with more training than the shop generally gives to the average apprentice.

(3) *Night Trade Courses* for men already engaged in the trades, or those who need a more thorough course than can be secured in their daily work and wish to combine up-to-date practice with theory, and thus increase their efficiency and earning power. These courses are in the nature of continuation schools in which men who reside and work within a reasonable distance of Pittsburgh may secure intensive trade instruction combined with such theory as it is possible to offer with the facilities of the institution and the limited time which the student can give to study.

Courses for Teachers.—Day school courses are also offered for the training of teachers for Manual Training, Industrial and Trade Schools. These courses require approximately 3 years, but men now engaged in teaching who offer evidence of thorough preparation in any subject of the course receive credit for it and thereby reduce the length of time required for graduation.

(See the fuller description of this School under Section 3 immediately following).

The School of Applied Design.

This school is for the education and training of students in Art and Design. It offers courses in Architecture, Interior Decoration and Illustration; further courses are to be added when the new building, to be entirely devoted to the Arts, is completed. Advancement from stage to stage of the work is based on a system of acquirement of 'credits' which allows the greatest possible flexibility of adjustment of work to individual ability.

The Margaret Morrison Carnegie School.

This school is for the education and training of women for the home and for leadership as well as for occupations requiring technical specialization. (See statement by Miss West, page 1541).

SECTION 3: THE SCHOOL OF APPLIED INDUSTRIES, CARNEGIE FOUNDATION, PITTSBURGH, PA.

This school is a part of the Carnegie Technical Schools for which the city of Pittsburgh provided the site and Mr. Andrew Carnegie the funds for the buildings and equipment in addition to an endowment of $7,000,000.

In the School of Applied Industries young men who desire to enter industrial work are assisted to select a congenial trade, and are given instruction not only in that trade but in all closely allied subjects, thus preparing them to start in as competent workmen. Older men who are already engaged in trade may obtain in the school such additional information relating to their work as will increase their efficiency and consequent earning power.

The school is open to both day and evening pupils. There is no fixed age limit on school entrance, although 16 is regarded as the earliest age at which a pupil can fully appreciate the responsibility of the work. As a rule no work for wages is done by the pupils during the school year, but pupils are encouraged to seek employment during vacations in lines of work similar to the courses pursued in the school, and there is a bureau organized especially for this purpose.

Courses and Trades.

In the Day School two courses are given:—(1) A regular industrial course extending over 2 or 3 years, intended for young men who present evidence of good scholarship, and whose age warrants the expenditure of time to lay a broad foundation for trade work. This course deals with the sciences fundamental to all trades, and includes practice in the various shops. (2) A short course, which may be finished in 1 year for maturer men who possess considerable experience in a trade, and who desire to confine their efforts to improving themselves in that trade only.

A course for teachers to take charge of departments in Manual Training and Trade Schools is also offered.

The different trades dealt with in the school are bricklaying, electric wiring, forging, foundry work, machinist, pattern-making, plumbing, stationary engineering, heating and ventilating, sheet metal and cornice work.

The Evening Courses are intended primarily for those who are working at a trade. In addition to the trades taught in the day school, house painting, graining and sign painting are taught. In the formation of classes preference is given to men already at work, as it is recognized that they are in the best position to make use of the instruction. The usual time required to complete a course is 4 years.

Information obtained from 'Conversation' with Dr. A. A. Hamerschlag, Sc.D., *Director of Carnegie Technical Schools, Pittsburgh, Pa.*

Dr. Hamerschlag considers that the period of adolescence is too early a stage, physical and mental, for the child to determine with wisdom its own natural aptitudes, but he is very much concerned that children even sooner than 14 shall secure something besides mere book-learning. They need a development of the motor centers, the activity nerves, which can only come from play and work. If that play can be made educational, i.e. stimulating to those nerve centers, it makes the material capable of intellectual fertilization when they go through their adolescent period.

Differentiation in School Work before 14.

It seemed to him tremendously important for people interested in Industrial Education to get out of their minds the mistaken notion that the period of a child's life up to 14 is a wasted period if he is not trained for actual shop practice or for brain work or agriculture.

Referring to a recent statement that one American city proposes to educate the children so that there shall be no jar to the child when he leaves school and goes into the factory, Dr. Hamerschlag thought nothing could be more disagreeable to a child than to feel that its environment in school was not richer, better, more formative and more stimulating than the atmosphere of a factory. Hence there ought to be a jar; there should not be any slipping from childhood into harness; certain active nerve centers in the body and brain should resent harness, if people are to rise even in the scale of industrial activity instead of becoming automatons or machine attendants. While he wanted the child to have some acquaintance with industrial processes, it should not be through

Manual Training of the crude type, which tries to imitate factory processes, for he claimed this paralyses, and is not sufficiently educational. He asked: 'Which would do the most towards stimulating and educating the child's mind—the quick conformation in clay through its fingers of something which is beautiful in shape and form, or the slow and tedious imitative process of trying to make a poorly-designed chair because it happens to be wood ?' Educatively, the clay would do most for the child; for physical development the chair might do most.

Dealing with the period of a child at the age of 14 or 15, when there is still room to do something beyond what the elementary school could have done, he disputed the statement that this can be given only through certain industrial channels.

Expression Through Work.

This institution, by stimulating the Arts, stands as a refutation of the idea that the only way to give Manual Training is through wood and iron. It offers an outlet for those who want instruction in the Arts, whether Painting, Architecture, Music or the Drama, believing that everything vocational, whether in the Fine Arts or in the trades, is equally uplifting and equally desirable in the civilization strength of a country, by virtue of the possibilities it gives the human being to express one's self through work. No one can say that the labor of the bricklayer is less dignified or less important than that of the machinist; and the latter cannot say that his labor is less dignified than that of the artist. They are all valuable, because they are all expressions of individual human beings, all of whom have human variance.

The ideal system of education in Dr. Hamerschlag's opinion is the one which offers to the greatest number of children the greatest number of elective methods of expressing themselves through work. The general proposition is this: You have so many different variables; you want so many human avenues by which the children can get training through work. That is the finest educational idea. But you cannot do that if too early in life you narrow the vocational impulse into a few mediums. Color may be a medium for one child; music for another; form for another; various materials give different media for different children and all you want is that the child shall express himself in work of his greatest capacity, whatever that may be. If it is on the lower scale he naturally turns into the lower scale of industrial activity; if on the higher scale he rises, whether you provide the work or not; but he rises faster if you have the different agencies to develop him to the position of leadership.

Selection from the Mass.

Dr. Hamerschlag defined the difference between work and education by saying that the thing a child is compelled to do, which is induced by things outside of himself, is usually waste, educationally; but if he craves work it is educational. If he has to work it may be wasted as far as his educational growth—not his usefulness—is concerned; for it may be so distasteful, and the reaction may be so strong within the child, that psychologically it hurts him. Those are the two extremes. Midway between them we have the great normal group, of whom we must think educationally. We cannot run education for the experts; it must be for the benefit of the great mass of the people, whether it be an institution for research or one for leadership. It must be for the mass, because out of the mass springs the individual who becomes the leader. It is like having hundreds and hundreds of roses in order to produce an 'American Beauty' by elimination. The others are roses, and each has its place, but they are not the exceptional. We must include the great mass.

The important thing is to have a great number of electives, and no sharply-defined lines between the stages of elementary, secondary and higher education. They must be as flexible as the human variant, so that the individual can fit himself in to any one of the educational schemes. The idea of trying to limit the life of intellectual activity at a certain period is just as extremely bad as it would be to concentrate in another period all the motor activity with no intellectual activity. It must be a gradual transition; it is the transition we see in connection with all industry. There is no sharply-defined place at which we can say: 'This is the point where an educational institution ought to shut off one form of activity'. Activities ought to be continuous; therefore he did not like the proposition which dealt only with the 14-18 period. If he had his way in Pittsburgh he would begin at the kindergarten to make the child use its hands and get the sense of form and of color so that it could begin to express itself; and he would continue some forms of those activities all through its schooling, up through the college and university, running it in varying quantities, parallel with great principles and methods by which the child could express itself.

Differentiation at 12 Years.

Dr. Robertson cited the schools of Winnipeg, which now have hand work all the way from the kindergarten to the High School; he had not seen any better organized school system. On the one hand there are a good many of the boys of whom it is known, from their parents' circumstances and perhaps because of their own taste, that they will leave school at 14 and earn their living at hand labor, even in the higher spheres of activity; on the other hand, there are other boys of whom it is known that they will go at least through the High School. Now would it be a good thing, he asked, to differentiate the course of training as early as 12, and give some manipulative training to those boys?

Dr. Hamerschlag replied that he thought the reverse should be done, because the one who is going on to the university will be deprived of hand work, while the other is going to get a dose of it for his whole life. To balance things, the one who is to go into academic life ought to have the over-dose. He believed it better to allow hand work to bear its proper proportion all through, and take it as part of the educative nerve formation of the child or the man.

Dr. Robertson, assuming for clearness of explanation a slight distinction between manipulative exercises which may give a boy manual training, and practical work which would have some commercial value in its product, asked whether it would be a good thing to have a boy do some real work of the latter kind in school, when he gets past 12, if it has also educational quality?

Dr. Hamerschlag thought the commercial work ought to be very slight if at all before 16, for the reason that you cannot train perfect teachers, nor get them to keep the proper relationship between material output and education. There would be a constant striving after output, with too much time devoted to what may be considered the minor product, while sacrificing the bigger product, education. If we had an ideal teaching-colony, we could say arbitrarily, 'We will spend 10% of the time of the student in productive activity which has an economic value'. But unfortunately, with the limitations of our teachers we have no such Utopian educational possibility. Therefore we go to the other extreme, and for fear of that very tendency we make nothing for the market—nothing that is definitely economic. The Worcester Polytechnic and some other institutions, like the Williamson School, concentrate in that direction.

General Culture with Technical Training.

In Dr. Hamerschlag's judgment the Cincinnati scheme is going to produce capable, economic foremen or managers, "but they cannot insert in their curriculum, (because they have not sufficient hours), much of the imaginative vitality which we give to our education. During hours when their students are confined to marketable product we are taking our industrial students through fields that in the average trade school are thought non-productive, and are trying to stimulate their imaginations in other directions.

"For instance, students of the Engineering School must take their courses in History and Music; those in Applied Design must take their studies in Applied Art. They are being taught that an ounce of brains moulded into a great wheel is worth 20 cents a pound, but the same thing beautified by the inspiration of genius or of art may be worth $1,000. They are getting the relationship of what we might call the artistic side to the productive side".

Business Value of Design.

Dr. Hamerschlag: I heard one of my teachers giving an example the other day that was most interesting. He described a man who was manufacturing covers for bedsteads, woven textiles, the pattern being rather tawdry—impossible coloring and an impossible pattern. The salesman could not sell for this factory in great quantity, so he came back and stated that if he could get a good pattern, even with the same amount of material in it, he could double and treble the business. The manufacturer sought out a good designer, who merely outlined a more beautiful pattern that had some point to it, some motive, and some good color. The same quality of worsted or cotton material was used, and the same amount of labor went into the production of this pattern, but the business trebled and quadrupled. So we keep telling these students that they must keep their eyes and their imagination trained for increasing the value of the product as well as for merely making the product accurately.

Dr. Bryce: Will you turn out men as well qualified for doing practical work?

Dr. Hamerschlag: Better; they are infinitely better by actual test. I had charge of the New York Trade School for a dozen years before I came here. I have been through all the stages trying to work out the problem of short apprenticeship, intensive skill, and I have compared it with what we have done here, and our students do better work because they are mentally stimulated as well as equally skilled. The skill comes automatically if the inspiration, the love of doing the best, is properly established in the man.

Co-operation and Correlation.

Dr. Robertson: Has he plenty of opportunity ?

Dr. Hamerschlag; He gets plenty of opportuntiy for work leading to skill in this institution. In Saturday employment and very largely in day work, and coming here at night, and also in the long summer period when he is at economic work, he gets the correlation of the two. I am convinced that our system of co-operation between the Trades Union, through its education committees, and the manufacturers through our night classes and Saturday employment, is an infinitely stronger medium than anything which would be more crystallized and more cut-and-dried into periods, because we can attract a much greater mass, we can depend more upon the student's initiative, and we can also be absolutely free from any dictation from any outside source. We are absolutely free to handle the educational proposition as experts; the manufacturer is equally free to handle his individuals as working units; and the outside associations of labor men must recognize the value of this as a competing force. We are unrestricted, and I believe the great essential thing for any educator is to have a free field and no favor to anyone except the individual, because our product must be the man.

Having been around these buildings you will realize we have everything from the most elementary trade workshops up to research, which latter we do not think belongs here at all. We believe ours is a big enough work to utilize the knowledge which has been secured by other agencies, without trying to search around for that. We believe research is the function of the institution at Washington, while our business is the man, the woman—not the science, not the subject-matter—and we must stimulate and build them up. I say that if you in Canada are going to do good things in education you must keep constantly in mind the man and the woman, and not the subject. Allow the subject to be merely the vehicle by which they express themselves, and make that many-sided.

The New Kind of Apprentice.

Being asked what he was going to manage to put in the place of a system of apprenticeship that is gone, Dr. Hamerschlag replied: This is doing it, for the reason that we don't need the old-fashioned apprenticeship any more. Our system of manufacture, our units of establishment, are no longer the subdivided units of the home and the small factory; they are the great mill, the great enterprise. Even in agriculture the time when man and horse labor produced the corn is threatened with change by the great machinery that is being used—ploughs mechanically driven and harvesting devices. It is not a question any more of producing that kind of apprentice.

The new kind of apprentice cannot be produced in those big establishments, because the processes are too minutely subdivided; machinery subdivides entire processes; therefore the student must be allowed to come outside. The apprentice must be permitted to get a general view of the thing and its relationship; then when he finds himself in a portion of it he is not absolutely like the semi-skilled helper in the shoe shop who does a certain portion of work on the last and does'nt know what relation it bears to any other part of the shoe; whose work is only temporary automatic labor, ultimately to be supplanted by the machine, and himself probably to be driven further down into lower occupations. He must be equipped for the change in the arts either by night school or in some other way.

I am called the father of night school work in this city, yet I am only a very young man. What I cannot understand is how we were so many generations without the night school, which doubles the number of students. There are just as many young men in this institution in the evening as in the day time. I want public schools to do the same thing—double their capacity. I want every big organization to partially help to educate its masses. The great danger, in leaving education entirely to these industries, is that of making it too narrow.

Mentality vs. Machiner

Mr. Simpson: Under the factory system, with its organization and subdivision today, and the education of the mechanic going on outside the factory altogether, what will be the result if a man is educated in school to cover a certain number of departments in a factory, yet on the other hand the manufacturer confines him to the drudgery of one occupation after he leaves school—there being no compulsory influence over the manufacturer to allow that man to utilize the particular education which he has received in the school?

Dr. Hamerschlag: That is what is taking place today. Very soon the individual refuses to remain in that harness which deprives him of his liberty, or else he remains in it to his great individual harm. Pyschologically he becomes deadened by routine processes, or gets into a position of resentment which ultimately makes him leave that employment and seek something for which he has not been well trained. Then he rises to another avenue, and the general principles applicable to all industrial arts carry him through. For instance, a student may leave this institution trained as an electrical wire man, and find that he is put into the process shop where they make a lamp socket, repeated a thousand times. I have known that boy get deadened by his work, then resent it, and leave to go and work in a machine shop, beginning at less than half the pay he got as a skilled man in the other field; but in a year I would see him rise quickly over the untrained individual, and come out as a manufactory unit, but not in the direct avenue of the trade he began. Opportunities of that type are simply tremendous, unlimited, because the development of labor-saving machinery is more and more demanding a sharper mentality than in the old days, for it requires a much bigger mental vision and a much better comprehension of processes to work quickly than slowly.

Trade Unions and New Processes.

Mr. Simpson: But in factories today we see hundreds and thousands whose motions are simply dictated by the revolutions of a machine, and who from their daily labor get no intellectual inspiration.

Dr. Hamerschlag: That ought not to be. They ought to be supplied by municipality or government or private endowment with opportunites for play, for recreation, for study in the balance of their day, to allow them to get out of that and allow others to get in. I am in a pretty good position to talk about the men who come to me from the labor unions, and they have a perfectly legimate claim for organization, for demanding a minimum rate, and for doing everything except 'soldiering'. I agree with everything except that you ought not to restrict the individual. Give the fullest free rein to create more opportunities, and make the standard of quality of your work command recognition; and I say, 'Come up here as individuals, and take whatever we have, equip yourselves, and go back able to do more and demand more; you are worth more, and you ought to have it.' A great many of them have done it, and have done it successfully. Presidents of Unions have been in here as students, and have gone back and formed educational committees and said, 'Boys, we have got to get ahead of this new method of using this material before anybody else does, and we are going to demand 50 cents a day more for doing it that way, because there is no supply.' Now, if other people can hold their product at market rates, why shouldn't labor hold its at market rates? As long as restriction is based on quality and merit, I don't know but it is a good thing; but when it is not based on quality and merit it is a bad thing. This institution and others have to help the working man get his position properly asserted, and see that the community gives merit, skill and ability their reward.

The ideal system would be, where compelling necessity puts a child into harness at 14, to also compel the user of the labor of that unformed, undeveloped man, to contribute something to his educational stimulus; he must not be deprived at that adolescent period of some chance to form himself—to resent, if you will, this hard, atrophying, terrible work.

Moving Pictures and Evening Classes.

I have no doubt that ultimately we are going to see the moving picture machine a very remarkable stimulating medium. We have them all over our school. There are lots and lots of students that cannot get the thing through the ears, that get it through the eyes. I have been a great advocate of evening classes. I believe that with an 8 hours day in this country a great many of the working population are going to get their education outside of working time.

With the improvement of transportation facilities and lighting methods, there is no doubt that the so-called night school is destined to play a very important part in general education.

Further Education of Skilled Workmen.

Dr. Robertson: Is it your view that the workman after he has passed his apprentice period altogether will prolong his education in some agreeable way?

Dr. Hamerschlag: Yes, we have them here, all journeymen, all averaging 30 or 40 years of age; not exceptional men; we have a whole mass of them; I suppose I have 200.

Dr. Robertson: Is it your view that the workmen will devote themselves systematically two evenings a week to some sort of civic as well as industrial culture?

Dr. Hamerschlag: That is what they do here. The journeyman who comes here does not want any shop work here, nor to be taught in another fashion the things he already knows. He comes here to get something supplementary to it—largely, we find, because he craves institutional activity. He wants to be a member of the Glee Club, or to be with the students, or wants to be a force in the city, and he wants a kind of combination of education and club. He wants college traditions reduced to him as an expression of his life here. So he comes here and takes subjects like English, if deficient in it, so that he may understand more about philosophy. I found a fellow last night sitting in the hallway reading the life of Carlyle. I asked him how he happened to read that. He said, 'Well, I am very much interested in social democracy, and our teacher mentioned that Carlyle had said some things about it, so I got this from the library, and while waiting for my classmates to meet me for a little debate I thought I would read it.'

Stimulating Social and Civic Spirit.

That is typical of a whole lot of these men. They are not here for hand improvement, for skill, for increasing wage-earning alone, but because they want to be part of some stimulating life. These are the sociological developments of which Mr. Field has charge. They have athletics, dramatic club, debating clubs, literary clubs, glee clubs, and all. This whole institution is permeated and filled with all those different kinds of activities, in which these men classifiy themselves not by virtue of the subject they are studying but by virtue of their common inclination. We have fellows who form themselves into a club to visit the museum. In the summer they go out and make collections of butterflies; some of them are interested in anthropology; others find here a lot of other fellows who are studying about our government, and they will go into those clubs. If they stayed out in their own district they might find two or three fellows; here they are always sure to get 25 or 30. We encourage that by giving no money ourselves. We say, 'If you want that and really believe in it, you believe in it enough to pay up your fee which supports all these activities.'

This kind of education is recognized as developing social and civic spirit as well as industrial profits; and we encourage our fellows to stand for public office in the city. I suppose 10 officers of the outlying boroughs are our own graduates. Every school has its course in civics; even the girls there have been studying their relationship to it. We think the time has come when the women must have an appreciation of what their civic duties are, and we encourage them in that direction. That is what we mean by widening their household interests and stimulating their imagination. That is a thing which ought never to be neglected or small, because you are interested in the plan of increasing the productivity of the hand.

Discussion of Economics, Civics, Etc.

Mr. Simpson: In your course of civics do your boys study the development of the Trades Union movement?

Dr. Hamerschlag: Yes; not only that, but in civics and economics they have constant debates, and we frequently bring in men from both sides. We get a business man to give his view; a corporation leader to give his side; and a socialist leader to give his side—not at big classes and mass meetings, but where there is intimate discussion. Then we go to this point also—we speak of the philosophy of industrial economics, discussing the piece system, the output system, the wage system, the day rate, the month rate, the industrial accident liability insurance, the question of pensions—that is usually the hardest discussion of the year, whether the pension for the employee is a right or a privilege, and out of which side of the cash drawer it should come, and where it is actually deducted. These are the live topics before these fellows for discussion, because we believe that is the only way we can open their minds. It is an interesting thing to notice sometimes the reactive forces which take place; a man who is arguing in favor of one condition finally gets into a place where he is arguing on the other side. It takes a pretty able man to keep the logic of his argument constantly on one side of the question where you have a lot of young fellows, all eager, all interjecting their questions. We have had some very interesting experiences in that direction.

SECTION 4: MASSACHUSETTS INSTITUTE OF TECHNOLOGY, BOSTON.

Information obtained in "Conversation" with President MacLaurin.

This Institute (familiarly known as "The Tech."), the Massachusetts Agricultural College at Amherst, and the Worcester Polytechnic, are the only three institutions of higher technical education receiving help from the State of Massachusetts. The Polytechnic has a course parallel to that of the Institute, but nothing like the equipment, and confines its work to Civil, Electrical and Mining Engineering, receiving about $15,000 a year. The Agricultural College, founded about 50 years ago, is now entirely supported by the State, receiving

$50,000 yearly. It has a farm, but its work is not nearly so extensive as that of Wisconsin and some of the Western Colleges. Massachusetts' share of Federal grants under the Morrill Land Grant Act was divided, two-thirds going to the Agricultural College and one-third to this Institute, which agreed to keep away from Agriculture and Forestry.

State Aid and Early Work.

For the last 20 years this Institute has been getting $25,000 a year from the State, but beginning in 1912 it will receive $100,000 yearly for ten years, in view of the special problem of moving to new site, building, etc. The annual expenditure is $700,000. The Institute gets nothing from the Government for research, and has no direct dealings with the Federal Government in connection with the Morrill Act, the money from that source coming to the different States, which apportion it. The amount is gradually increasing, as it varies with the value of the land. The two Acts under which the Institute has been receiving money from the Federal Government through the State of Massachusetts are the Morrill Act of July 2, 1862, and an additional Endowment Act of Congress, August 30, 1890, but the Institute is not in any sense a State institution except that it gets this $25,000 to $30,000 from the Morrill Act. The State has representatives on its Board of Trustees.

The Institute began just 50 years ago in a very small way with 15 students and 5 instructors in the present building. In those days the courses were not really technical. It had a few courses in Chemistry and Physics, really only scientific courses. They had a very clear idea of building up a Technical Institute, but the Civil War broke out only a few days after the Charter was signed, money was hard to get, and the time was not opportune for founding such an institution; so they went along very cautiously for a number of years and had very small numbers. As soon as they could finance even in a very modest way they started to have somewhat definite schools, beginning with the old well-established Civil Engineering and Mechanical courses. Then in a year or two they formed a Mining course. They ran along like that for quite a while.

In addition to ordinary Engineering courses the Institute now gives courses in (1) Public Health, (2) Architecture, (3) Ship Building.

How the Public Health Work Began.

All along they had done a good deal of Chemistry, and it so happened that they got men who were interested in the application of Chemistry to problems of Sanitation and Public Health, etc., and began to specialize along those lines. That ultimately led to the establishment of a special course called Public Health, which has come to be a very important field of work for the Institute, in which it gives a degree. It has been found that they can do work which apparently the Medical Schools cannot do as well. There is a tremendous demand all through the country for men trained in the Engineering School who add to a certain amount of engineering knowledge the necessary amount of Bacteriology, Chemistry, etc., required to administer Public Health Departments in the various

States. For every graduate in those courses places could be got for ten. Every new city is always wanting something done by administrators of Health Departments, men to put down proper sewage systems, etc. The Department is not very large relatively to the others, but has grown very important. It has been helped by the liberality of private benefactors. An anonymous woman takes a great interest in it, and has given a great deal of money each year for investigations and research into certain problems of public health. An experiment station in sewage disposal has been established, and there for many years researches and experiments have been made into various methods of disposal and treatment of sewage, etc. Extremely important work has been done, which is known in Germany and England, and men come from there and from various parts of the United States to learn about it.

Work in Industrial Chemistry and Research.

The work in Chemistry began along stereotyped lines, but it was realized that it was better to get in touch with industries and find why there was not so much chemical industry in the United States as there ought to be, and how the Institute could stimulate it. The first thing to do was to get hold of first-rate men. One was brought from England and one from Germany, and a large department has been built up, comprising between 50 and 60 professors and instructors. A very important part of the work has the definite aim of keeping in touch with the industries of the country. In order to do this, students every year organize at their own expense summer excursions for six weeks, and visit industries all over the country as far west as Chicago, spending three or four days in various works.

More important than that in some ways has proved the expedient of establishing a series of laboratories to undertake experiments for different chemical industries. This has proved extremely valuable both to the Institute and to the industries. Those laboratories are maintained by the industries, but there is no direct profit in it to the Institute. Agreements have been made with the DuPont Powder Company, what is known as the "Powder Trust," the United States Steel Corporation, Edison Electric Company, General Electric Company, Arlington Cotton Mills, and a great many large Corporations to undertake for them the routine work of research, which is done in the Institute. For instance, the Powder Company find some difficulty in the manufacture of some particular kind of explosive; their own men have tackled those problems but have not found a solution; so they agree to pay so much a year for the Institute to do that work, being charged only the actual cost of investigation, salaries, running expenses and materials.

Graduates and Research Problems.

The Institute now has a staff which practically does nothing but that work; and it has been found especially valuable to put young graduates at those problems—it gives them their head. If they make a successful hit they get in touch, for instance, with the Steel Trust, who usually write to the Institute to send a representative. The Steel Corporation in manufacturing particular metal sheets could not get a uniform product; perhaps five out of every hundred sheets would be different, mainly in color, from any other sheets, although all were similarly treated, which meant that 5% of their product was lost, because they could not sell it in that form. They puzzled over it for a long time, but could not make it out, so they asked the Institute to investigate that problem, and after working two or three years the Institute men ultimately straightened it out. Another problem is that of corrosion of various metals, why they rust, and the proper way to prevent rust under different conditions—a large problem because of such a variety of conditions. That involved really years of research, and is not finished yet. The Powder Company have similar problems.

Saving $300,000 a Year.

The Gorham Company in Providence, R.I., making what is called sterling silver, have problems of annealing which have caused very much trouble for years, but which the Institute men attacked very successfully, saving by that single investigation about $300,000 a year not merely to that company but to a group of companies interested. The Institute received no direct benefit at all except the cost of the investigation, part of its policy being not to charge for such things. The professor who had charge of that investigation was and still is a teaching professor, but the research part of his work has become so important that the teaching has slipped into the background for lack of time.

When the department of Physics was started 30 years ago there was no such thing as Practical Electricity, Dynamos, etc., and this was the first institution in the world to establish a department of Electrical Engineering. The Institute is always having pressure put upon it to establish some new thing.

Training Foremen in Evening Classes.

In the early days of the Institute it was thought necessary to cater for foremen, but it was afterwards found that it had to have a definite aim, which is now to prepare for the Engineering profession.

Although the establishment of evening courses for training foremen was of no direct benefit to the Institute, yet it freely loaned its building and apparatus and actually supplies instructors to the Lowell Institute, which conducts these classes and pays instructors extra remuneration for their evening work out of its own funds. These classes have about 100 students training as workmen, foremen and superintendents. On completion of a 2 year course graduates may enter the second year of the day class. About 10 are now taking advantage of this plan.

This evening instruction work is voluntary on the part of the Institute professors. The older men do not care to give up their evenings, but most of the younger are quite glad to undertake it, find it very interesting, and are mostly quite enthusiastic about it, as it brings them in touch with keen men who on the practical side often know more than the instructors. The authorities encourage this, because it helps instructors to keep in touch with actual conditions in practice, which the history of the Institute shows is the key-note of success.

VISIT TO THE INSTITUTE.

There are 1,600 students paying $250 each, but each man costs the Institute nearly $400 a year, counting administration, teaching, fitting and upkeep of laboratories, but nothing for plant or upkeep on buildings. The authorities, afraid the school will grow too big, keep it as small as possible by sifting continually on entrance and during the 4 years, so that graduates are not more than a third of the men who enter. At the end of the first 5 weeks all freshmen are examined, their marks tabulated on large sheets and set up in a room where all their instructors meet and discuss the men's work, pass certain votes, and report on work which is "unsatisfactory" or "very unsatisfactory." If the student does not improve he will not be allowed to remain until the end of the term. These reports are sent to the faculty and adopted *en bloc*, and parents are notified. Five weeks further on there is another examination and the same thing is done, only in a more serious form—the whole faculty decides on the marks. If a man's marks show that he is not able to do the work, or if in the opinion of the instructors he could have done better work but will not, he is required to withdraw. This seldom happens at the end of the first term unless his work is exceedingly bad. He is allowed to go on for 2 years with warnings in the form of votes of the faculty and notices to his parents. Out of a class of 400 under this system there would be about 10 required to withdraw each term, or 80 in four years. Some have to withdraw on account of failure of resources, etc.

FEATURES NOTED BY COMMISSION.

The following features were noted:—(1) Entrance Examination of high grade including English, French and German. (2) English Composition and Chemistry are stressed in first year's course. (3) Correlation of Chemistry with the industries in subsequent years. (4) Special Research Laboratories for the Industries under separate staff.

Of the 1,600 students, 185 come after complete courses in the colleges, or after two or three years; those men, after examination, are placed higher up. French and German are required for matriculation. English Composition and Physics are given in the first year, very well-educated individual instructors being employed, so that each student can have a quarter of an hour. The aim is that the men have an idea of English as a collateral subject. The men who teach English also act as advisers to those students, who are encouraged to talk to their adviser on all subjects, hence a confidential relation grows up between them. Students are divided according to ability, in the sections. The student has class room and also individual work. The instructors are changed in the term. There are very few special students, and these are mature.

School for Industrial Foremen.

Those who are deficient in education or come for only one subject, such as drawing, are discouraged not only for lack of room but because the slower men in the section would carry the standard down. A man who has taken the Scranton course but who has not the standing for entering is rather discouraged, as it is not the wisest way to spend his money, the Institute's position being so much higher; but in the evening the School for Industrial Foremen already referred to, which is absolutely free, uses the laboratory. The Institute instructors use the same laboratory, but conduct the course in a different way, as those men, about 100, take the 2 years' Mechanical or Electrical course and get a certificate for industrial work, not a degree, as they do not require the same standing.

Various Training Features.

In the Architectural Dept. there is a fine collection of photographs, classified; an excellent collection of books and students' drawings. In this course a great deal of Freehand Drawing is given on the board to develop the artistic side. The teacher is a "Prix de Rome" man. Students get a course in history of civilization; proper coloring; work with pencil, pen and ink; throughout the year a large amount of freehand drawing. All the students get freehand drawing the first year; the Architects get a little more after they have decided on their course.

The Institute does not charge fees to manufacturers for tests nor give certificates of such, the making of tests being a perquisite of the professors of Engineering, who sometimes earn more fees outside the school than within. The experience with practical problems is helpful to students, and also brings them in touch with the manufacturing community, besides giving the professors an opportunity of placing students, who are thus able to get a living wage from the start.

Special Manual Training work is required in all 4 years. No set pieces are made, but all principles are fully taught, and in each course a very full line of types is covered, practice being given on all the things that can be made with saw and chisel.

Director Smith of the Manual Arts Department claims a very distinct superiority for the laboratory method of teaching principles, and says that when the student gives his whole time to the work he can turn out a thorough mechanic in six weeks.

The material from Prof. Della Voss' Technical School in Russia which was exhibited at the Centennial Exposition in Philadelphia in 1876 is in possession of this Institute, whose faculty was the first in the country to start this branch of work.

COURSES AND DEGREE.

Only one degree is given for all graduates in whatever Department—that of Bachelor of Science.

FOUR-YEAR UNDERGRADUATE COURSES.

Regular Cour es of Study leading to the degree are offered in:—

Civil Engineering, Mechanical Engineering, Mining Engineering and Metallurgy, Architecture, Chemistry, Electrical Engineering, Biology and Public Health, Physics, General Science, Chemical Engineering, Sanitary Engineering, Geology and Geodesy, Naval Architecture and Marine Engineering, Electro-chemistry.

In most of these Courses distinct Options are offered in the later years which enable the student to concentrate more of his attention upon some one side of his profession. In no case, however, is the specialization carried so far as to preclude a thorough training in all the fundamental branches of the subject. The more important of these Options are as follows:—

Civil Engineering.—1 Hydraulic Engineering, 2 Railroad Engineering.

Mechanical Engineering.—1 Marine Engineering, 2 Locomotive Construction, 3 Mill Engineering, 4 Heating and Ventilating Engineering, 5 Steam Turbine Engineering.

Mining Engineering and Metallurgy.—1 Mining and Metallurgy, 2 Metallurgy, 3 Mining Geology.

FIVE-YEAR UNDERGRADUATE COURSES.

These Courses leading to the degree are designed to meet the needs of 3 different classes of students:—(1) Those who wish to complete in 5 years the work of 2 allied Courses; (2) Those who wish to combine with the work of a single professional Course a larger proportion of humanistic studies and of work in general science; (3) Those who wish to distribute the work of a single Course over 5 years without undertaking additional required studies.

For all 3 classes the foundation is a common 5-year schedule including all the studies of one of the professional Courses, the difference lying in the use of the free time not assigned in this schedule. In all cases, moreover, the work of the first year is identical with that of one of the regular 4-year Courses, thus affording the student an opportunity to base his choice on a year's experience and on conference with members of the Faculty.

COURSES FOR TEACHERS.

To teachers and to persons of mature age engaged in technical pursuits, and wishing to devote some time to scientific study, the Institute offers the amplest opportunities in its lecture-rooms and laboratories. Such persons may in general be admitted without formal examination, on satisfying the Faculty that they are qualified to undertake the work proposed. They will be expected after admission to attend the same exercises and examinations as other students.

CIVIL ENGINEERING COURSE.

This Course is designed to give the student sound training, both theoretical and practical, in the sciences upon which professional practice is based. Particular care is taken to enforce the application of principles taught; the student is made familiar with the use of engineering instruments and the usual problems of practice.

Civil Engineering is the broadest in scope of the engineering professions, being the parent stem from which have diverged all the other branches; but, even though these have become recognized as distinct professions, the field of Civil Engineering still remains so large that no one can become expert in its whole extent. It covers Topographical Engineering; the building of railroads, harbours, docks, and other works serving the purposes of commerce and transportation; Municipal Engineering, including the construction of sewers, waterworks, roads, and streets; Structural Engineering, including the construction of bridges, buildings, walls, foundations, and all fixed structures; Hydraulics, the development of water power and other branches. All these branches of Engineering rest, however, upon a relatively compact body of principles, and in these principles the students are trained by practice in the class-room, the drawing room, the field, and the testing laboratory.

In the comparatively advanced work of the fourth year the student is offered a choice between two Options or lines of study; namely, a general Option in Civil Engineering, including the study of Hydraulic and Sanitary Engineering in considerable detail, and an Option in which more than usual attention is devoted to highways, railroads, and railroad management. Students desiring to pursue in greater detail the study of Geodesy and Topography are offered opportunity to do so.

MECHANICAL ENGINEERING COURSE.

This Course aims to equip the student to deal with general engineering problems from the most favorable standpoint.

Courses are given in the class-room, in the drawing-room, and in the Engineering Laboratories, the object being: (1) to give the student practice in such work as engineers in the pursuit of their profession are called upon to perform; (2) to enable him to base all his work upon some principles, not upon empirical rules; (3) to teach him to perform original investigations; and (4) to enable him, by means of a thorough familiarity with both the theoretical and the practical aspects of his business, to deal intelligently with other men.

Mathematics, Physics, and Applied Mechanics are given, the last including the study of the Strength of Materials, with practice in testing.

The recitation-room work of the Department begins with the study of Mechanism, the construction of gear-teeth, and courses on valve-gears, and the mechanisms found in machine-tools and cotton machinery. Courses are given on Thermo-dynamics, Steam Boilers, and the Theory of the Steam-engine; also upon Applied Dynamics, Hydraulics, Hydraulic Motors, Foundations, and Industrial Management, the last involving a study of the organization and the relations of the various departments of an industrial establishment, and the determination of costs.

A course in Machine Design is also given in the fourth year, the main object of which is the applications of principles already learned to the solution of problems in design. In the fourth year, also, the student is offered the option of courses in Marine Engineering, Locomotive Construction, Mill Engineering, Heating and Ventilating Engineering, and Steam Turbine Engineering. Instruction in Drawing extends up to the end of the third year, and its aim is to teach the proper way of making the necessary dimensioned drawings, tracings, and blue prints for use in practice. Instruction is also given in the design of gear-teeth, valve-gears, and other mechanism designs.

The instruction in the Engineering Laboratories in its earlier portions is devoted to giving the student a drill in such experimental work as an engineer has constantly to perform, such as boiler tests, engine, etc. The latter work and the thesis work take very largely the form of investigation.

MINING ENGINEERING AND METALLURGY.

The demands made upon the mining and metallurgical engineer call of necessity for training in a great variety of lines. The policy of the School, accordingly, is to give him the underlying principles of Mathematics, Physics, Chemistry, Mineralogy, Geology, Mining Engineering, and Metallurgy, as well as some practical knowledge of Mechanical, Civil, and Electrical Engineering. Thus equipped, he can after graduation take up specialized work, with the expectation of carrying it on successfully.

Beginning with the second year, 3 optional lines of study are open to the student. With the studies included under the first Option the Course is a general one, adapted to the needs of students who prefer not to make an immediate choice between professional specialties. Those who have not a serious reason for doing otherwise are advised to take this Option.

The second group of optional studies is arranged with reference to Mechanism and the Steam-engine, the time necessary being taken from Surveying, Geology, and Mining Engineering. This Option is adapted especially for the iron and steel metallurgist. Option 3. is identical with Option 1. up to the middle of the third year, and is arranged to meet the needs of students desiring to devote themselves especially to the geological side of Mining Engineering, or to join the National Geological Survey or one of the State Geological Surveys along economic lines.

Valuable opportunities are offered for observation and field work in the Summer School of Mining and Metallurgy, and in mineralogical and geological excursions, as well as in the ample laboratories of the Institute.

For students able to devote an additional year to professional study, subjects for an Advanced Course of one year, which may lead to the degree of Master of Science, have been arranged. In view of the various demands likely to be made upon the professional mining engineer, such an extension of the Course offers peculiar advantages, even if taken without the intention of obtaining a higher degree.

CHAPTER LXVII: DRAWING, DESIGN AND ART.

SECTION 1: INTRODUCTORY.

Two problems in Art, relating to the school work from elementary up to and including High School grade, call for solution:—

(1) How to introduce Drawing, Design and Art in the lower grades and carry it logically through until it diffuses good taste and develops into the elements of Designing and Mechanical Drawing, requiring comparatively little additional training in technique in order to be available for manufacturing and constructive industries.

(2) How to co-ordinate the courses of study so that the so-called new subjects —Manual Training, Domestic Science and Nature Study —may have full opportunity for development along with Drawing, Design and Art, while at the same time the so-called cultural (literary or academic) studies shall not suffer but become more effective.

These two problems are fundamental to all technical training; for on all sides it is conceded that any system of Industrial Training and Technical Education must be based upon a foundation laid in the elementary schools. If the elements of Art, namely, Freehand Drawing and Designing, are lacking in the lower schools, we may look in vain for original designs for our manufacturers, and will remain in the position of the stove manufacturer who in his evidence in Toronto complained that he must slavishly copy American designs because he could get none in Canada. So, also, if the new hand-and-eye subjects cannot have full scope in our schools we shall flounder in the quagmire of fruitless effort, of book-learning unrelated to the world's insistent cry for workers.

The Key to the Problems.

In Art, that little-understood and often despised hand-maiden of Industry, we may find the guide and teacher who will bring into organized relation all the separate elements, making them work together for the common good. The key to the problem is found in the close relation of the school to life. Art, in broad terms, is the expression of man's thoughts, feelings, experiences and aspirations.

Industry, invention, tools, processes, machinery and art-expression in myriad forms being among the agencies which man employs to advance civilization, the measure of success in education, and especially in Technical Education, will be the manner in which the forces, movements and expressions are made familiar to the young and the methods by which academic and manual work, art and industrial work, are blended in school experience.

The whole effort must be to make the school blend with life; make it serve the interests of life; and make the pupils ready to step out into responsible, conserving and contributing life.

Art in Rural Schools.

An example: Many of the drawings of weeds, etc., which appear in print in connection with a monthly nature-study publication are made by the children of one American school. This question was put to the Nature Study teacher who writes the articles referred to:—"Assume a one-roomed Canadian rural school with 20 children taught by a 19-year old girl who has had six months' Normal training, in the course of which she got practically no Nature Study, having had very little of that in the High School, but who can use her pencil in drawing, could such a girl help her students in the matter of agricultural instruction if she took up simply the weeds and taught the children how to draw them?" After long reflection he answered, "If she could teach the children to draw the weeds, she would give them the elements of agriculture, for they could then draw all the grains and flowers, and would be interested in studying them."

Another example: Mr. O. J. Kern, School Superintendent of Winnebago County, Illinois, for 10 years, in beautifully printed and illustrated reports, themselves works of art, has emphasized outdoor art for country life, the beautifying of school grounds and the improvement of buildings; also indoor art, school sanitation and decoration, travelling libraries, art exhibits, pictures, etc.

To stem the drift toward city life he claims that it is money well spent to make the school-house and everything about it attractive and beautiful. Here is one of the centres of the life of the community—the one in which is gathered its most impressionable element. The school is supported at public expense in order to make good citizens. It aims at securing the highest possible development of mind and character. Every element of order, neatness, and beauty, every broadening of influences, every appeal to the finer nature of the child, means better men and women and a more prosperous and attractive community

Supt. Kern argues that country school grounds should set forth the highest ideals and influences of the countryside; this will help to spiritualise country life and agriculture. "Are we dreamers," he asks, "if we contend that the glory and beauty of country life, as well as the vision of larger yields of corn, may help the young men to decide for the farm? A glorified life on an 80 acre farm may be as valuable a national asset as a bin of high-bred corn testing 20% protein. Who knows?" He emphasizes the importance of Arbor Day planting, and shows by illustrations of trees and shrubs and photographs of artistic surroundings of large manufacturing buildings, how profitable, educationally and commercially, is outdoor beauty.

Definitions of Drawing, Design and Art.

In the Year Book for 1903 of the Council of Supervisors of the Manual Arts, the following definition is given of what Art is:—

The term ART in its broadest sense may include almost the whole voluntary self-expression of the race. The modes of utterance through which man expresses his thought and feeling are language, music, gesture, construction, painting, sculpture and the other "arts." The natural instrument of expression of form and color ideas is the hand.

"FINE ART is the free and adequate embodiment of the idea, in a form peculiarly appropriate to the idea itself." (Hegel).

THE MANUAL ARTS are, and always have been, the natural modes of expression in many lines of useful knowledge, and for some of man's highest thought.

The Educational Values of the Manual Arts in the Development of the Child are thus stated:—

The child learns to know the world by making and doing, by tactile and visual percepts, through actual experiences to self-realization. The development of any faculty is in direct ratio to its employment; self activity must be the means of the child's growth. The work of the child's hands must express the living interests of the child. The manual arts give play to the instinctive tendencies of the child's life. Civilized human beings are compelled to be artists; man is constrained to express himself in form and color whether he will or no, as in dress and furnishings.

Finally, drawing, painting, modelling and making, including the designing, constructing and decorating of useful articles of whatever kinds, in paper, wood, metals, textiles, or pottery, may fulfil in the highest degree the natural conditions of self-activity.

The demand does not involve the idea of preparing for trades or "making artists;" it is based on the nature of the child and the general principles of education.

"What we need is more kinds of ability, not more kinds of knowledge." (Hadley).

Art Study is related to social activity in the school and social sympathy in the adult. It is the business of the school to develop social activity, and the Manual Arts are particularly well adapted to this development, besides forming a link between school and home.

We need the study of the Manual Arts for the sympathetic comprehension of our race. Only through such means man becomes broadly socialized, or identified with his race. Art Study thus viewed acquires a profound moral significance.

Industrial Art lies at the foundation of manufacture. The knowledge of design has high commercial value. Thus taste combined with skill is an important basis of national wealth. The welfare and happiness of the commonwealth demand that the State be equipped with skilled workmen, and take its place in supplying the world's market. The foundations of such education must be laid in the schools.

Art is a condition and result of contentment in work. Happiness arises through the natural exercises of the powers. The desire for self-expression and the expression of the beautiful are instinctive. Contentment in labor is largely conditioned on the possibility of exercising these. Self-expression and beauty are also a result of contentment in labor. The Art in a thing is "the expression of man's pleasure in successful labor". (Morris).

Since the majority of men cannot get these conditions in their labor, it must be supplied in their environment. Contact with the beautiful in nature and art is indispensable together with the opportunity for self-expression. It is incumbent upon the State to prepare the condition essential to the happiness of the workers. Art education is necessary for the achievement of these results, and it must begin in the public schools. Hygiene and economy demand that children be kept happy in their school work.

"The aesthetic view of life is the necessary complement to the scientific. It is the constructive imagination (identical with the poetic faculty) to which we are indebted for the generalizations of science as well as for all real art. The training of the constructive imagination is far the most important part of education". (Eliot).

Liberal education demands both the intellectual and aesthetic points of view. The arts subjects represent the aesthetic point of view in education. The Art idea is inseparably related to the happiness and efficiency of the members of the commonwealth.

SECTION 2: SCHOOL ART IN CINCINNATI, OHIO.

Art work begins in the Kindergarten, the object being to encourage the children to express themselves regardless of technique, which is not developed until the 4th grade. There is a very careful course in manual gymnastics which develops the hand and gives muscular control. White chalk is used on the blackboard, the pupil turning the piece of chalk sideways to produce "mass", the object is to emphasize mass and thus enable the pupil to see in the result the solid thing, and to think of all the "content" of the "mass" instead of mere outline. The periphery is formed by enlarging and defining the mass.

Control of the hand is needed in the young, and this can be got by drawing large objects. Blackboard work does not lead to fluent movement, on account of grit in the chalk; charcoal on paper in making large forms gives better results. Art Supervisor Vogel considers the brush ideal, because it gives both mass and fluency of movement, and does not require much muscle. He is not looking for power in muscle, but for control. Although clay modeling was discarded in the first two grades because teachers objected that children became soiled and desks and floors dirty, and because of fear that it was not entirely sanitary, Prof. Vogel believes that clay is the ideal material because actual things reproduced give permanent form. Plasticine is inferior to clay because, being so costly (25c. per lb.) the material must be restored to the original lump.

Nature Study Through Water Colors.

Nature Study is developed almost entirely through the medium of water colors. In the Fall and Spring, Nature Study takes up almost the whole time devoted to Drawing and Art. As soon as possible each child gets an individual subject on his desk, a flower, a plant, a vegetable or fruit form, a piece of wood or vine. There is a personal feeling in regard to the plant that rests on the desk, a feeling of ownership, a closer intimacy and relation between the student and the subject; thus the student sees more and is led to report more in his painting. The pupil studies the plant or specimen in detail, and also has the problem before him of properly relating it to his sheet of paper as to shape and arrangement—practically a problem in artistic "composition" which he himself must solve.

In grades 6, 7 and 8 some conventionalizing is done—enough to prepare pupils for this and for design work when they reach the High School. Abstract forms are used, the suggestions involving independent results. A spirit of rhythm prevails in these lessons, and the child must feel and express it. The aim is simplicity—beauty in a few strokes; a positive, direct expression of thought without any wavering. Balance, rhythm and harmony are taught. The forms are finally colored in two tones of a single color, working up to complementary harmonies.

From the lower grades upward the elements of design are given, and in grades 6 to 8 design is taught for its own sake. In the first five grades the constructive work is with paper and cardboard and book covers, etc., associated with the four seasons and the holiday season. In the fifth grade strawboard is covered and used as sand scratches, calendar backs, covers for booklets, note-pads, etc.

Art and Manual Training.

Pupils go direct to the Manual Training shop in the seventh grade. They first make mechanical drawings of all articles which are arranged in series, all the shops doing practically the same work except at holiday seasons. The object of making finished articles is to give satisfaction; hence chip carving is preferred to deep carving, the latter being more slow and taking more time in the making of an object.

All Art work is paralleled with the Manual Training work and where possible correlated. If the students make a Swiss broom holder, or a box, or a book frame, the Art teacher takes up structural and applied design. In the girls' department the study of the successive stages and applications of Art is taken up when the teacher requests it. In the lower grades the object is primarily to develop expression by means of various materials. Paralleling this later on is the development of original design in colors and wood.

A certain time is devoted to drawing from objects, generally pottery forms, such as vases, bowls, cups, as beautiful as can be obtained, also tinware and domestic articles. The drawing is oftentimes associated with fruits and vegetables.

In the lower grades posing work is associated with the expression work. The plan is to set a pupil before the class in a certain pose for a very short time, then let the class draw from memory, then bring the model back to test and compare results.

Art in Millinery.

In the High School, Art is related to the home, to the store or shop, the office, the street, the individual. The latter involves the study of one's wearing apparel, designs for stick-pins, etc. Girls work out problems in millinery, first drawing a design of a hat form, getting suggestions from the frame. It may not be the particular frame they are going to use, but they study the form and draw the elliptical surface; then work out the trimmings, using a piece of ribbon. If they intend to use velvet, silk or feathers they study the texture of these and make their compositions, then work out the plan in the classroom in millinery. Because they have lived this experience they have a higher conception of what they want, and the result may be entirely different in the millinery shop, because this planning in the Art Department has the same effect on the student as making three or four different styles of hats.

Sometimes young people will depart from the drawing or painting and produce an actual hat, which is brought to the Art room and used by the class as a model for object drawing.

Art in Actual Life.

In the Art department the students work out all the decorative and instructive features, and then in the Domestic Science room they work it out in actual materials. Art in relation to the home involves the arrangement of pictures on the wall; the proper harmonizing of furniture; the different parts of furniture and their relation to certain rooms; color schemes in rooms; working out in the Domestic Science room after the sixth grade cushion covers, curtains, "throws", and other decorative features. Art in relation to the shop involves the making of articles such as furniture, machinery, etc.. Art in relation to the office involves the appropriate selection of furniture. Art in relation to the street involves a study of construction and architecture; civic art in general; yard, gardens, parks, streets, etc.

SECTION 3: SCHOOL ART IN SALT LAKE CITY, UTAH.

The Normal Training School in connection with the University of Utah takes pupils at 5 years of age into the Kindergarten, carries them on to the eighth grade (age about 13), and graduates them into the High School.

In this school, Industry and Art go hand in hand from the very beginning of the course. The little tots delight in constructing paper houses and all necessary furniture, made from cardboard, cut and folded as directed by the teacher.

The Home the Unit of Activity.

The Home is here the unit of all activity; hence food, clothing and shelter are the elements which constantly call for provision throughout the grades. The Home in the kindergarten is a weak affair made of paper; but as the child matures and develops, his ideas take on a more substantial form, and a few grades higher up we find the Home and its furniture made of wood, requiring various tools to fashion them, artistic designs for wall-paper, and painting to ornament the home; also various articles to make it comfortable, beautiful, and bright, such as floor mats woven in raffia, rugs made of woollen yarn, hammocks netted, etc.

The heads of the Home are the recipients of the chief attentions of the pupils. To the father or mother are many of the letters addressed which are used for writing practice by the little ones. For the home are made numerous articles in the workshop. To father or mother would be presented the Christmas gifts upon which hundreds of busy fingers were working when our visit was made; and on special school occasions invitations, designed, written, printed or painted by the pupils are always sent to the parents. This co-operation between School and Home is one of the vital and valuable features of this Training School; and to the constant interest of parents much of its remarkable success as a teaching agency is due. The Home as the center and pivot of the entire organization gives coherence and meaning to all the elements and activities in the multifarious life of the little school community—its work, studies, play, projects, and performances. To use an artistic phrase, the Home is the *motif* of the picture.

Children's Individuality Sacred.

The greatest possible latitude is allowed for individuality. These teachers have travelled so far from the old dogmatic, pedantic, critical, punishing conception of teaching, that they seem to have gone to the other extreme and become too modest in control and discipline and dictation; yet under their benign administration the children grow and develop "while you wait." Their animation, their enthusiastic expression, the adding of another object or color to their art work, or a new combination of strands in their weaving, betoken active mental development. Thus woven into their brain structure never to be forgotten, will be the hand-movements, the artistic forms and the esthetic outlines involved in cardboard folding, raffia-plaiting, wool-weaving, in cord-netting, clay-modeling, wood-working, decoration with colored chalks and paints, the construction of descriptions—(in poem as well as prose)—of the flowers they have grown, the birds they have tended, the babbling brooks which have charmed them with their music, the little dramas they have written and performed in order to illustrate their conceptions of Robinson Crusoe, Hiawatha, the Utah Pioneers, or the chivalrous lords and lovely ladies of the days when knighthood was in flower.

School-Garden Work, Dramatic Reading, etc.

But the utilitarian is not overshadowed by the esthetic, for here "Nature Study with a School Garden" is featured very strongly. The pupils cultivate a 10-acre plot, and from one season's diligent and intelligent culture they made a revenue of $250, which was used for school improvements. They have built an arbor surrounded with creeping vines, not merely providing a cool shelter but encouraging the botany instinct.

Text books and set subjects are merely incidental, subordinate elements here. Reading takes dramatic form when possible. The Commission saw four children reading (dramatically) a story from "Alice in Wonderland" holding the book in one hand, but "suiting the action to the word."

In the highest grade some books are regularly used—speller, arithmetic, geography, history and reader—in combination with lessons prepared by the teachers and printed at the school printing plant. Activities such as sewing, cooking, weaving, etc., call for many words more or less technical, not found in ordinary spelling and reading books, and these are provided on special sheets. Much of the history and the industrial material is obtained from magazines and supplementary reading books.

The students are continually winning first place and distinctive honors in competition with scholars of their own age who are taught by ordinary methods. The Principal finds by actual experiment that as he increases the work in the Manual Arts (now occupying nearly 50% of the school time) he makes the pupils more proficient in academic studies. This is not remarkable in view of the fact that if you thoroughly interest a boy or girl in a piece of work you start a whole flood of thinking and reading and discussion on that line. Thus the workman becomes educated through work, both by the unseen process of brain-building and by his own active efforts in acquiring knowledge.

Art as Hand-Maid of Utility.

Through all the grades, Art is treated as an expression of thought, and the children are encouraged to express themselves, though in ever so weak a way. The thought that calls for expression may be suggested by reading, by a lesson in history or geography, by observation, by nature study or domestic science, by occurrences in the school or at play or work, by a passing public event, or the arrival of a special season of the year.

But Art is not allowed to soar; it keeps close to the ground and to the dictates of utility. Articles are made for the home; presents for mother and father; benches, sand-boxes, arbors, etc., for the playground. The element of timeliness is also present. At Christmas season all the children make gifts for parents; room decorations represent Christmas bells and mistletoe; wall paper is designed of conventionalized holly leaves; the reading lesson, written neatly on the blackboard, is the story of Bethlehem, etc. The thought running through all the work is that articles and pictures made must be useful, timely, interesting, beautifully suggestive.

Keeping School Close to Industries.

The industries are closely related to the school life and work. In the lower grades the teachers have beautiful pictures, some in colors, collected from magazines and elsewhere, showing harvest scenes, mining, milling, etc. Then the trades and occupations are shown—firemen, light-house keepers, fishermen, sailors—men who risk their lives for the good of society. These pictures are used as the basis of talks and questions by teachers, and of drawings by pupils, who also represent the scenes or actors in clay, paper, wood, by compositions in prose and verse, or by dramatic representation. The making of the firemen's helmet in paper is one of the features in the lower grades. The talks and the readings are calculated to impress upon the children an idea of the great service rendered to the community by toilers in various occupations, especially hazardous ones.

The spirit of brotherhood is developed by children making little grinders and sifters, and with these removing the bran from wheat and making little loaves of bread, thus getting an impression of the pioneer's difficulties. During the visit of the Commission a "Pioneer Supper" was cooked entirely in the Domestic

Science Department, and the children served their visiting parents with a menu peculiar to the early days of the State. The children grow popcorn in their school garden, then prepare it in the Domestic Science Department and send it to the Orphans' Home.

Visit to a Bakery.

The pupils visit factories and give their impressions in cut paper, in drawings, in clay, in wood, and various other ways. In the Commission's Exhibit of Drawing and Industrial Art is a series of sketches in color made by these children in the second grade, giving their impressions of a bakery after a visit to one. The baker was delighted to have the children visit his establishment, and he made it interesting to them by giving them a treat. All the manufacturers are pleased to have visits from pupils.

Each grade is entitled to decorate its room in its own way; thus no two rooms are alike. In the 5th grade room the wall was covered with plain paper which was decorated by the children in colors, making a very good imitation of wall paper in a conventionalized pattern. In other cases walls are covered with friezes, some of them highly ornamental, and others descriptive of some historical period—Colonial scenes, the landing of the Pilgrim Fathers, the "Mayflower," or a Dutch pattern with windmills, canals, etc. Some of the older scholars were furnished by the printing office with beautiful printed mottoes, space being left for the initial letter, which was filled in by the scholars themselves in colors. All the rooms have plaster casts representing art and art concepts.

Technique only after Struggle.

The principle of giving formal information and instruction only when it is called for by the pupil is worked out to the limit in this school, especially in the Art department. The little tot has seen, felt or thought something which it wishes to express on paper, but the child has not learned its A.B.C. or how to write the letters; so how can it put down words? It has not learned to draw, so how can it make artistic lines? The teacher, who holds that feeling is the foundation of Art, and that technique is subordinate, tells him to go ahead and do his best; perhaps after discussion of the idea she may suggest the form which the drawing should take. Then the child begins to struggle, and the result would be pitiful if it were not so hopeful of what he will do when he has learned the alphabet of Art. Some of the clay modeling bore striking evidence of lack of instruction in technique, for while the figures expressed their general contour as to dress and attitude, they entirely lacked facial features—the young artists evidently being afraid to venture on such difficult ground.

The use of Art as thought-expression without attention to technique at the start was defended by the Principal, who argued that children when they start do not know that anything is difficult, and would undertake to draw a flock of angels for a Christmas card just as readily as they would draw a chair. When they discover their need of technique they get it, but not before. He was very much opposed to over-stimulation, over-strain. "We will do it when we get to it " were his words.

He was opposed to too much interference by the teacher with the possibilities of the child. "We surround the child with the thing that will stir him up to do something that we want him to do, and let him come out himself rather than pull him out."

SECTION 4: SCHOOL OF INDUSTRIAL ART, TRENTON, N. J.

This is a model type of institution for a comparatively small city (96,815). It was established in 1898 under the State Industrial Education Act of 1881 and is housed in a beautiful 5 story building donated as a memorial; land and building are worth $140,000. It is managed by a Board of Trustees and an Advisory Board of 8 represenitves of manufacturing, railway, financial, ceramics, silverware and artistic interests. The staff comprises a Director and 20 artists, designers, chemists, electricians and craftsmen.

Day and Evening Courses : Freehand Perspective, required of all candidates for Fine Art diploma; Light and Shade; Elementary and Advanced Antique; Painting; Elementary Art; Designing; Modeling; Figure Composition; Artistic Anatomy; History of Art; Mechanical Perspective; Sketching Costumed Model; Bookbinding and Metal Working.

Juvenile Day Classes supplement children's work in public schools; the course extends over 8 years, each year devoted to some one branch of Art.

The Bookbinding Department has enlarged its scope to cover elementary bookmaking, portfolio work, boxmaking, etc.

The Metal Working is in copper, brass, silver and German silver. Elementary work in flat or repoussé, raised or bowl forms, etching, piercing, hard and soft soldering, is followed by advanced work in enameling, engraving, stonesetting and craft jewelry working, including fobs, buckles, stick-pins, pendants, etc. Craft classes are organized as necessary.

Evening Classes cover the same ground as the Day Courses, excepting juvenile work and some minor classes.

The school believes no training is so necessary for the architect, designer and modeler as drawing from life; but students are required to prepare for this, which they generally do by spending two years (two nights weekly) in the Antique Class.

The Ceramic Design Course, in co-operation with modeling, enables the students to design forms, turn them, apply decoration in relief, make moulds, etc., and apply glazes. The school operates its own kilns. Silverware Design is also taught in this class.

Building Construction, planned primarily for carpenter and mason apprentices and journeymen, is treated practically; it includes drawing of cellar, floor and framing plans and details of construction, and instructions in laying out work. Class-room is equipped with carpenter's bench and tools, and practical demonstrations supplement the drawing. Blueprints are much in use.

Mechanical Drawing Course, carefully planned, embraces use of instruments, lettering, principles of projection, intersections and development of surfaces, and their application to practical problems. When the student's progress warrants, the course is extended and enriched with special reference to his daily vocation, including also mechanism and machine design.

Architectural Drawing and Design cover study of plans and elevations, and full-size details of construction.

Thorough training is given in *Arithmetic* as applied to shop work and building trades; an advanced course covers algebra, geometry and trigonometry.

Commercial Illustration and Ornament are thoroughly studied.

The Chemical Course includes lectures, experiments, recitations and individual laboratory work on principles, laws, formulas, etc.; analysis; study of clays, glazes, oils, iron, steel, chemistry of photography, etc., with such research work as students' abilities and equipment permit.

Course in Electricity supplements daily work of men engaged in electrical trade. Much attention is given to the use of architectural drawings in laying out wiring for houses, etc., with wiring diagrams.

Ceramic Chemistry deals with ceramic raw materials and their chemical constituents, body making, raw materials of glazes, glaze making, manufacture of ware, drying, decorating and burning, kilns, fuel, ceramic formulas, terra cotta, earthenware, majolica, porcelain, bone and spar china, etc.

English Composition is taught so as to enable men to handle correspondence and prepare intelligent and readable reports of investigations.

Household Art Course covers dressmaking, millinery and home decoration.

This school prepares teachers of drawing for public schools by courses in drawing, painting, designing and modeling, while the State Normal School, located in Trenton, gives them the science and art of teaching. Those completing this four years' course receive public school teaching certificates good for ten years, renewable or exchangeable for life certificate after two years of successful teaching.

Museums and Exhibitions contain special collections of china. Besides reading room and good working library the city public library is very strong in fine art section. Numerous prizes are offered to students.

All students pay enrolment fee, $2; $10 per year additional for day classes.

SECTION 5: RHODE ISLAND SCHOOL OF DESIGN, PROVIDENCE, R.I.

The population of Providence is 225,000, chiefly manufacturing.

The objects of this School are:—

(1) The instruction of Artisans in Drawing, Design and Modeling, to enable them to apply the same; (2) The training of students in the Practice of Art; (3) The advancement of Art education by means of exhibitions, lectures, etc.

Day and evening classes are held, and a Saturday morning class for children aged from 6-16.

The school is supported by voluntary effort, and is entirely separate from the Public Schools. The City of Providence gives 75 Scholarships for evening classes, amounting to $500 in all, and the State of Rhode Island gives $2,000 annually in Day Scholarships. Other Scholarships are furnished by private individuals, Art Clubs, etc., and several of the large manufacturing firms give Scholarships to their employees.

The local manufacturers heartily co-operate with the school and give it their support in every way.

The attendance at the evening classes is larger than that in the day time—workmen from the various jewelry and other firms coming to improve themselves in their special branches. Diplomas are given in 8 departments of the evening classes to those pupils who satisfactorily complete the course. All branches of industry are represented—printers, advertising men, jewelry workers, mechanical men, workers in textile mills, weavers, designers, etc. The Textile Department is well equipped with hand and other looms, and special attention is given to textile and weaving designing and color. Designing and color are also studied in the Jewelry and Architectural Departments. The majority of the men in the modeling class are jewelers and stone-cutters. The House Construction class is composed of plumbers, carpenters, bricklayers, plasterers, etc.

The Normal Art (Day) Class has grown from 4 students 4 years ago to 17. Courses are given in Drawing, Design, History of Education and Psychology (at Normal School), Wood and Metal work, Basketry, Weaving and other Public School subjects. These students aim to be teachers in private or High Schools.

Saturday Classes for Teachers are held (1) in Drawing and Painting for Public School work; (2) Lectures by Miss Cleves, Art Supervisor of Boston, who has wonderful methods.

Principal Elliott wants graduates from the Departments of Design and Architecture to have at least the High School Diploma, but the Committee objected that this might hamper poor students, for whom the school is intended.

The school has a very fine Museum, containing classic casts, jewelry, etc., which is found a valuable adjunct to school work, and also helps to interest the public in the school. Included in this is the Pendleton Collection of Colonial Furniture, comprising a complete house furnished to show the 18th century style of furniture, decoration, wall paper, pictures, carpets, etc. This school has the only Art Gallery in Providence.

SECTION 6: PENNSYLVANIA MUSEUM AND SCHOOL OF INDUSTRIAL ART, PHILADELPHIA, PA.

The aim of this School is to make Art industrial. The school was opened after the Centennial Exposition in 1876 by citizens, without State or City aid. South Kensington (London) methods were copied, but found impossible in the United States without the national conditions existing in Great Britain. Principal Miller took charge soon after, but the school was without precedent, and with no public confidence that Industrial Art could be taught that would be attractive as Art and yet practical in relation to Industry. Mr. Miller took his cue from "industries as we should see them," especially from machine shops, showing how Drawing was taught there from the view point of designer as well as mechanical draftsman; also from the great textile industry of Philadelphia.

Mr. Miller has developed an Art school in which industrial purpose shall be continually kept before the pupil by visible representations, good craftsmen, and by a little group of shops in which the crafts themselves can be taught. These crafts are: leather work, metal and wood work, plaster—using clay in teaching modeling—"for the Art school never designs to do anything in plaster, it always does its work in clay and then turns it over to the factory to do in plaster." The essential thing is that students make casts, learn to make moulds, and learn to work in plaster as in clay. From plaster it is very easy to work in wood. The school has a kiln for firing cement specimens, so that the student "has continually the craftsman's point of view while studying Art."

How the School is Financed.

After showing Philadelphia how the school influenced its industries, and showing the State how pupils came from all parts of it, the school receives annual grants: from the city of Philadelphia, $20,000; State of Pennsylvania, $40,000; tuition fees, $25,000,—total $85,000. The school costs $100,000, and has a small endowment. There are 42 teachers, nearly all of whom teach both day and evening.

Students number 1200, more than half being at evening classes. On the Art side the students are mostly women; on the Technical mostly men. The school does not want students under 16; they enter on examination in English and Drawing. Large classes of Public School teachers come for Normal work.

Graduation represents qualification, without reference to length of course. Students from other schools may get the diploma in a year; the vast majority require 4 years.

Specializes in Textiles.

In *Textiles*, this is the first school in America. Principal Miller found that practical designing involved grasp of the technique of textile manufacturing; students cannot stop even at the weaving, but must learn jiggers and how to punch them; how to work and adjust loom; how to make head motion, etc.; also the essential thing—*dyeing*. "So we worked gradually back into the industries themselves, until we took a ball of wool, or a hide of leather, or a plank from a lumber yard, or cement from the oven, and all that sort of thing. That is our scheme. We have gone on working backwards to the sources of the industries."

Textile work is thoroughly practical; the men turned out are trained superintendents as well as designers. "Textile design as understood by the trade or the textile manufacturer is not a thing for women. Millions of designs are made in schools of design that would be applicable to printed stuff; but that is not textile design."

Textile School work includes preparing material and worsted spinning. This school makes more cloth than all the textile schools of England

and certainly more than others in America—not in quantities of goods, but in numbers of samples.

Students study the thing itself; its atmospheric conditions; the regulation of all things on which success in the conduct of a mill depends. Machinery is kept running, and studied as to effective planning and good delivery of fibre.

Manufacturers and Trades Unions Friendly.

Local manufacturers let their fibre run through the school mill, paying a little for engine service and a few operatives to keep it always going. The school can deliver merchantable yarn as fine as the manufacturers could get anywhere, which is the highest test; and students get the benefit of all this work. The school can save the manufacturer enough money on operation to pay for haulage of fibre and finished article.

Trades Unions are friendly and send their fine artisans. The school turns out men only, not cloth products. It is training men all down the line from captains of industry, sons of mill-owners, men from mills, who want to increase wages; weavers wanting to be loom fixers; loom fixers wanting to be boss of loom work department; card stampers to be designers; dyers wanting to learn the science of their trade. "That is perfectly legitimate and right, and the only proper guide for directing those men's education," said Mr. Miller, "We must all of us go shy of getting up in the clouds and talking. That is the trouble with all this Manual Training in the Public Schools; it is the trouble with all the educators' point of view in this matter; they all get off on the high horse about the teaching, as if the best way to forward industrial education ought to be by everything else except industrial education. You say, 'What we want is to make them citizens, and when we get hold of them we are going to teach them the science of government and the economic history of this thing and that!' Well, the boys who go to sleep don't know or care anything about this thing; there is no reason why they should care about it. They want to know how to do the job that is right ahead of them, and they want it practical, and they get it or else they don't come. You can't get them to evening schools, or day schools either, unless you give them something that they want."

American vs. German Methods.

Mr. Miller points with pride to the record of the men who have come as common weavers and spinners and who have now got their own establishments; who went out first as foremen and that like, then superintended a mill, then got their own mill. Mr. Miller says there is always capital lying around waiting to be put into the thing, if capitalists see that a man has the stuff in him to carry it on. He told of a graduate of the Crefeld (Germany) School who said, "Apparently we did those things ourselves, but really we did not; the warp was already drawn in and the whole thing was explained thoroughly to us; perhaps we could shove the shuttle a few times; but I see your boys do everything."

VISIT TO SCHOOL WITH DR. MILLER.

In the *Art School* emphasis is laid on " Art in its application to Industries, but yet Art." The motive of instruction is artistic, hence appeals to young women, who outnumber the young men.

Everything in the School makes students think of Art in the terms of Industry. The school identifies art with the life of the people.

The *Technical School* (in separate wing) does not overlap the work of the Art School very much. Students in both sections draw, but textile students are occupied largely with technical problems—dyeing, chemistry in application to dyeing and bleaching, etc.

Life Class work is distinctly different from Art Academy methods. "These Indian boys pose in actual life, but with a view of using them in an industrial way. It is not less life-class work, but there is a distinct industrial purpose, an attention to details, an adjustment with relation to decorative effect, that gives it an industrial character." The student is made to feel that he is in the presence of an industrial problem. He poses and dresses the model with a view to developing its decorative possibilities. He thinks of it as if it were to be a curtain for a glass window or a door. This scene is made not only for success as such, but with a view of getting the designer's attitude towards drawing things from nature.

"The little things in shops that people call Art (with a capital A) are only a few blossoms at the top of the tree. We must have the tree. They have it in Italy and elsewhere; they always had it in France. We get the blossoms, but we have them without the tree."

"You should think of the study of modeling and drawing from life always with the idea of doing something with it—applying it for illustration pretty directly, as shown here. I want students to see that potentially that thing is present whenever they design a piece of wall paper, calico or anything. Another feature is that they must make the thing; they must know enough about the material to be able to think in terms of wood or metal in order to design in wood or metal."

Students can do metal work in the blacksmith shop so that they can learn design "in terms of metal."

"Here is a student who has made his little hinges in his own original way; he has made his iron fixtures, as well as getting out from the plank his piece of furniture. He has done his own carving and his own joinery and all that. It is not studied at all with the product as an end, but as a means to teach the students to think in terms of material.

Class, studying decoration of wall, was taking cue from room itself and working out designs and color schemes for wall, window glass, prints, overmantels, panels, etc.

Students were making sketches, to be afterwards developed into full-sized working drawings for woodwork. Nothing but planks from lumber yard are brought into the school. Girls saw and draw them—women work the same as men, but with saws closed in, so that skirts will not be caught. Girls become teachers, and must know these things.

There is a Saturday class for Public School pupils to learn design. Pupils of the Public School of Industrial Art (age 14-16), after taking very elementary work there, come here for higher work.

This school has always about 50 students sent from Public and High Schools, the School Board paying their fees; but they ought to have been started in the High School before coming here, in Mr. Miller's opinion.

Teachers' Course requires 4 years for certificate. The school refuses to give them shorter courses. Teachers must be certified "to having gone through this whole thing and shown a fair amount of proficiency in all these things, so that when he or she tackles the question of Drawing or Design he knows what woodwork is; he has done something that means artistic work in wood. It shall never degenerate into mere Manual Training or technical training or anything of that sort; it must be artistic; it must have the artistic element applied in a practical way, worked out and expressed in terms of material, and real things that go into people's houses. We take the cue from the house—from the habitation. Students make great numbers of these designs for the interiors of rooms. They have to learn to draw well enough to put it in perspective, and make the color-effects, and then they must carry the working out of those details into some required direction before they go out. We see that they make some chairs, some tables, steps, benches, chests—something."

CHAPTER LXVIII: VOCATIONAL SCHOOLS FOR GIRLS.

SECTION 1: INTRODUCTORY.*

Trade schools for girls, or even schools that offer industrial courses which aim directly to fit girls for specific occupations, are not numerous. However, the interest in those which have been established is manifested both by a definite movement for the organization of other schools and by their influence on the economic and social problems of wage-earning women. Before organizing industrial schools for girls in any community the need of studying not only the schools but also the local industrial conditions under which women work is recognized as essential. Investigations of the opportunities for women in various vocations have been limited in scope and few in number. Where such have been made, the information secured has been exceedingly valuable to the schools; but what is true in one locality may not apply to others. In many cases a general conviction that girls should have, or were demanding, some vocational training has led to the introduction of dressmaking and millinery, with little knowledge of the local conditions of work, wages, hours, chances of employment and opportunities in the industry. This has frequently been done by committees of men unacquainted with the millinery and dressmaking trades, and who did not know whether there were other vocations that offered better opportunities for girls. The advisory committees and directors of some of the schools likewise have frequently been men and women of little knowledge of women's occupations and opportunities.

Dressmaking and Millinery Defined.

It is noticeable that dressmaking and millinery are almost the only trade courses offered to girls at present. Power sewing-machine operating is only another form of work on clothing. The dressmaking trade itself is so specialized that it is difficult to enumerate the subdivisions in the trade so that they may apply to all schools. The plain sewing courses are usually planned to train seamstresses—i. e. girls who are able to do plain sewing and mending in homes. A dressmaker's assistant, or improver, as the term is used in the trade, means a skilled worker who knows the sewing processes and can intelligently take directions from experienced sleeve, waist, and skirt makers. A dressmaker proper must have a fundamental knowledge of all branches of the trade. The occupations of designing, drafting, fitting, etc., are the higher positions and are usually secured by working up from the lower positions.

The terms used for the subdivisions in the millinery trade are fully as indefinite as those of the dressmaking trade. Because of this lack of definiteness the

* Condensed from 25th Annual Report of the United States Commissioner of Labor, 1910.

term "assistant" is used here, as in the dressmaking trade, to mean the position of the worker skilled in the processes, but who works under the direction of experienced workers. As in dressmaking, experience as well as knowledge of processes is necessary to be a finished milliner. The occupation of designing, copying and trimming are the higher positions in this trade. An effort is now being made by the schools to define the terms designating workers in these trades so as to eliminate the present prevalent confusion when pupils seek employment.

Two of the schools, the Manhattan Trade School for Girls and the Girls' Trade School of Boston, have worked out a distinct department of the school as an employment bureau for their graduates. Thus they are enabled to keep in touch with conditions in the industries for which they are preparing girls.

Various Types of Schools.

In schools of the elementary short-time type, the usual purpose is to prepare girls of the poorer classes to become self-supporting as quickly as possible. The class of pupils for which these schools were established is especially characteristic of large cities, and this must be borne in mind in considering them. A large percentage of their pupils have not gone beyond the fifth year in the grammar school. The chief emphasis of the entire course is the practical character of the training. It is not expected that pupils will be finished dressmakers or milliners, but only that they will be qualified for work as assistants. As a rule, pupils must be of legal working age in order to enter these schools. In the short period of school training an attempt is made to put the girls in proper physical condition for work, with enough instruction in the laws of health to enable them to remain so.

The advanced short-time schools are somewhat different in their general characteristic from the other types. Their pupils pay a tuition fee, and they are usually older and better able to profit by the instruction given. The school work is offered in courses, so that a pupil may take as much or as little as is desired, but these courses are fitted to the actual needs of the pupils for whom they are designed. The work is of high grade, and is arranged to meet the needs of the trade. No academic subjects are taught, as it is expected that all such instruction will have been secured before entering the school. As the work in this type of schools is advanced in character, considerable attention is paid to designing and costume sketching.

Day and Evening Schools.

A third group of girls' schools offers longer and more theoretical instruction, but of a less pronounced trade character than that of either of the above types. Among these are public high schools with day courses for industrial training. Their entrance requirements often include graduation from the grammar school, and their courses are usually 3 or 4 years in length. The first year's work in these schools is largely cultural, while that of the remaining years is planned to be as closely related to their chosen vocations as possible. Training is given in all features of the pupil's work during her stay in the school.

In a fourth group of schools there may be included the evening schools for women. Some of these are public schools, and some are philanthropic. Their courses are offered for girls and women employed during the day. Much of the work in them appeals particularly to girls who want it for home use. Many enter such courses because of a definite prospect of marriage, and are taking it in preparation for housekeeping. The instruction given in these schools is not limited to the processes employed in the different occupations taught, but includes cultural subjects, physical training, and regulations and laws which will affect pupils when they go to work. The aim is to make intelligent as well as skilful working women.

SECTION 2: THE MANHATTAN TRADE SCHOOL FOR GIRLS, NEW YORK.

This school, which was visited under the guidance of the Principal, Miss Florence J. Marshall, enables girls, on leaving school, to become skilled work-women in a shorter time and in a larger and more intelligent way than through trade training alone. Pupils must have graduated from the elementary school and be of good moral character. The course covers one or two years, but girls may remain longer. The school day is from 9 a.m. to 5 p.m. with 1 hour for lunch, thus accustoming girls gradually to the working day. Pupils who know what trade they mean to follow can start on it at once, while those in doubt are given an opportunity of choosing and deciding. All instruction is individual.

There are 45 workwomen employed as salaried instructors, receiving from $2.50 to $3 a day, and taking about 10 pupils each. The teachers are experts in their respective lines, the trades being taught by experienced mechanics, and everything is done to make the school prepare for actual business practice, by keeping to factory methods as closely as possible. On completing the course pupils receive a diploma which helps them to obtain employment.

The academic work has a bearing on the trade, and includes Civics, Business English, Mathematics of the trade, Industrial Conditions, Instruction on Labor Unions, etc., Hygiene and Physical Culture. A course is also given to illustrate the privileges, rights and duties of each unit, the ethics of trade, cost of living, etc.

Pupils are admitted at any time. There are now 400 in attendance. Girls are not expected to leave in less than a year, but many do. The school takes a neutral attitude towards employers and workers, but holds that girls should have an intelligent understanding of trade unions and collective bargaining. Regular trade orders are taken from outside.

Girls are examined on entrance by a physician and the physical instructor. Lectures on personal hygiene and related subjects are given, and physical training twice a week. The expense of the physical department is partly met by philanthropic ladies.

The girls start at $4 a week, but are told that they must make at least $8 to cover expenses. The type of students in attendance is high, the girls being bright, keen, neat and industrious. Many of them are of foreign birth or parentage. Places are found for them, and the school keeps in touch with them after they leave.

Aims, Characteristics, Results.

The *Aims* of the School are:—

(1) To train girls in skilled handwork.

(2) To produce the best type of trade worker.

(3) To imbue each worker with love of and respect for work.

(4) To uplift a class to which the country must look for future industrial progress.

The *Characteristics* of this School are:—

(1) It fits girls for the actual needs of the trade.

(2) Trade instruction occupies the great part of each day.

(3 Practical academic work, drawing and color work, are taught with a single eye to their bearing on trade needs.

(4) The work is based on the three fundamental tools—the needle, sewing machine (foot and power), the paste brush, out of which countless branches of trade work grow.

The *Results* are:— awakened intelligence, increasing skill, accuracy and speed, capacity for clear and original thinking, love for work. Girls are placed within a year at good wages. The school is appreciated by the trade.

The Reason for the School.*

In 1902 a committee of men and women interested in philanthropic, sociological, economic and educational work in New York made a special investigation of the workrooms in that city. They were but the more convinced (1) that wages of unskilled labor are declining; (2) while there is a good opportunity for highly skilled labor, the supply is inadequate; (3) the condition of the young, inexpert working girl must be ameliorated by the speedy opening of a trade school for those who have reached the age to obtain working papers; (4) if public instruction could not immediately undertake the organization of such a school, then private initiative must do so, even though it must depend for its support upon voluntary contributions. The result was that an extreme effort was put forth and the following November the first trade school in America for girls of 14 was begun.

A Short-time Trade School.

The immediate purpose of the school was to train the youngest and poorest wage-earners to be self-supporting as quickly as possible. It was decided to help the industrial workers rather than the commercial and professional, as the last two are already to some extent provided for in education. The function of the school was, therefore, that of the Short-Time Trade School, which would provide the girl who must go to work the moment she can obtain her working papers (about 14) with an enlightened apprenticeship in some productive occupation. Such training cannot be obtained satisfactorily in the market. The immature workers are present there in such large numbers that they complicate the industrial problem by their poverty and inability, and thus tend to lower the wage. Jane Addams of Hull House, Chicago, says these untrained girls "enter industry at its most painful point, where the trades are already so overcrowded and subdivided that there remains in them very little education for the worker." The school purposed to give its help at this very point.

What the Trades Demand.

Trade, on its side, is eager to have skilled women directly fitted for its workrooms, but finds them hard to obtain. The school's duty was to discover the way to meet employers of labour. It is true that the utilitarian and industrial education, offered by public and private instruction, has benefited the home and society, but such training has not met the problem of adequately fitting for specific employments the young worker who has but a few months to spare. The lack of this instruction has been in specific trade application and flexibility as to method, artistic needs, and mechanical devices. These points are essential to place the girl in immediate touch with her workroom.

The School's Ideals.

Therefore the Manhattan Trade School assumed the responsibility of providing an economic instruction in the practical work of various trades, thus supplying them with capable assistants. Hence its purpose differed not only from the more general instruction of the usual technical

*From sketch of the School and its work, by Mary Schenck Woolman, B.S., Prof. of Domestic Art, Teachers' College, Columbia University, and Director of the Manhattan Trade School for Girls.

institution, but also from those schools which offered specific training in one trade (such as dressmaking), in that it (1) offered help to the youngest wage-earners, (2) gave the choice among many trades, and (3) held the firm conviction that the adequate preparation of successful workers requires more factors of instruction than the training for skill alone. The ideals of the school were the following: (1) to train a girl that she may become self supporting; (2) to furnish a training which shall enable the worker to shift from one occupation to another allied occupation, *i.e.*, elasticity; (3) to train a girl to understand her relation to her employer, to her fellow worker, and to her product; (4) to train a girl to value health and to know how to keep and improve it; (5) to train a girl to utilize her former education in such necessary business processes as belong to her workroom; (6) to develop a better woman while making a successful worker; (7) to teach the community at large how best to accomplish such training, *i.e.*, to serve as a model whose advice and help would facilitate the founding of the best kind of schools for the lowest rank of women workers.

A Complex Problem.

In other words, the Manhattan Trade School aimed to find a way (1) to improve the worker, physically, mentally, morally and financially; (2) to better the conditions of labor in the workroom; (3) to raise the character of the industries and the conditions of the homes, and (4) to show that such education could be practically undertaken by public instruction. The four aims are really one, for the better workers should improve the product, make higher wages, react advantageously on the industrial situation and on the home, and the course of instruction formulated to accomplish this end would help in the further introduction of such training. In general, it may be said that the untrained girl has to take the best place she can find, without reference to her ability, her physical condition, or her inclination. The most desirable trades are seldom open to her, for they require workers of experience, or, at least, those who have had recognized instruction. Even if a green girl enters a skilled trade, she cannot rise easily in it, and is apt to be dropped out at the first slack season. The sort of positions open to her have usually little future, as they are isolated occupations that do not lead to advanced work. Illustrations of these employments are wrapping braid, sorting silk, running errands, tying fringe, taking out and putting in buttons in a laundry, dipping candy, assorting lamps, making cigarettes, tending a machine, and tying up packages. These young unskilled girls wander from one of these occupations to another, their salaries, never running high, rise and fall according to the need felt for the worker, and not because her increasing ability is a factor in her trade life. After several years spent in the market she is little better off than at her entrance.

Difficulties in Organization.

It was to relieve this serious situation that the Manhattan Trade School was founded. It began its work in the face of great discouragements. Employers were prejudiced against such instruction, for girls trained in former technical schools had not given satisfaction in the workrooms. The parents of the pupils felt that they could not sacrifice themselves further than the end of the compulsory school year, but must then send their children into wage-earning positions. It was impossible to obtain state or municipal aid. and it was known that the experiment must be costly, for: (1) A trade school must be open all the year for day classes, and for night work when needed, (schools usually are open from eight to ten months). (2) The work must be done on correct materials, which are often expensive and perishable, but pupils are too poor to provide them, therefore the school must plan to do so. (3) The supervisors must be well educated, with a broad-minded view of industry, capable of original thought and having a practical knowledge of trade requirements (women of such calibre can always command the best salaries). The teachers and forewomen also must combine teaching ability with competence in their workrooms, but as the market wishes a similar class of service and gives excellent wages to obtain it, the school must offer a like or even a larger amount. (4) Usually, teachers of highly skilled industries are expert in but one occupation, such as straw hat making by electric machine or jewelry-box making; hence, even if the student body be small, the teaching force can seldom be reduced without cutting off an entire department or trade. A trade school thus differs from a high school, in which two or more academic subjects can be taught by the same instructor.

Selection of Trades.

The selection of definite trades was made after five months' investigation in factories, workrooms and department stores of New York. The occupations chosen employ large numbers of women; require expert workers; involve training that is difficult to obtain; offer chances for promotion; pay good wages; offer favorable workroom conditions, physically and morally.

Slack seasons occurring in many otherwise good employments were considered and plans were made whereby the worker could be enabled to shift to another allied trade when her own was slack. If a girl gains complete control of her tool she can adapt herself to other occupations in which it is used with less difficulty than she can change to a trade requiring another tool.

Tools of Trade as Centres.

Women's industries, to a great extent, centre around the skilled use of a few tools. These tools were selected as centres of the school activities and the connected trades were radiated from them. The most skilled occupations were found to require the use of the sewing machine — foot and electric power, the paint brush, the paste brush and the needle. Statistics show that teaching the use of this last tool will affect over one-half of the women wage-earners of New York, of which there are at least 370,000. In addition to the general scheme of fitting a worker so that she may take up another allied occupation in slack seasons, specific training, for this purpose, is given to those students who choose trades where the busy season is short and of frequent recurrence.

The curriculum includes instruction in the following trades; the courses are short and the teaching is on trade lines.

I. Use of electric power sewing machines.

1. General Operating—(cheaper variety of work—seasonal, fair wages. Better grade of work —year round, fair and good wages, piece or week work): Shirtwaists, children's dresses (cloth and cotton), boys' waists, infants' wear, children's clothing, women's underwear, fancy petticoats, kimonos and dressing sacques.
2. Special Machines—(seasonal to year round work, depending on kind and demand, wages good) : Lace stitch, hemstitching, buttonhole, embroidery (hand and Bonnaz).
3. Dressmaking Operating—(year round, wages good) : Lingerie, fancy waists and suits.
4. Straw Sewing—(excellent wages for a short season, but the worker can then return to good wages in general operating) : Women's and men's hats.

II. Use of the needle and foot power sewing machines.

1. Dress and Garment-Making (seasons nine to eleven months, and fair to good wages): Uniforms and aprons, white work and simple white embroidery,gymnasium and swimming suits (wholesale and custom), lingerie, dress embroidery, dressmaking—plain and fancy.
2. Millinery (short seasonal work, low wages, difficult for the average young worker to rise): Trimmings and frame-making.
3. Lampshade and Candleshade Making (seasonal work, fair pay): This trade supplements Millinery.

III. Use of paste and glue. 1. Sample mounting (virtually year work, fair wages); 2. Sample bookcovers, labelling, tissue paper novelties and decorations (seasonal and year round work, good wages); 3. Novelty work (year round work, changed within workroom to meet demand, wages good); 4. Jewelry and silverware casemaking (year round work, good wages).

IV. Use of brush and pencil (year round work, good wages): Special elementary art trades, perforating and stamping, costume sketching, photograph and slide retouching.

Note. Year round work, in general, includes a holiday of longer or shorter duration, usually without pay.

Entrance, Selection, Progress.

The school is open throughout the year in order to train girls whenever they come—the summer months being slack in most trades are especially desirable for instruction. The tuition is free and in cases of extreme necessity, a committee gives Student's Aid, in proportion to the need. Entrance to day classes for girls who are from 14 to 17 and who can show their working papers or be able to produce documentary evidence of age, if under 16, can occur any week.

Each girl who enters, after selecting her trade, is given à typewritten paper showing the possible steps of advance in her chosen course. She takes this home in order that the family may know what is before her. She can by special effort or by outside study lessen the length of her training. The first month in the school is a test time. If the girl shows the needed qualities she is allowed to continue.

During the month of trial her instructors decide what she needs and if her chosen trade is the best for her. The right is reserved to make a complete change if her health will not stand the one she desires, if she has no ability for it, or if she gives evidence of special talent in another direction.

Every student has, as a part of her trade education, such academic work, art and physical training as seems necessary; when she passes certain standards she is then allowed to devote full time to her selected occupation. It is not possible for a worker who has skill with the hand, but no education to back it up, to rise far in her trade.

Trade Art Instruction.

Courses in Trade Art were organized as a fundamental part of the instruction. Each trade has its own art, and the school has tried to adapt the work in the studies to each different occupation. It recognizes that the art applied in dressmaking differs from that in millinery, and this again from that required for decorating jewelry boxes and calendars. It consequently offers each student the kind of elementary art training needed in her trade. The time is too short to develop designers, but it does help a girl to be more exact, resourceful and useful in her workroom, and often enables her to make a higher wage. A worker who can place trimming, adapt designs to new purposes, stamp patterns, draw copies of garments and combine color attractively, is especially desirable in her chosen employment.

Lunchroom Cookery.

The school has been able to prove that girls educated there can command a fair wage in trade, but that a longer time given to this training will enable them to obtain better positions and salaries. Hence an increasing number have been willing to remain longer, giving even a year or more to preparation. It was with this latter class that the time was ripe to offer some training in lunchroom cookery which could teach them what could be procured at low prices and yet be nourishing; how to prepare food at home, and how to use the hot table often found in an up-to-date factory. For this purpose, therefore, some simple additional equipment was installed and a daily menu was offered comprising inexpensive, attractive, wholesome dishes, at the lowest possible cost. Many of the students care for so little variety in food that all of the necessary elements for building strong, healthy bodies are not supplied, hence they are undernourished. They require encouragement to even try the food which is essential for improving their physical condition. The girls have taken great interest in their lunchroom cookery. They appreciate the inexpensive menus and admire the simple table decorations. Gradually they have given up spending their few pennies for poor fruit, cake, or candy at some cheap shop and now purchase nourishing dishes cooked by the students at the school.

Hygiene and Housekeeping.

The cooking course connects directly with the talks on hygiene, The plan of work is the following: (1) Twenty girls are chosen at one time. These work in two groups of ten each, and for six weeks have daily one-hour lessons. This gives them 30 lessons, which is almost equivalent to what the public school offers in a year but, being concentrated into daily work and practical use in the lunchroom, is of equal, if not greater, efficacy. (2) The students set the tables, cook a definite part of the lunch, dish the articles, prepare the counters, sell the various dishes, keep and report sales, and clear the counters afterward. The groups alternate in order that preparing food, watching its progress and taking it from the stove may be done by all with a minimum loss of time from their trade instruction. (3) The selection of girls to take the course is made from (*a*) those who can remain long enough in the school to combine trade training with the simple cooking course, (*b*) those who have such poor health that a knowledge of what to eat and how to cook it is the first consideration, and (*c*) those who are already little housekeepers in their homes as their mothers are incapacitated or dead.

Trade Workers as Instructors.

Trade workers are employed in the business shops connected with the various departments. These assistants have proved their value in making the best utilization of the order work. They facilitate the completion of the work on time, and help train the girls to feel responsible for their share of it. As the students work slowly at first, and as their hours in the shops are interrupted by other studies, the trade workers, when necessary, continue with or complete the articles while the girls are absent. They make possible the tradelike organization of the shops, for each one has around her her own little groups of assistants and teaches them while she also works. Constant repetition of the same process ceases, after a time, to be valuable to a student, hence her time must not be wasted by too simple work or by unnecessary details. It often happens also that an article may require expert work in its completion which the students cannot yet do; the trade workers select for each girl the process which will be of value to her and then do the work the students cannot do or should not do.

Orders Demanded and Filled.

The following lists will show the class of orders which have been demanded by trade and turned out by the school.

Operating Department Orders: 1. Trade Work:—ribbon run on webbing for suspenders, infants' dresses—8 different styles, children's aprons—2 different styles, hemstitching and embroidery for yokes, ruffling—hem and hemstitched, fagotting.

2. Individual Custom Orders:—dressing sacques, aprons—kitchen, gingham, and work, gymnasium suits, waists, children's dresses, corset-covers, drawers, skirts and chemise, sheets, pillow-slips, curtains, straw hats, fancy petticoats, kimonos, handkerchiefs, fancy neckwear, infants' outfits, boys' waists, quilting, hemstitching by yard, silk waists, and dresses hemstitched, tucking by yard, waists, collars, cuffs and cloth embroidered, initials on linen and monograms on saddle cloths; ruffling by yard.

3. Order Work for other Departments:—Dressmaking: machine work on nightgowns, corset-covers, drawers, combination suits, petticoats, kimonos, gymnasium bloomers, swimming suits, buttonholes, hemstitching on silk skirts, dresses, waists; bonnaz embroidery on dresses, waists; millinery: veils hemstitched; art: pencil and brush cases; office coats and overalls for janitors employed in school.

Dressmaking Department Orders: Aprons, petticoats, maids' dresses; machine-made underwear; collars and neckwear; nurses' uniforms; swimming, bathing and gymnasium suits; children's and baby clothes; fine hand-made underwear; plain shirtwaists, fine waists, afternoon gowns, street suits, evening gowns, cloth suits tailored.

Pasting and Novelty Orders: Mounting suspender webbing, mounting corset samples, pasting suspender tabs and sockets, case-making. Desk sets, lampshades and candleshades.

Art Department Orders: 1. trade order work: stamping, perforating, coloring fashion plates, stencil cutting.

2. Custom Work: Stencilling curtains, scarfs, table covers, sofa pillows; designing patterns for embroidery for table covers, doylies, bags, buttons, shirtwaists, skirts, parasols and chiffon scarfs.

3. Order Work for other Departments:—Decorating book covers, desk sets, boxes, dress trimmings—panels, lapels, vests; collars and cuffs, insertions for hand and machine; banding for hats, letters, monograms, designs for doylies, scarfs, curtains, work-bags.

SECTION 3: TRADE SCHOOL FOR GIRLS, BOSTON, MASS.

This school opened its doors in July, 1904, as the outcome of an investigation by a voluntary association of ladies among employers of young girls as to the need of a Trade School or Trade Training Classes for girls in Boston. It was conducted as a private enterprise until taken over by City and State in September, 1909. It is now conducted by a Committee as local representative of the State Board of Education. Its threefold object is: (1) to give a trade training to girls between 14 and 18 years who are obliged to become wage-earners, training them to enter trades and giving them greater opportunity for development and self-support; (2) to help them to understand their relation to industry, and to improve their condition morally, mentally and physically; (3) to increase their general efficiency, and relate this to home life.

The academic instruction includes Spelling, Business Forms, Business English and Accounts. Instruction is also given in Color Study and Design, in Hygiene and Physical Training and in Cookery.

Non-residents may also be admitted, but not to the exclusion of resident pupils. Students come from a radius of 20 to 30 miles. About 8 per cent to 10 per cent are supported by friends, who allow \$3 or \$4 weekly for living expenses.

All pupils are taken on probation for a month, and those who show no aptitude for any one of the school's lines of work are advised to withdraw.

There are two terms; the regular school term and a summer term during July and August. Sessions are held five days weekly from 8.30 a.m. to 5 p.m., 5½ hours daily being devoted to trade instruction, and about 2 hours to supplementary academic work.

The length of the course for the average pupil is one year. Certificates are granted to pupils who satisfactorily complete the work of the school and prove their ability in the trade elected.

Trades Taught.

There are four trades taught; each pupil elects one.

(1) *Dressmaking.*—Children's Garments, giving practice in construction, and in hand and machine sewing, including use of electric power machines. White Work Underwear, giving use of finer material; construction of larger garments; practice in more difficult processes; fine hand tucking, rolled edges, lace inserting, simple embroidery, etc. Fitted Linings and Shirt Waists; use of various textiles; shirt waist suits and simple dresses. Costumes, giving practice in dress finishing, simple braiding and embroidery.

(2) *Millinery.*—Plain Sewing, giving practice in hand and machine sewing, including special stitches used in millinery; shirring, velvet hemming, wiring, etc. Hat Making, summer materials, including linings, bands, frames, straw braiding; making of maline, chiffon, lingerie, and straw hats. Hat Making, winter materials, including buckram frames, fitted and draped coverings; making of felt, velvet, satin and silk hats.

(3) *Clothing Machine Operating.*—Clothing machines, with practice on straight away work, aprons, etc. Plain sewing. Garment Making on Electric Power Machines (no basting). Aprons, underwear, petticoats, kimonos, waists, children's clothing. Use of special machines, buttonhole machine, tucking machine.

(4) *Straw Machine Operating.*—Straw machines, including use of coarse braids, lappings, joinings, tip making, fitting of simple shapes to plaster blocks; use of fine braids, handling of delicate colors, braid combinations, and fitting difficult shapes to blocks.

Supplementary Studies, Teachers, etc.

The supplementary work required of each pupil comprises:—Spelling, Business Forms, Business English; *Textiles*—(processes of manufacture; judging kinds and qualities of materials; learning uses, widths, prices, etc.); *Color Study and Design* (applied in copying and planning hats and costumes; judging good and poor design and color combinations; selecting materials in color schemes; designing simple costumes and making practical designs for braiding and embroidery); *Cooking* (planning, preparing and serving the daily luncheon; care of lunch room, kitchen, dishes, closets, towels, etc.); *Physical Exercises*, with lessons on the care of the body and the necessity of proper food, sleep and exercise. Emphasis is laid on correct postures in sitting, and on the need of fresh air in the work room.

The length of course is usually one year, but it varies in cases from ½ to 1½ year. It is hoped to established a 2 year course and a graduation diploma.

Actual cutting and tailoring are not taken up. The dresses made are house dresses or those adapted for evening wear.

There are 19 regular teachers and 10 pupil-teachers in training. The professional or trade teachers are obtained from such as forewomen, etc., in the trade; the academic teachers have the ordinary Public School qualification.

The school building, originally used as a convent, is well adapted for school purposes. It is equipped with a fire alarm on each floor. A fairly large hall is used for opening exercises, physical culture, etc. (Students have regular games, and dancing in addition to the regular physical culture exercises). The power room is designed to seat about 50 students at 2 long tables extending the full length of the room. The cooking department is also utilized to provide (at practically cost prices) lunches, etc., at 10.30 a.m. and at mid-day. Laundry work is confined to school towels and aprons.

A business-like attitude prevailed throughout the school.

Incentives to students' effort are the making and selling of products as well as making garments for themselves from their own material.

Every Friday from 3.30 to 5.30 p.m. a social meeting is held at which addresses on the pupils' work are given by prominent visitors.

Pupils Placed on Graduation.

When the course is completed and the pupil has attained a satisfactory standard of proficiency, an effort is made by the Principal of the Committee and 2 vocational assistants to place her in a permanent position. Each is recommended at a certain wage, and the employer asked to guarantee it to her for two weeks, and to report to the school at the end of that time if she is not satisfactory. The girl also is asked to report either progress or difficulty. As a rule, employers are more than satisfied, but if not, the girl is permitted to return to school until she has overcome any deficiency. In this way the school establishes confidence between itself and employers, and often receives from them helpful recommendations relative to its work.

Between September, 1910 and April, 1911 about 60 girls were placed at an average wage of $5.70, and nearly all are doing more than satisfactory work. A number who have not completed the course went out on part time, spending one week in the shop and the next in the school, until their work was entirely satisfactory and the employer was willing to guarantee the minimum wage, $6 weekly, barring special cases. The comparative average weekly wage of 108 girls taking positions from September 14, 1910 to June 21, 1911, was as follows:—Placed by School, $6.16; self-placed (those who from necessity or choice secure positions for themselves before their training is completed) $3.43.

Health, Culture, Character.

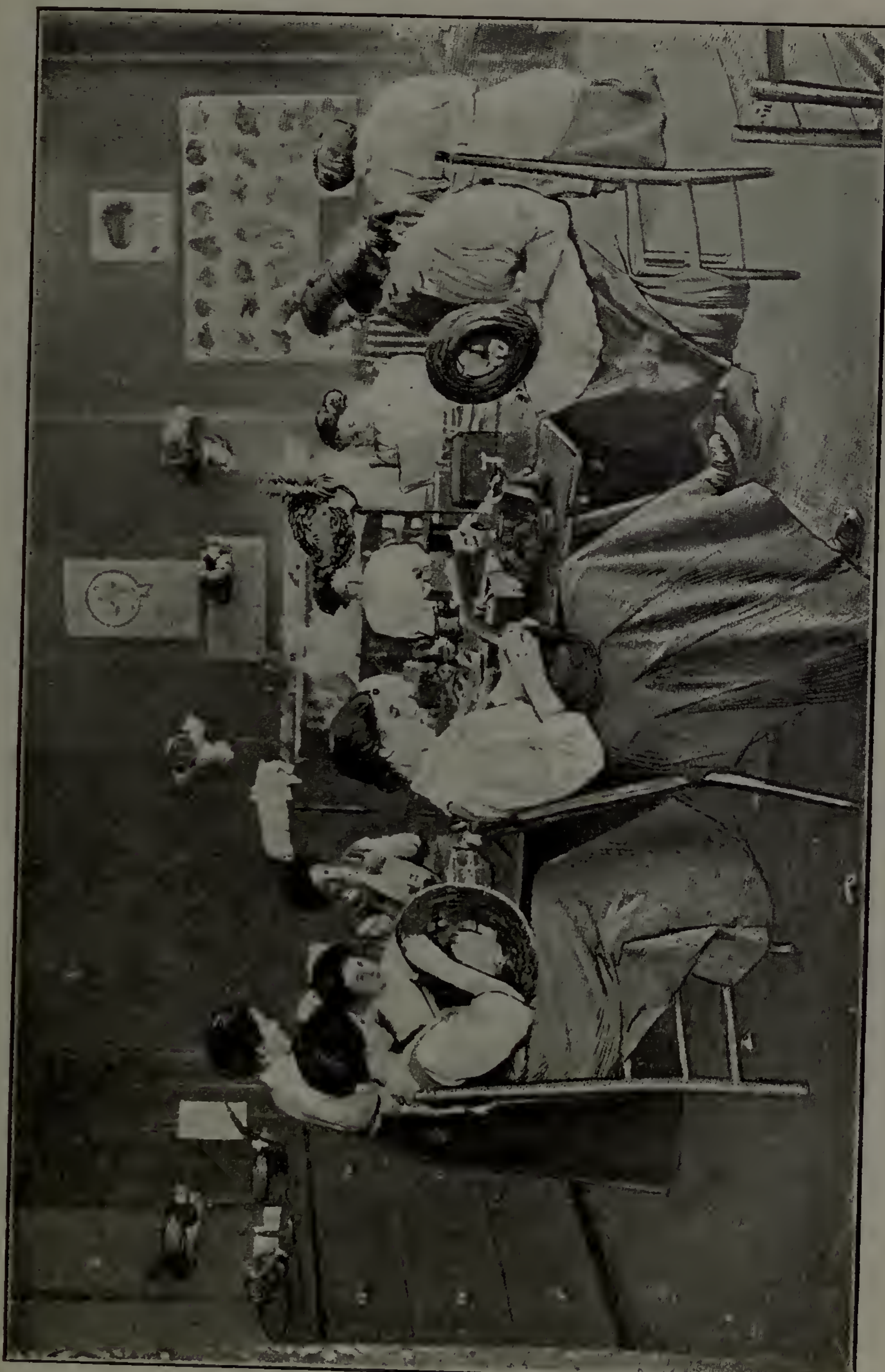
While it is a definite trade school for girls it also does much toward their improvement in health, culture, and character. It has all the advantages of the best of educational life. Everything taught has in view as much the effect upon the girl who learns, and the way she learns, as upon what she will earn by what she learns. It is all as genuinely educational as vocational. Dr. A. E. Winship, Editor of the "Journal of Education" states:—"It is not easy to find a culture school where the spirit from first to last is more inspirational than here. Rarely does a girl in any school come in closer touch with inspiring leadership than here."

The school has evening classes during the winter, open and free to students over 17 who are not attending a public day school and are able to profit by the instruction offered in Cloth Machine Operating, Straw Machine Operating, Cooking, Household Management and Economics.

The school offers opportunity for power machine operators to learn machines with which they are not already familiar, and to increase their speed and efficiency in their present work; also for homemakers, housekeepers and domestics who wish to improve themselves in their vocations.

DRESSMAKING CLASS, TRADE SCHOOL FOR GIRLS: BOSTON, MASS

SESSIONAL PAPER No. 191d



Millinery Class, Trade School for Girls: Boston, Mass.

SECTION 4: VOCATIONAL SCHOOL FOR GIRLS, ROCHESTER, N.Y.

This school was opened in 1909 by the City Board of Education and the State authorities as a school for home-makers, but the plan proved unsuccessful, as pupils thought they were being trained for domestic service and became dissatisfied. The tendency of other schools to send their undesirable pupils to this school added to the unrest; hence in 1910 it was entirely reorganized, the home-making course being made incidental to the primary purpose of the school instruction in Sewing, Dressmaking and Millinery.

The school is free, and is open from 9 a.m. to 3 p.m. on 5 days weekly from September to June. Any girl of at least 14 who has finished the sixth grade may attend, and may enter at any time.

All pupils are required to devote 5½ hours weekly to Cooking; 11 hours to Trade Practice work; and 13½ hours to such subjects as Arithmetic, English, Industrial Geography and History (including Civics), Spelling, Designing and Hygiene, these subjects being closely correlated to vocational work.

In December, 1910, 27 girls were receiving instruction in Dressmaking, 14 in Millinery, and in addition 16 were taking the Home-makers' course, with practice time evenly divided between Dressmaking, Millinery and Cooking.

In introducing Dressmaking and Millinery, local industries were not especially considered, but rather the general demand for girls skilled in these trades. The training given, which covers 2 years, is planned to make them efficient helpers or assistants.

Pupils work out designs in millinery or dressmaking. The work in design s carried on along with the other departments.

Complete Garments and Meals by Pupils.

Garments and hats are made from materials furnished by the pupils, and are retained by themselves.

Several school hats were shown, one costing 55 cents, the girl having had the velvet. She had put on a ribbon; with everything complete it cost 88 cents. Handbooks were worked out from the girls' own designs. Violet flowers and tops of hat pins were made out of ribbon.

In Dressmaking, all work is ordered; any one can give orders as a customer of the school for work to be done. Each girl makes a complete garment from start to finish, so there is a broad base of work; the girls thus become independent workers when they graduate. Fancy needle work, bags, aprons, etc., were for sale for the benefit of the school.

In Domestic Science work the pupils prepare a lunch each day which is bought by students; they also serve lunch to women who come in. There is no feeling in the city that the girls are getting inferior education. They are here because their parents wish it, and because they are getting something they could not get in any other school. They get as much Arithmetic, Spelling and Literature as they would in a Public School. The Principal said most of these 100 girls would not have gone to High School, but would have left school altogether.

SECTION 5: TRADE SCHOOL FOR GIRLS, WORCESTER, MASS.

This School was established in 1911, under the State and City ordinance providing for Independent Industrial Schools, under the management and control of a Board of Trustees after an investigation of local industries and needs.

It is for girls who desire an education that will prepare them for industrial work as distinguished from office work and teaching. Pupils learn the elements of a trade, getting training that will enable girls of 14 to increase their earning capacity, and that they could not get if they started work as unskilled apprentices. They study also such academic subjects as are related to their trade work. Girls who have not completed grammar school work may be admitted on condition that they show ability for trade work.

The school is open (except during August) from 8.30 a..m. to 4.45 p.m. five days weekly. There are no home lessons.

It is held in a splendid old mansion house of 28 rooms, including 2 well-equipped kitchens and pantries and a basement laundry with stationary tubs and sink.

Physical culture and cooking are on the courses—the latter chiefly for the daily luncheon, which the girls cook and serve at cost. At noon-hour the girls read and dance.

Of the 72 pupils, 36 were taking power machine work, 18 plain sewing, 18 millinery. Three types of dressmaking are taught,— plain sewing; seamstress work as in going about from house to house; and such as is done in dressmakers' establishments. Fine sewing on corsets being a local industry, girls are trained for that, and for fine hand sewing which is needed by successful milliners. A bonnet was shown, and figuring the making at $2 it cost $3.05; in a shop it would sell at $7.75.

The trade work is conducted in school shops where hand and machine work is done on garments that are sold. Materials for work and tuition are free. The atmosphere of the school is that of a home rather than a factory. Two years later a "shop" atmosphere will be created.

It is proposed to add pasting and glue work, as there is a large Valentine factory in the locality; also training girls for cooking, for lunch rooms, as helpers in hospitals, etc., for which the Worcester people seem well prepared. The dressmaking course is correlated to the academic and gymnastic work and cooking. A good many of the girls are workpeople. Older girls attend for 3 hours a day and get hand work. Some factories send girls to the school for training. The principal claims that employers would get nearly as much by sending girls part-time as in keeping them full hours in the factory, because the school would "work them up" so much faster. Many girls attend for personal advantage, apart from trade.

In the first year all take Cooking and Art, but in the second year the work in Cooking, Art and English is elective.

COURSES.

Trade.—Sewing, millinery, electric power machine operating.

Academic.—Arithmetic, English, textiles, spelling—all as related to the several trades—civics, and apportionment of incomes. *Art.*—Form, spacing, proportion, line and color, as related to trade work; applied design, costume and hat designing. *Cooking.*—Buying, preparing, serving of foods for the school luncheon, planning simple menus, canning and preserving. *Physical Education.*—Light gymnastics, dancing, personal hygiene. Care of eyes, teeth, throat and ears. Corrective exercises.

A representative committee of 15 men and women act as advisers. Some of these are familiar with the trades taught, and others are interested in the work of the school and cognizant of social and industrial conditions in Worcester. In this way, the administrators of the school are kept in close touch with the community, and especially the needs of those groups to whom the school can render special service.

SECTION 6: THE HEBREW TECHNICAL SCHOOL FOR GIRLS, NEW YORK.

This claims to be the oldest vocational school in the United States, having begun operations 8 months before the Pratt Institute, Brooklyn. Mrs. M. D. Louis, the founder of the institution, is today its secretary. It began as a Hebrew Sunday School in 1881. For a long while it existed as a little commercial and sewing school at 267 Henry Street. About 7 years ago the present fine building was erected at Second Avenue and 15th Street. The school is supported by voluntary contributions.

There are two departments—Manual and Commercial. In the former there are 17 periods per week of 45 minutes each for Dressmaking, given in the last 6 months. Millinery is given to each girl on two days, 3 hours each week. Attention is paid to Sewing and Embroidery, Drawing, Cooking, and Household Art in connection with the Cooking throughout the course. Physical Training consists of gymnastic work and swimming in a large swimming pool. There are 3 periods for Choral Music, also a series of musical lectures.

Literature and History are taught in correlation throughout the course. Physiology is given in the first 6 months, emphasis being given to hygiene and home sanitation. Arithmetic is given daily, largely in correlation with the problems that arise in the Manual Department. English Grammar is taught in connection with the English Literature and History. Penmanship is given 3 periods per week during the first 6 months.

The Commercial Department gives Stenography, Typewriting, Modern Illustrative Book-keeping, Office Work, Penmanship and English. During July and August the programme is varied so as to devote half of the time to Physical Training or recreation work, 4 periods being given daily for Shorthand, Typewritingand English, and one each for Vocal Training and Elocution, Swimming, Dancing, and Gymnastics.

A Dressmaking Class.

A Class in Sewing: Hebrew Technical School for Girls, New York.

School Shop, Teachers, Etc.

School hours are from 8.30 a.m. to 4 p.m. on 5 days a week. Of a total of 32½ hours per week, 15¼ are given to practice work, 9 to academic subjects, 1½ to cooking, and 6¾ to physical training, ethical training and music.

Only the fundamental principles of the trade are taught, the practice having to be acquired in the trade itself.

In the Manual Department pupils are first taught the rudiments of sewing. As they become proficient they make simple garments, which are sold to them at cost price; then they go on to more elaborate work and hand embroidery, and make garments for customers. All girls get some instruction in millinery, and at the end of the more elementary work can begin to specialize on either millinery or dressmaking.

A school shop has recently been established to provide further practice for girls after finishing their dressmaking course, in which they remain 6 months, being paid a small wage, increasing from $2 upwards.

The greatest demand for graduates comes from the smaller manufacturers and shops where careful work is required; larger ones will not pay the wages asked.

Of the 6 trade teachers employed in 1909-10, 2 had had actual experience in the trade, and all had previously taught it. Great need is felt for a Normal School for Industrial Teachers.

The school is non-sectarian. Of the 27 or 28 teachers, only 3 are of the Jewish faith. 'Discussion periods' are held one period per week throughout the course, in which questions are discussed with the pupils pertaining to honesty, truthfulness, punctuality, regularity, etc.

More Applicants than Vacancies.

There are five times as many applications for admission to the Commercial Department as there are vacancies, and from one and a half to twice as many for the Manual Department as there are seats. A girl who has lost both parents stands first chance; one whose father is dead, second chance; if mother is dead, third chance; the child of a poor laborer with a family to support stands next. Four-fifths of the children come from the poor of the East Side. 75% are Hebrew; 20% Catholic; 5% Protestant. The entrance examination consists of 20 words in spelling; 5 sentences embracing a page of dictation; some addition, and five or ten problems in arithmetic.

In the Commercial Department the pupils must have completed the grammar school; in the Manual Department they must have passed 7 A and gone up to 7 B. After this examination, girls are sized up and allotted to the Manual or Commercial Department; then they are sent to a medical examiner, who gives the pupils four examinations—first at entrance and three times during the course. Those who are anaemic have corrective gymnastic exercises; the strong and heavy have club exercises; those who come between are given lighter hand work.

In order to make pupils feel they are not getting charity, and have a little responsibility at home, a weekly fee of 25 cents in the Commercial and 15 cents in the Manual Department is charged; 10 cents goes for refreshment, each girl receiving a cup of cocoa or a glass of milk at 10.30 a.m. daily, and another at luncheon period. Each girl is requested, but not required, to pay $2 into the endowment fund during the 18 months of school attendance or afterwards; about $10,000 to $15,000 of this fund has been thus contributed.

A distinct feature of this school is that if a pupil should meet with reverses so that she would have to leave school if not helped, if she is well up in her work she receives from the stipendiary fund from $1 to $5 per week; but out of 465 on the list, there are only 10 on the stipendiary list.

Individual Methods, Mother Teachers.

No girl drops out of school without her teacher or the Superintendent knowing why, and the total loss in this way is not 5%. Each September and March a class of from 140 to 150 graduates. The Employment Bureau finds positions for practically all the girls before they graduate. No girl is allowed to go out at less than $5 a week, and the school investigates employers very carefully, and sees that none is sent where there is danger to her reputation. When girls get positions, they report each year where employed, salary per week, etc., and track is kept of every one.

Another distinct feature is that students are divided into classes and have 'Mother Teachers', along with their class teacher, through both junior and senior terms for 18 months, to whom a girl may complain if not receiving proper treatment from the teachers. Substitute teachers are employed through July and August, thus giving the regular teacher a month's vacation.

This school aims to do as much in the 18 months as the ordinary High School in 2 years. If pupils can leave the city and go into the country, they are allowed two weeks vacation during July and August; with this exception, and a week's vacation each at Christmas and in Passover week, the session is continuous for 18 months.

The Superintendent drafts the curriculum in consultation with the Instruction Committee. Each teacher is left free to use her own personality and individuality in her methods of teaching.

Visit to the School.

A visit was made to the School with the Superintendent.

Dressmaking Department.—Beginners were making simple underwear; talking about different material; trying to find out how the girls would understand difference in materials—one girl said she thought by the touch. There are no exercises for the development of the faculty of touch. Other girls of 14 to 15 were working first at baby dresses, then fine underwear, which is sold at sales and at the stores; garments are worked as a class problem, and all involve the same principles, so as to give the problem along with class instruction. Before this they take individual orders, which is better for the girl, as involving problems. The school has no trouble with the trades people of the city, as it only sells 30 baby dresses in a term, at $2 to $4.50 each, when they may cost $2.

Physical culture.—There is a Roof Garden for basket ball, a Gymnasium with all apparatus, and a running track. Two days in the week the girls are taught dances and steps in companies; a regular dancing teacher comes in the summer time.

The school kitchen is used for cooking luncheon and serving teachers' luncheons at 15 cents each. A class divides into two sections, each working 3 months.

Order Department.—School graduates were working here having returned to become more efficient in dressmaking. Orders are taken from Directors and friends of the school, and given to the teacher in charge. The school pays $10 a week to some girls. Some have been there 5 or 6 years.

Time-slips are pinned to each garment, showing entry number, job number, day of week, time spent, the amount of money paid, if any. There is a ready sale for maids' aprons, caps and collars. The girls are said to make things best in an educational way.

Senior girls make dresses for teachers in one month without cost, the teachers furnishing the material, the embroidery teacher making the design. Designs were made by the teacher for needlework on neckbands and collars. Girls were making their graduating dresses.

A Teachers' Rest Room was a feature noticed.

A Reference Library is available for pupils of the senior class.

Embroidery.—Specimens 150 years old were shown. Each girl brings the stitch, puts it on a sampler to keep for reference; then makes it in color, using the scallop and the shape she has learned; then a second sampler showing the different ways of doing simple decorative stitches. The girls are taught where these can be used, and they are applied as far as possible in the work they are doing. After stitching, the girl does fagotting; then she is shown how she can use this fagotting. Then the girls take up lettering, German letters first; they are shown where the German letters are better than the French; then they take up the French raised lettering, which requires much more skill and accuracy in line work and direction of stitch. By the time they have done this they are ready for their junior work, which is application of embroidery to baby dresses, collars, cuffs, etc.

SECTION 7: HIGH SCHOOL OF PRACTICAL ARTS, BOSTON, MASS.

The purpose of this school is to give full opportunity for the development of that type of students whose talents lie in lines of doing and expressing rather than of acquisition. It is a High School with a Practical Arts Department, having a 4 years' course, with 30 periods a week—3 lessons in sewing and 2 in cookery and housewifery.

The school tries out the girls for the first year and sees what they are fitted for. Some of them choose Domestic Science, which includes cookery, housewifery and the care of the home. They also get some "home" dressmaking and millinery as distinct from the trades; but a girl taking this course is evidently aiming to make herself a competent housekeeper. Another girl chooses Dressmaking with a view of going into the trade to earn her living when she leaves school: hence for the next 3 years she devotes her industrial effort to that one trade, also taking some Domestic Science, because such a girl is very likely to marry—7 years being about the average time spent in the trade before marriage. The Milliner also takes her trade course, together with some sewing and some Domestic Science. They must take all three, but they "major" in one. Some girls go to the Normal Arts School to develop drawing. The purpose is to educate a woman and give her a training different from the old type.

The School is in its 15th year. There were 560 pupils in 1911; 39 graduated in June 1911, and about 80 would graduate June 1912. Out of the 560, 8 were taken back into the school as helpers in kitchen and sewing rooms. They will probably become teachers eventually, and some will go into dressmaking and millinery shops.

The school tries to place its pupils in shops where they will rise, believing that in about 4 years they will become forewomen.

A Practical School Atmosphere.

The atmosphere of the school and the appearance of the girls show that there is a seriousness of purpose, and that the womanly qualities are being brought out. They do their book work so much the better for it. In arithmetic they study the problems of everyday life—weights and measures, computations of cost of things in the kitchen. When handling muslin, they feel the fabric and know the value. Principal Weaver examined one of the girls on a piece of cloth, as to price per yard, nature and quality. The girl said, "I know this is shirting, because there is a white stripe in it. I went and bought it on my own responsibility; it is a piece of men's shirting. It is for a waist. We have not got all the buttons yet, but it has taken about 3 yards of cloth, costing about 90 cents, and the whole thing will cost about $1.25." Another girl had picked up some gingham for which she had paid 32 cents a yard. She said it was easier to get a stripe than a plaid. Another was drafting a skirt pattern for a long dress, she was going to buy from sample a navy blue serge for $1.50.

They make tailored suits here. All the work is cut out and laid out in the girls' presence by the teacher. The trade is taught in detail up to the tailored suit, one of which was on exhibition. The sewing tables arranged for 4 pupils were simple and inexpensive, and much better than the horseshoe plan.

A sample time ticket was obtained. The girls furnish everything except the needles and the machines, and the girl keeps what she makes. If she cannot afford to buy the material, the school furnishes it, and she makes it up, and the school owns it. The fact that the school has nothing not disposed of shows the condition. They begin on underwear, aprons, shirtwaists; get to washing materials the second year; the third year silk and wool; the fourth year tailored garments. That is for those who are taking it regularly; the others are making graduating dresses and things of that sort.

COURSE OF STUDY.

The course of study is presented under two general heads—academic and industrial—and usually demands 4 years for its completion.

The course of study during the first year is the same for all pupils. During the three years following no electives are offered in the academic work except a choice of French or German, but the pupils are allowed to choose different lines of vocational training.

The Academic Departments are English, History, Mathematics, Science, French, German, Art. The Industrial Department at present offers these courses: Dressmaking, Millinery, Household Science. The latter is offered to girls who desire to make an intelligent study of the home from the standpoints of sanitation, furnishing, decoration and care. The Dressmaking and Millinery courses aim to give ideals, taste and skill which shall have money earning value for the possessor.

First Year.—*Required.*—(Total periods per week 28, as shown in figure opposite each subject) —English 5, History 2, Mathematics 4, Art 4, Sewing 6, Cooking and Housewifery 4, Choral Practice 1, Physical Training 2.

Elective.—None.

Second Year.—*Required.*—(20 periods)—English 4, History 2, Foreign Language 3, Chemistry 4, Art 5, Choral Practice 1, Physical Training 1.

Elective.—Dressmaking Course 10, Millinery Course 10, Household Science Course 10.

Third Year.—*Required.*—(20 periods)— English 4, History, Civil Government 2, Foreign Language 3, Biology (one-half year) 2, Physics (one-half year) 2, Art 5, Choral Practice 1, Physical Training 1.

Elective.—Dressmaking Course 10, Millinery Course 10, Household Science Course 10.

Fourth Year.—*Required.*—(20 periods)—English 4, Foreign Language 3, Household Accounts (one-half year) 2, Home Nursing (one-half year) 2, Economics 2, Art 5, Choral Practice 1, Physical Training 1.

Elective.—Dressmaking Course 10, Millinery Course 10, Household Science Course 10.

The English Course aims to develop the speech, intellect, taste and spirit of the students, so that they shall be able to speak the English tongue with a fair degree of precision and grace; to think logically; to read with pleasure and appreciation the works of standard American and English authors; to teach them to select good books for reading and to live in the possession of fine ideals.

In the English class for 14-year old girls the teacher was reading a girl's production in the form of a sonnet, illustrated by postal cards from the Rocky Mountains. This sonnet had been submitted by the pupil in draft form, was returned to her to "work over," and was now being read as revised. Mr. Weaver asked the girls as to their interest in Ruskin, Shakespeare, Milton, etc., and they responded affirmatively.

Art.—The purpose of this course is the cultivation of taste through a study of the principles of beauty and their application to the problems of dress and the home. It includes representation, construction, mechanical drawing, composition and design, costume design, and household decoration and furnishing. There is a library of design.

Drawing is specialized for Domestic Science, Millinery and Dressmaking. Pupils in second year were working on designs of graduation gown, cost limited to $4; all to be similar but not alike. One girl who was a little deaf has gone into making designs for newspaper advertising at large figures. Color of eyes, hair, etc., are studied in millinery work. Designs of embroidery and drapery were shown, also color schemes for rooms and furniture, monograms, menu cards, window bills, etc.

Millinery.—The girls work according to shapes of faces and color of hair. They work from buckram frames, wire frames, and miniature designs.

Household Science.—The object of this course is to train girls in all that pertains to the art and science of practical housekeeping, and practice is given in the care of the house, cooking, marketing, planning meals for families and institutions, with such sewing and millinery as will guide pupils in the selection and making of their own garments. The Commissioners visited the rented residence across the street from the school, where girls take full charge of housekeeping. meals for teachers, etc.

Practical Physics.—Different systems of heating are taken up and studied. Girls run the furnace at home for a day or two and study its points. They learn how to place a hot water radiator to get the best results. They draw up schemes of plumbing for their own houses. They investigate the Boston milk and water supply, dust and sanitation. They do some work in dyeing —chemistry as applied to fabrics, etc. They study tests for lead; draw off water and work over the settlings and see what is in it. Mrs. Governor Foss looked at the drawing made by a pupil and asked where the shut-off was in the plumbing. The girl pointed it out, and Mrs. Foss then told how they had a break in their own house and had to let the water run till the plumber came.

History.—Special attention is given to the history of the development of arts and industries.

The Science Course aims to put the student in touch with the scientific problems of life. In every branch of science, attempts are made to teach application quite as much as theory, e.g., pupils learn the bleaching of straw for hats.

The Mathematics Course aims (1) to train girls to think logically and clearly, and (2) to enable them to solve simple problems. In turning over hems, etc., they get arithmetic. Household accounts are taken in the last year. In the second year they have some algebra because Principal Weaver wants some work that teaches the girls to think logically and work exactly, and algebra is a good subject. In the second year they take some geometry, which is tied up with their drawing, drafting, etc. In their science also they get some mathematical work. A lot of mathematics are taught, not for the sake of teaching mathematics, but to mentally strengthen and stimulate the girls.

System in Course of Handwork.

Principal Weaver, pointing out the difference between Manual Training and this industrial work, said he had been a teacher in a Manual Training High School for boys, who would take a little carpentering, and about the time

ONE OF THE COOKERY ROOMS, HIGH SCHOOL OF PRACTICAL ARTS: BOSTON, MASS.

Third Year Dressmaking Class, High School of Practical Arts: Boston, Mass.

MILLINERY DEPARTMENT, HIGH SCHOOL OF PRACTICAL ARTS: BOSTON, MASS.

they got used to that they went to woodcarving; then they had some wood-turning and forging and machine work and, by the time they got through, all that they had was a smattering of handwork just like a smattering of bookwork. Jumping from one thing to another in bookwork, he asserted, leaves the mind illogically trained; and you can hop around in the same way with handwork and leave the hand weak.

In this school, however, a girl devotes herself for 3 years to the problems of Dressmaking, Drafting, Fitting, Cutting; studying the subject logically, not taking a few weeks of Drawing and Embroidery and Latin. Hence the hand, eye and mind are trained on that one thing thoroughly just as on Mathematics or History, and when pupils get through they have that one thing. It is found that the girls by the time they are given a good deal of specialized work, are getting a good grip on things. Of those who take the dressmaking major, one girl measures over and puts down the figures, and she drafts and cuts and fits. That is where they get practice. The teachers are quick to find out about the girls in that way; and if they find Sally can fit, they wait for Sally.

The Teacher Problem.

The trouble is to get teachers, because regular academic teachers have not much sympathy with the methods here. For example, the plan of this school is to take up science and do scientific work for the home, so that instead of girls studying about chemical substances they never heard of, they learn about saleratus, olive oil, washing powders, etc. Then in physics they take heating, lighting, ventilating, water-supply, etc. In the English department the aim is to get the girls to love good literature, not to get them ready for college examinations. As a result they read and love Shakespeare, Ruskin and Thackeray, whereas many Latin Schools would grind them on the obscure parts of literature till they disliked it.

The trade teachers were 'picked up;' one or two being taken right out of the trade; the milliner was an old school-teacher first, but with the school's growth it becomes more and more difficult to secure teachers. A teacher of Domestic Science can be found more easily than one for sewing and cooking. A woman who is expert with her hands may be almost illiterate. A young school graduate has been taken in as special assistant, having taken Domestic Science during her course, and she is going to train as a cooking teacher, staying here perhaps a year, then taking a course at Columbia or Pratt, by which time she will be old enough to take a school.

Simple Kitchen Furnishing.

The Commission found that the old form of gas-stove burners placed around the room is discredited in this school, because as the girls have to work at home with a stove, table and sink, they ought to have the same here. As a big stove could not be got, four ordinary ones were placed together in the middle of the room, so that the girls step from the table to the stove and over to the sink. The fitting of these rooms cost only about $600, instead of $1,800 in the old style.

Principal Weaver's theory is that teaching a girl to make a loaf of bread and calling it a lesson does not work. She has to make it till she can do it like playing the piano while talking over her shoulder; you can't teach it like a lesson and then go on to the next. So in pickling—they have to handle a whole lot of stuff, and do it over and over, before they get the reaction. Many of the teachers who keep house buy bread made by the pupils, and the girls also buy it to take home. The pupils make bottled fruit and pickles. They have a pretty stiff course in this at the beginning of the season.

About $250 a month is spent in the 3 kitchens for milk, butter, eggs, etc., but this does not cost the city a cent, as the articles are sold at lunch. This school does not cater for the lunch—it is an educational by-product, and is sent down to the lunch counter and sold for enough to cover the cost of material and waste; thus the class costs only the instruction in the room, the same as a class in history. The girls in most of the classes in other schools cook little messes and eat them, no attempt being made to turn them into money. This problem has been solved here; the girls get good lunch cheaply, and the school gets the returns.

Each girl has a wooden covered box for apron, towels, work in hand, cook book, etc., the latter being printed to save time in copying.

Vocational Assistant.

The school keeps close tab on pupils through a woman called a vocational assistant, who looks up the shops and secures places for the girls, learns of their leaving or changing places or receiving increased wages, and deals with anything unsatisfactory. Teachers at the school find what the girls like, and the school has to keep up with the times in constantly changing business and shop methods.

This school covers pretty much the same work as the Trade School for Girls, only much more fully, as the latter takes a shorter time and pupils have not the preparation before they come in, being of a lower grade. The girls here must all be graduates of the grammar school, hence they get some cooking and sewing before coming here. Occasionally a girl is sent down to the Trade School when it is found that she needs to go to work and cannot stay the 4 years. Some girls drop out of this school before completion of full course, because of leaving the town or going to work, but not to go to another High School to any extent; and they don't drop out to do nothing, as in other High Schools.

SECTION 8: THE WASHINGTON IRVING HIGH SCHOOL FOR GIRLS, NEW YORK.

This School has five branches in various districts of New York City, the total number of pupils being 4,600, with 125 teachers and a head of each of the branch schools, the latter of whom do no teaching.

The courses include Commercial Work, Dressmaking, Millinery, Embroidery, a Special Course for Designers, as well as one for Bookbinders, Printers and Library Assistants.

In spite of the fact that the building visited by the Commission was decidedly overcrowded, the girls all seemed very happy, busy and alert, and of an exceptionally high physical type. This is ascribed in part to the excellent system of physical culture practised, which includes calisthenics, dancing and Swedish exercises. The girls are also given breathing and body movement exercises at the close of each period of school work. The spirit of the school was free and natural, unhampered by rigid disciplinary rules.

One-third of the students are taking purely academic courses, covering 4 years, and two-thirds the vocational courses plus academic, extending over 3 years.

The students in the Art Design class were executing some exceptionally fine original designs for embroideries and costume magazines, and were thoroughly well equipped to take charge of dressmaking and millinery establishments and other branches for which they were being trained. Scholarships are awarded which take the students to higher Art institutions. 100 students were taking a course in Design, some of whom go into trade and others enter higher Art schools.

Ladies' tailoring is not taught, being classified as a man's occupation.

There are over 1,000 students in the Commercial classes, with 15 teachers.

Breezy School Literature.

The jovial spirit of the school is reflected in the name by which it is known among the pupils—"The Washing and Ironing School"—and in the bright breezy "Composite letter" issued by the Girls' Welcome Committee of the school, embellished with many illustrations from drawings made by the girls in the Art department. After enumerating the many subjects that may be taken, the "letter" goes on:—

One girl does not study all these things at once. Oh, dear no, the studies are arranged in courses. You have to select your course when you enter. There is the four years' course and the three years' course. Let us tell you about them. The first-year work in each is not very different from the first year in the other, so that a girl may change without difficulty.

The Four Years' Course gives you a general academic education or prepares you for the teachers' training school, or for college. Nine hundred and eighty-two of us are taking this course. No high school in the city has shown a higher record than our graduates in the training schools.

We have a four years' course, too, for girls preparing to be Library Assistants. Their first two years of work are just the same as all the other four years girls, but in their last two years they practise cataloguing and managing parts of libraries.

Fifteen hundred and sixty-three of us are in the three years' course. One of these departments is that for Designers, comprising still-life, picture study, draperies, illustrating, lettering and design.

Another three years' course is that for Dressmakers. It has in it: sewing, draughting, costume design and millinery. The graduates from it get good paying positions immediately.

Our Commercial Course is also three years long and it includes stenography, typewriting' bookkeeping and various kinds of office work. So numerous have been the requests for our graduates that the school has not been able to supply the demand. Business houses do not want cheap girls turned out of short-course business schools. They call for well-trained young women who can spell, who are liberally educated, who can compose good letters, who know something more than the mere operation of a typewriting machine. Make no mistake about this. Don't let anyone fool you with a short-cut proposition that will fit you for a third-rate place from which you cannot rise. Start right and make yourself a high-grade, well-educated woman.

You ought to walk to and from school every day, rain or shine, to be sure of getting fresh air and exercise, so as to keep well and happy.

The social life of the school is rather remarkable, and the girls' view of it is given thus:—

Of course, you want to know about some of the interesting features of school life that have made the Washington Irving School a favourite with us.

We all believe school to be a social institution. A part of your training here will be in the management of such social gatherings as educated and able women are called upon to direct. We have given receptions to Mrs. Hughes, the wife of our Governor; to Mrs. McClellan, the wife of our Mayor; to Mrs. McGowan, the wife of the President of the Board of Aldermen; to Mrs. Winthrop, the wife of the President of the Board of Education; to the ladies of the Federation of Women's Clubs and to others prominent in the best interests of our time. It is a valuable experience to be hostesses to wide-awake women. Our committees on speakers bring to the school the men and women most active in the world's work. Our girls take charge of these meetings and learn to assume the responsibilities of social life.

Our teachers are glad to give to us the chief place in these affairs and to assist us by suggestion and advice. Our teachers do not build stone walls about themselves, but, like sisters, enter into our interests with encouragement and enthusiasm. This has made the Washington Irving known as a family school, with a delightful spirit of equality. We have no patience with school-girl snobbery. The first thing we do when a new term opens is to give a reception to the new girls, to make them feel their welcome.

You will be surprised to find how easy it is to take hold and help conduct the assembly exercises of the school without any teacher taking part in it at all. You will find the conversation classes on the topics of the day delightful.

So, too, will you enjoy the excursions to the art galleries, the museums, the stores and the woods, as well as the annual visit of your present teachers to our school, to meet you once more and to encourage you in your advancement. Every spring you will take part in Appreciation Day, a reception especially for your own particular friends.

Now, dear, we mustn't make this letter too long, but we must say again that you have a great opportunity. Talk it over with your father and mother. The success of your whole life depends upon what you make of yourself. Perhaps it is thought at home that you cannot go to school for four years longer. Why not try it for one year? Every week that you devote to a continuance of your education is a gain well worth the trouble.

You don't want to be apologizing all your life long. Be able to say you made the most of the opportunities the great city of New York offered you.

Yours cordially,

All the Girls of the Washington Irving High School.

SECTION 9: THE MARGARET MORRISON CARNEGIE SCHOOL, PITTSBURGH, PA.

Information obtained from "Conversation" with Miss Clara L. West, *Principal.*

There are 475 pupils. This (1911) is the fifth year of the school, and its first in the present building.

The entrance requirement is High School graduation or an equivalent examination. Students may be examined for admission at 16 and over, but the usual age for admission is up to 18, although there are some women of 20, 30 and 40 who are doing special work.

During the first two years, general training is given. During this time the student is not allowed to begin her specialization, the aim being to develop her power, her ability. After that she chooses a special line. If she is not to be a teacher she may take her diploma at the end of 3 years; teachers must have 4 years of training.

Training Leaders and Home-Makers.

The aim is to train women as leaders and home-makers. The main service of the school is to make them home-makers, and then to develop such power that they may be efficient in social service and leadership. The school aims to unite college education, technical education and finishing education. It stands for the graces of life and the best features of stability, utility and beauty. The stability is represented by those tested academic studies which have stood the wear and tear of time. That is how the school has developed. A certain number of academic subjects are taught—a sufficient number to develop a woman on what are called college or intellectual lines—then a certain number of technical or manual things which will make her apply her brain knowledge to her hand; and then enough of those things which are necessary to the development of the graces of life—æsthetic dancing, carol singing, dramatics, glee club work, and a great deal in literature, the history of education, and psychology—things that are necessary on the side of æsthetics, ethics, the useful, the beautiful, the good.

We want Queen Anne in the front room and Mary Anne in the backroom equally efficient. The point is to balance these so that a woman shall be an efficient and professional woman in her own home, whether it be a single home or some institution through which she serves the community and the State.

Cultural, Technical and Finishing Courses.

This is a school for women trying to put together the cultural, technical and finishing courses. Ultimately this school will grant a degree. At one time there was a good deal of opposition on the part of the women because they considered the school was doing kitchen work, and they did not think that was college education. Miss West got all the college women together and said "You must take more of these things in the college curriculum. Your college curriculum is a curriculum made by men, and the reason you wanted it is because you wished to prove to men that you have as good brains as they have, and prove it on their lines. Now, having proved that, you may well afford to give it up and have a curriculum suited to your own lives and functions, and you have not got it now." This was the theory on which she based her plan as far as possible—that the world is held in shape by two apparently contending and opposing forces—the centrifugal and centripetal—the one flowing, progressive, investigating; the other conservative, tending to a centre of rest. They are equal forces; otherwise there would be chaos They are equal in force and in value, but different in function. They are united in purpose. Now, that is what should be considered in educating men and women; their united purpose is the elevation of humanity. They are different in function but united in purpose, and they are equal in value; that is very clear. Then why not educate a girl for her function, instead of making her a feeble imitation of a boy?

Unique Method of Teaching.

It is the method of teaching the subjects in which the school claims to be somewhat unique. Very few textbooks are used; principles are touched on, but textbooks are required as biographies, for reference, and for individual reading. The development of the individual is aimed at as much as possible, and this is done even in sewing, and often very successfully in things which one would think were not connected are correlated. The strength of the school has been in that one thing; that is where it has succeeded.

Miss West gave an illustration of correlation. While she was lecturing on the health of the child, preservation of health, and the elevation of the moral standard by the Greeks, the teacher was going over the Greek literature with the class. While teaching the moral law, she selects for illustration Antigone's defence, and reads the great passage from Socrates—her justification in burying her brother and appealing to the supreme law. The English Department at the same time is teaching sentence structure, but the reading may be a description of the Olympic games out of a Greek author. In the senior year the history has been taught in a certain way, and when dealing with Cicero and the philosophy of Latin civilization, Miss West begins with the play of Julius Caesar where he walks through the storm, just to illustrate by that one passage the idea that the storm is the symbol of the life which he lived in the political anarchy. The pupils have that one peg on which to hang an estimate of Cicero's value. Then they are shown not only Cicero's ethics of his time, but what we learn by looking back at him. They learn not to judge dreamers as the ancients judged him, and cut his head off, but as he has been judged later on as one of great value to the human race for what he did. He was an eclectic philosopher. For that reason we should learn not to judge our dreamers, because we don't know what the future is to unfold; their peculiarity may be necessary for the world. The girls have had all that preparation in reading Julius Caesar in the literature classes, and it comes that way. The same with history. The basis is all prepared in the classes. In addition, there are mathematics, science, ethics, history.

Blending of the Practical Cultural Social.

Students make more progress in these because they have much hand work. If a right balance of the cultural and academic subjects with the technical subjects can be attained, the education of woman will have been solved. The solution came in the Middle Ages with the great Guilds of Florence. The highest intellectual attainment was accompanied by the greatest skill of the hand; they could put it into use and turn it into beauty in life. The cultivation of the tastes is the greatest thing that can be done for women.

The authorities of this school look to the time when woman will get her rights, not as a voter particularly—for that is not the main thing—but her right to help in civic administration for health, sanitation, the conduct of schools, hygiene—in fact, the care of the child life of the world. The basis of the school's work is really the care of the health of the world and the elevation of moral standards of society. Hence a girl may get this liberal education and go home and do nothing else; she is a well-educated woman who understands her obligations. Or she may understand her power so that at the end of her second year she develops in specialization as a dressmaker, costume designer, secretary, or in household arts or domestic science as dietician for hospitals or manager of institutions, or as a teacher of any of these things.

The students who are going to be teachers go to the settlement work and practise, and we have reports as to their ability to manage children and adapt themselves to the teaching. The school has arrangements with hospitals by which field work can be done by dieticians, and also for sewing, cooking and secretarial work in offices. Besides their work at school, students must have had field work and have worked it out in connection with life.

Domestic Science and Dietetics.

In Domestic Science the rooms are called kitchens, and the girls work on the exact quantities used in a family. The canning and preserving is always sold to the faculty and the money brought back to the school. In the Process Kitchen the first class learn baking, boiling, stewing and frying. They don't waste their time cleaning dishes; there are maids to prepare for the classes. A class in dietetics, computing the calories in foods, are training to be dieticians. The woman is kept in her normal position as a woman as much as possible. The rooms are a fair sample of conditions and work. Students work out in a theoretical way the day's diet on the basis of what the body needs; then in their estimate of the foods, they find in what proportions those things exist, and make up their dietaries. They discuss the influence of age, occupation, climate, etc., and adapt the diet to the particular individual.

They work on an economic basis by limiting the amount for foods, and seeing if it is possible to buy food for 15 and 25 cents a day, taking the average American man's working diet. They also work on school children's diet, especially with regard to their own earnings, going into the theory accurately and then taking it into the kitchen to see whether they can work it out.

Art in Color Line and Form.

In Art studies they have cotton print designs because they are going to choose cotton print dresses. They are first shown the combination of straight lines and spots, then how to make their repeat on square paper, either regular or angular or alternate repeat. The first two years has everything to do with the women in the home—not training them as artists, but training them in color and line arrangement above everything else.

Towards the end of the Junior year they have a very informal set of illustrated lectures, relating to those things together, as they meet them in their homes and dress; and this is correlated with the sewing department in the Junior year. Then in the Senior course they make designs and carry out the work of every-day designs for the home. Then they have type problems—one each in stencil, metal, leather and pottery—the types of decoration they are going to use in their home; and one in that course is always reserved for a "fad" problem—the worst fad that can be found; the thing that is worst done in the country—embossed cards, or something like that to see how that can be handled adequately and well.

Then there is a special elective course in costume designing—a technical course to develop good taste and make technicians of them. Then comes the graduate course.

Trade Designing in Evening.

There is a night class for trade designing, where girls are trained to work in a limited field so that they can go into the various trades or make the actual article. The course goes on progressively and coherently for three years. In the garment costume work, dressmakers come for two hours a week for intimate adaptation, not creative work but adapting styles. They get facility of hand through studying the reasons why things are done. In the embroidery class they work designs on handkerchief corners and work out features in colors.

At the beginning of the English course the students have a short course in parliamentary procedure, learning to organize clubs and conduct a meeting. In the secretarial course they have commercial law in the third year. Economics are taught, then psychology, theory of teaching, practice observation. Science is correlated—physiology in the centre, chemistry on one side and dietetics on the other.

General Statement.

The building occupied by the Margaret Morrison Carnegie School is the first of a proposed group to be devoted to the education and training of women for the home and along specific technical and industrial lines.

Externally, its appearance differentiates it at once from the buildings designed for the Engineering and Trade Departments of the Technical Schools; and the ideals of the Woman's School are expressed in the motto on the cornice of the entrance court:—

"To make and inspire the home;
To lessen suffering and increase happiness;
To aid mankind in its upward struggles;
To enoble and adorn life's work, however humble—
These are woman's high prerogatives."

The Margaret Morrison Carnegie School offers courses adapted to meet widely different needs. These are divided into the following heads:—

1. Day School,—
   a. Regular Home Maker's Course of two years with Technical Specialization in the third year.
   b. Graduate course for the Training of Teachers. Fourth year.
   c. Special Subject Courses.
2. Night School,—
   a. Courses for Home and Trade Use.

Although the work given under these heads varies to meet the requirements of the different courses and the needs of the students enrolled therein, the main aim and purpose of the School remains the same throughout all the courses, namely, the development of the individuality and womanliness of the student and the utilization of her powers in the broadest possible way along the lines of her keenest interest and greatest aptitude.

REGULAR DAY COURSE.

The 3-year regular day course embraces 2 years of general training, with special emphasis on home-making, followed by one year of technical vocational training. The aim of the first division of the course may briefly be stated under the three following heads:—

(*a*) To give the student a new point of view, as to her obligations and opportunities as a woman.

(*b*) To present to her new fields of thought and interest and to give her the opportunity to prove to herself and to the Faculty of the School her fitness to elect one of the lines of technical specialization offered in the Senior year.

(*c*) To develop powers of concentration, observation, and reasoning necessary to success in any field, and to give sound general training in the essentials of woman's education which will serve to prepare her as a home-maker in the highest sense of the word, and be a foundation for any of the lines of specialization.

The credits assigned to the Plebe and Junior years are as follows:—

History	7½	English	13½
Physiology	5	Ethics	1¾
Economics	2	Home Nursing	½
Hygiene	½	Chemistry	8½
Mathematics	3¾	Distribution of Income	1½
Accounts	1¼	Cooking	5
Dietetics	2¼	Housekeeping	1
Laundry	1	Physics	1
Textiles	½	Sewing	4
Drawing	4½	Physical Training	4
Food Mfg. and Production	1	Choral Singing	2
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Specialized Courses of the Senior Year.

The fields of specialization offered by the Day Technical School are those in which a woman's experience and a womanly point of view may be considered as very positive aids to success.

To students who have satisfactorily completed the work of the Plebe and Junior years and have secured credit standing in the subjects of those years, fundamental to their chosen line of specialization, technical work in the following courses is offered: (a) Household Arts Course: (b) Secretarial Course: (c) Dressmaking Course: (d) Costume Design Course.

HOUSEHOLD ARTS COURSE.

The object of this Course is to intensify the interest of women in the development of the home, the conservation of its proportion and individuality, the extension of its influence.

A broader view of the economic function of woman, either as producer or consumer, is aimed at. The means for extending this possibility by making her efficient in either capacity is provided for.

In raising household work to a professional level, the course has, as its base, efficient teaching in English, History, Ethics, Psychology, Design, Chemistry, Bacteriology, Home Economics, Sanitation, Household Management, Institutional Management, Practical Cooking, Dietaries—family and institutional portions.

Actual practice in the Housekeeping Apartment gives each student experience in every form of household training with an appreciation of methods of distribution, co-operation and rotation of work.

The institutional phase of the work offers opportunity for training of housekeepers, managers or dietitians for school lunch rooms, women's clubs and tea rooms. For a diploma in this course a student must obtain credit standing throughout the year on the following subjects:

Chemistry	4	English	2
Bacteriology	2	History	2
Institutional Management	6	Social Ethics	1
Housekeeping	6	Physical Training	1
Dietaries	9	Choral Singing	1
Applied Design for the Household	2		
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COSTUME ILLUSTRATION AND DESIGN COURSE.

This course offers an opportunity for young women of originality and artistic ability to make use of these talents in practical ways, as designers of original costumes, illustrators of costumes for fashion magazines and millinery plates, or as cataloguers of costumes for importing and dress-making establishments.

The specialized work of the course includes Drawing and theory of Color, Design, Pose Drawing, History of Costume, Costume Design and Illustration, and Pattern Modeling.

To be recommended by the faculty for a diploma in this course, the student must obtain credit in the following subjects:

Costume Illustration and Design	10	Millinery	2
Pose Drawing	8	English	2
Drawing	5½	History	2
History of Costume	1½	Social Ethics	1
Pattern Modeling	2	Physical Training	1
		Choral Singing	1
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Night School.

The Night School is primarily for students who are employed during the day, and its work necessarily differs from that offered by the Day School because of the brief period of time that students can give to school work and to outside study. The sessions are held from 7:30 to 9:30 p.m. on Monday, Wednesday, and Friday evenings.

The minimum age for admission is 17.

Preference is given applicants employed during the day and dependent upon their earnings for their livelihood. There are no written tests for entrance, but each applicant must, in a personal interview, satisfy the Interviewing Officer of her fitness to profitably pursue the work of the School. Special requirements for admission to the different departments are stated under the description of the course offered. Capacity, earnestness, and *regularity in attendance* are essentials to the retention of a place in the classes.

The School does not attempt to develop experts, but to those who are gaining their livelihood by daily employment offers courses of instruction that will increase their efficiency and hence their earning power.

The system of instruction is especially helpful to those who have not had an opportunity to acquire the theoretical foundation and breadth of training necessary for intelligent practical operation. When this broader training is combined with actual practice in all branches of the subjects taught, it should enable the students to advance along their chosen lines more rapidly and efficiently, and finally qualify them to fill higher positions than would otherwise be open to them.

The Night School Certificate is awarded to all students who complete, to the satisfaction of the faculty, any one of the Regular Courses offered in the Night School.

No certificate is granted to a student unsatisfactory in her attendance.

CHAPTER LXIX: CORRESPONDENCE STUDY SCHOOLS.

In addition to the information submitted hereafter in this chapter, attention is called to what is said on Correspondence-Study Courses in section 8 of chapter VI of part II of the Report, at pages 219 to 224. The Correspondence-Study Courses of the University of Wisconsin are outlined there with a sufficient measure of fulness.

SECTION 1: PRINTING COURSE OF THE INTERNATIONAL TYPOGRAPHICAL UNION.

Under the direction of the Commission on Supplemental Education of the International Typographical Union, the *Inland Printer* Technical School conducts a course in printing.

In 1907 at the Hot Springs Convention this Commission was appointed to formulate some system for the technical education of the members and apprentices of the Union. At that time the *Inland Printer* School, Chicago, had been for six or seven years conducting the most successful institution of its kind under the encouragement of the Union, and a suggestion was made that it would be possible to put the course, given at this school, in writing so as to permit it to be given through a correspondence course.

Comprehensive Course Needed.

The International Typographical Union being composed of more than 60,000 printers scattered over the continent, and working in small as well as in the most pretentious offices, it was necessary that the Commission adopt or devise a system of education that would reach and prove beneficial to the most expert in the metropolitan office as well as the most inexperienced working in an out-of-the-way town with a few hundred inhabitants and one printing-office.

As it was not "making printers," the Commission discovered it would be quite feasible to impart principles by correspondence, thereby giving the student an opportunity to learn much that ought to be taught during an apprenticeship, as well as what cannot be acquired in a printing office, but which is needful to a thorough understanding of type composition.

The Commission also assured itself that a course such as would be derived from the instruction given in the *Inland Printer* Technical School would enable the dependent compositor to branch out and do work that is rapidly falling into the hands of commercial designers and other graduates of art schools, but which logically, economically and industrially is within the province of the compositor. Satisfied that such a course at once would widen the field of the compositor's operations and enable apprentices and indifferent printers to obtain a better grasp on the fundamental principles of typography, the Commission decided to adopt the correspondence course.

Low-Priced but Effective.

From the standpoint of the International Typographical Union it is necessary that this instruction be imparted at as low a price as possible—free from the taint of profit—for the sole object of the plan is the advancement of the student. The *Inland Printer* School management declared its willingness to co-operate with the Union in any method that gave promise of widespread dissemination and be satisfied with the prestige that accrued from being connected with such an uplift movement. At the time it was estimated $20 would about cover the cost of outfit, postage, tuition, etc., and that figure was agreed upon as the price at which the scholarships should be sold. The International Typographical Union on its part agreed to defray all expenses incidental to advertising the course, and in addition give a rebate, or prize, of $5 to every student who pursues the lessons to their end with ordinary diligence and intelligence.

This arrangement made possible the selling of an educational course at the sum named, which as a commercial venture would cost $50 or $60, perhaps more. The unusual method of reward was adopted in preference to that of giving large prizes to exceptionally adept students, because the Union desired to stimulate thought on technical matters connected with the craft, certain that in doing so it would widen the workfield for compositors.

Lessons Relate to Actual Work.

So anxious is it to give him the best possible information, that the Commission asks each student to keep a pad beside him and jot down anything which seems to interfere with his work, initialing it and sending it to headquarters, where it receives the earnest attention of the instruction department. A detail of the method employed is interesting. The student sends in his lesson, be it one on lettering, design or a piece of type composition. The instructor takes it up, goes over it carefully, letter for letter or line for line, as the case may require, marking such defects as are apparent and showing where and how to improve, all the while talking into a phonograph recorder, giving his reasons for the alterations and criticisms and advising the student. The phonograph record is transcribed on a typewriter and the typewritten letter of advice and criticism, together with the marked lesson sheet, are mailed to the student. By this means the latter gets the benefit of a blackboard illustration and oral instruction at the same time.

High-Class Criticism and Advice.

The great value of the I.T.U. Course lies not in the printed lessons, but in the criticism and advice which flow in a steady stream from the instruction department, couched in language familiar to the printer-student. It may be that other correspondence courses do not concern themselves so much about details of this kind, but the Commission maintains that in these details lies the chief value of the course. The students learn by doing, and doing correctly, under the eye of capable and painstaking tutors. Being shown *why* his work is wrong, and how to correct it, is of inestimable value to a student.

SECTION 2: THE INTERNATIONAL CORRESPONDENCE SCHOOL, SCRANTON, PA.

This institution started about 22 years ago, and has enrolled over a million and a half of students of all kinds, conditions and classes and at all stages of preparation. The postage is $525 a day and there are 1500 employees. Students on taking up the course are brimful of enthusiasm, but after a few lessons the majority drop the work. However, many of them subsequently resume their studies, even after an interval of 10 or 12 years, and often complete the course eventually. The School has never yet held up a student who desired to complete the course, although the contract calls for its completion within 5 years. The educational power in the school is vested entirely in the staff; an executive committee elected by the Board of Directors conduct the business from a practical standpoint—that is attend to the book-keeping and administration.

How Difficulties Are Met.

The text-books, examination papers, etc., used by the school have all been compiled by experts and constantly revised until all difficulties likely to be met with by a student have been eliminated. On being returned by the student each paper is examined by two Examiners, (the one checking the work of the other), and then submitted, in many cases, to a specialist before the corrected papers are sent back to the student. Each lesson is based on the previous one sent in by the student. It is not a stock letter, but is specially dictated for each particular student. The courses are checked by practical men so as to ensure their being up-to-date in every particular. As for instance, when the Electrical Drawing Courses were revised, the men that went over them were the heads of the General Electric Company and of the Westinghouse Company.

Encouragement of Students.

A special department of the institution is that devoted to the encouragement of students to keep on with their studies. One of the greatest difficulties met with was that of keeping students at work. Quite a number feel the moment they get the first instruction papers that the task is greater than they can undertake. When no reply is obtained from a student for a week he is written to, and after another week he is written to again, and so on four times. Then if he still does not reply a notice is sent to the representative in his neighbourhood and an attempt is made to encourage him to persevere with his task. Every time a student misses to send in the answers to his papers, within the average time, this course is followed.

Courses Covered.

The school gives courses of instruction in all branches of the following subjects:—

- Advertising
- Agriculture
- Architecture
- Arts and Craft
- Automobile Running
- Boilermakers
- Chemistry
- Civil Engineering
- Commerce
- Concrete Engineering
- Electrical Engineering
- English Branches
- Gas-Engine Operating
- Languages
- Law, Commercial
- Lettering and Sign Painting
- Locomotive Running
- Mechanical Drawing
- Mechanical Engineering
- Mines (Coal and Metal)
- Navigation
- Pedagogy
- Plumbing, Heating, and Ventilation
- Poultry Husbandry
- Salesmanship
- Sheet-Metal Work, Boilermaking
- Show-Card Writing
- Special Courses
- Steam Engineering
- Structural Engineering
- Textiles
- Window Trim'g & Merc'tile Decoration.

Co-operation With Railways.

As illustrating the working methods of the school it might be mentioned that contracts have been entered into with about 170 railways, who agree with the school to collect payments from men who accept courses of instruction. Cars are equipped with models of airbrake apparatus in working order and these are sent over the road and all the employees of that road are entitled to instruction. Then the school has instructors at different points, who remove about half the seats from a passenger car and put in tables for the use of employees who attend lectures and demonstrations. The work taken up is principally the study of air brakes, general mechanics, train orders, and all that pertains to transportation. All railway men have to pass examinations, both before being taken on and for subsequent promotion to the rank of engineer, etc., and the work of the instructors is to fit the men to pass those examinations.

CHAPTER LXX: LEGISLATION FOR INDUSTRIAL EDUCATION.

"The year 1910-11 has witnessed a substantial advance in legislative and other practical measures looking to the development of industrial education in the United States. In Massachusetts, which has taken the lead in State activity in this field, important steps were taken during the year. Perhaps first among these was the passage of a new act by the legislature which has materially altered the conditions under which the State support may be obtained by industrial schools. By the terms of the original act of 1906, amended in 1909, a community could obtain the assistance of the State toward the maintenance of industrial schools only by constituting an independent Board of Trustees to manage such schools. By the new act industrial schools may hereafter be established under the local school board, which has entire freedom to control such schools, provided they bear the burden of support. Such schools, however, may obtain the benefit of the State's aid and remain under the direction of the local board if they conform to the standards set up by the State Board of Education and are approved by that body.

"Another important legislative action during the year was the passage of a resolve appropriating $7,000 for an investigation into the possibilities of part-time instruction for the State of Massachusetts. This investigation was placed in the hands of the State Board of Education.

"In January, 1911, the State Board of Education issued a report upon the problem of agricultural education in Massachusetts. The constructive feature of this report was a recommendation that part-time schools be established in which the pupil should devote a portion of his time to systematic work and tabulation of results upon a part of the home farm, leaving the school instruction to deal with the scientific principles involved, agricultural methods, and a study of the student's experimental results.

"One of the incidental but valuable features of the report was a series of definitions as to the terminology of vocational education with a view toward an exact interpretation of such terms when used in cities of Massachusetts and in rulings of the State Board of Education. Of still further value in this direction is a bulletin published by the State Board in September, 1911, defining in exact terms the standards as to school organization, courses of study, and methods of instruction necessary to secure the approval of proposed schools by the Board and the award of State moneys."

New York State.

In New York State the education law has been revised during the past year and the law relating to industrial and trade schools passed in 1908 has had a section added which concerns 'schools of agriculture, mechanic arts, and home making,' open to pupils who have completed the elementary school course or who have attained the age of 14 or have met such other requirements as local school authorities may have prescribed.

Syllabi have been developed by the State education department for use in intermediate industrial schools covering the subjects of industrial and commercial geography, industrial arithmetic, mechanical drawing, and home making. Syllabi in farm mechanics, dairying, animal husbandry, farm crops, etc , have also been developed for the agricultural schools.

There are at present 35 industrial and trade schools in the State, employing 145 teachers, with a day enrollment of 3,370 pupils and an evening enrollment of 2,933 pupils.

The State has definitely undertaken to train teachers for vocational work. Recognizing the fact that no one type of school is competent to deal with the problem, this work is being carried on in three State normal schools. One of these institutions has an evening training school for mechanics who are fitting themselves as teachers. The emphasis in these teachers' courses is placed upon the planning of courses of work and equipment; upon instruction in shop mathematics, electricity, and mechanics; and finally, upon methods of teaching industrial subjects. One of the normal schools has a course in training teachers of agriculture. The work of this school is not intended to rival that of the agricultural colleges, but to prepare teachers to carry on any of the scientific work related to agriculture outlined in the syllabus of the department.

Wisconsin Commission on Industrial and Agricultural Extension.

The Commission which was appointed by the Legislature of the State of Wisconsin in the year 1909 to investigate the subject of Industrial and Agricultural instruction and formulate plans on which to base legislative action, submitted its report to the Governor on January 10, 1911.

The Commission urgently recommends continuation schools with compulsory attendance of children from 14 to 16 years of age already engaged in industry, supplemented by Trade and Evening Schools. It urges the limitation of children's labor to eight hours, including all time occupied in vocational schools, and advises the modernization and extension of outgrown apprenticeship laws and their adaptation to the requirements of proposed industrial schools.

In regard to rural schools, the Commission advises the establishment of a central Board of Education, elected at large for each county, this Board to engage a county superintendent and to consolidate school districts and to discontinue schools at will. State aid is recommended for consolidated schools, provided agriculture or agricultural and domestic sciences are introduced, and courses of study and teachers shall be subject to the approval of the State Superintendent. Additional State aid is recommended for State graded schools, village and city schools, and township High Schools, with the same provisions specified for rural schools.

The Commission further proposed that each County Agricultural School shall receive from the State $6,000 per annum instead of the present sum of

$4,000, provided that the county contribute not less than the State if the State contributes more than $4,000.

In order to illustrate how continuation schools may be adapted to the requirements of the State—in villages as well as in cities—the Commission presents an elaborate survey of the field of German industrial education. The tendency of industrial schools to become theoretical instead of practical, and the manner of obviating the difficulty are emphasized. The report says:

"After a long period of trial the Germans have established almost universally local committees of business men, manufacturers and workmen, who control these schools wherever they are. * * * * *

We believe that the State of Wisconsin instead of relying upon the establishment of trade schools such as have been set up in the thickly populated State of Massachusetts, should begin at once a plan for providing for this period between 14 and 16 years of age by means of continuation schools. In that way we can reach the greatest number at the least cost and we can allow the system to grow gradually and with the best results. It is the general agreement of all investigators * * * * * that boys are not generally wanted as apprentices before they are 16 years of age. Therefore if they leave school at 14 they practically waste their time."

The recommendations regarding industrial education depend for their effectiveness upon the State University, which is relied upon to fill the gaps in the system and render it sufficiently elastic to meet local requirements without bringing too heavy burdens upon the poorer communities.

In regard to the training of teachers in industrial and agricultural schools, the report recommends:—

That a minimum salary law be passed which shall apply to all teachers in industrial and agricultural subjects, and which, while placing emphasis upon thoroughgoing general training, shall place an additional premium upon special preparation for the teaching of agricultural and industrial subjects.

That adequate provision be made in some State institution of normal school grade and in the county training schools for the establishment of courses of instruction in industrial and agricultural education and the extension of courses already in existence of a character that will give proper emphasis to industrial and agricultural training.

That the High Schools in the State other than the free High Schools, commonly known as the independent High Schools, shall receive State aid for manual training, agriculture and domestic economy to the same extent that State aid is granted to free High Schools for these purposes.

"As a result of this report the Legislature of Wisconsin passed a number of Acts which became laws May 19th of the current year (1911). These laws provide that when any school board shall decide to establish a trade school or schools, a tax not exceeding three-tenths of a mill upon the dollar shall be levied upon the total assessed value of property in the city and used for the establishment and maintenance of the trade school; that the apprenticeship laws of the State shall be amended so as to prescribe that every apprentice shall receive instruction not less than five hours per week in English, in citizenship, business practice, physiology, hygiene, the use of safety devices, and such other branches as may be approved by the State Board of Industrial Education, and that such instruction may be given in the public school; that whenever any evening school, continuation class, industrial school or course shall be established for minors between the ages of 14 and 16 working under the local board, every such child shall attend such school not less than five hours a week for six months in each year, and every employer shall allow all minor employees over 14 and under 16 years of age a corresponding reduction in hours of work; that employers shall allow a reduction of hours of work at the time when the classes are held whenever the working time and that of the class coincide; that illiterate minors shall attend public evening or continuation schools; that no State aid shall be granted to any school for instruction in agriculture, domestic economy, manual training or industrial branches unless the salary paid to every teacher instructing in such subjects be at least $60 per month; that a State Board of Industrial Education be created, to consist of three designated educators, *ex officio*, and six appointed members of whom three shall be employers of labor and three shall be skilled employees, and that this Board shall have control over all State aid given under the Act; that the State Superintendent of public instruction shall appoint an assistant in the department of instruction to be known as Assistant for Industrial Education; that in every town or village or city of over 5,000 inhabitants, there shall be, and in towns, cities and villages of less than 5,000 inhabitants there may be a local Board of Industrial Education whose duty it shall be to foster and establish and maintain, industrial, commercial continuation and evening schools, and that such a Board shall consist of the Superintendent of Schools and four other members, two employers and two employees who shall be appointed by the local board charged with the supervision of the schools and who shall serve without pay; that no State aid shall be granted to any school under this Act without the approval of the local Board of Education, and that no money that shall be appropriated by the city, town or village for these schools shall be spent without the approval of the local Board of Education; that whenever 25 persons qualified to attend an industrial commercial, continuation, or evening school file a petition therefor with the local Board of Education, the board shall establish such school or schools or provide other facilities, as authorized in this Act."

"These legal measures represent the most pronounced recognition of the part time continuation schools that has yet entered into legislative enactment. It goes without saying that progress made by Wisconsin in developing this particular type of industrial education will be watched with great interest by the rest of the country."

GROUPS OF SCHOOLS OF FOUR KINDS.

CHAPTER LXXI: TECHNICAL SCHOOLS FOR MINERS.

It has been already mentioned elsewhere in this Report that the Commission had the advantage of being accompanied during part of its enquiries in Europe by Professor Frederic H. Sexton, Director of Technical Education and Principal of the Nova Scotia Technical College. Professor Sexton, in company with the members of the Commission and also by himself, paid special attention to the Provisions for the Education of Miners. He made a full report on these matters as published in the annual report of the Superintendent of Education for Nova Scotia, 1911.

The portion of his report on Technical Schools for Miners, which extends to 65 pages, contains in a well arranged form substantially the information gathered by the Commission by visits to the schools described, supplemented by Professor Sexton's own enquiries and investigations. The Commission, with his consent, avails itself of the arrangement of the material from official sources as prepared by him for the schools of England and Germany.

Selections have been made of those parts which deal with classes and courses for working miners and foremen chiefly. No attempt is made to present a statement of work at such institutions of the highest grade as the Imperial College of Science and Technology at London and the Mining Academy at Freiberg, Germany, which also were visited.

In the Courses of Studies in Mining Schools stress is laid on Mathematics and Drawing and organized knowledge of the principles and practices in mining operations. A few paragraphs are given under "Courses of Study at Leeds" to indicate the importance attached to these subjects. A similar course is followed in regard to the Drawing in the report of the Glasgow and West of Scotland Technical College; and likewise, for organized knowledge of mining processes and operations under the report on the Mining School at Cowdenbeath. It is not without significance that at Aachen, Germany, the mining students receive instruction in singing, particularly mining and patriotic songs.

In this Chapter the Commission makes no particular recommendations, as it considers that the Provisions recommended in Chapter VII. of Part II. of the Report, pages 239 to 271, can be applied locally to the needs of miners as well as to those of other industrial workers. The arrangement of courses, and their content of subject matter, in the reports of the various schools which follow hereafter are suggestive and instructive.

SECTION 1: ENGLAND.

In England the various Colleges in or near coal mining districts usually give three year Courses in Coal and Metal Mining leading to a degree of B.Sc. in these subjects.

Also throughout England, wherever collieries exist, there have been established technical schools in the shape of evening Continuation Classes or "part-time" day classes for the instruction of the men employed in the industry in the science and practice of mining. It is very common to find evening schools in every colliery town in a certain district with a carefully prepared Course covering two or three years and the higher courses offered under the auspices of some Technical College or University on one afternoon a week for 6 or 8 months of the year covering 3 years. In some of the colliery counties the general supervision and inspection is relegated to the professors in charge of the mining department of a centrally located University.

A few examples of the manner in which mining districts have been organized for technical education in mining subjects are given.

(1) LEEDS AND SHEFFIELD DISTRICTS.

The Leeds district and the Sheffield district cover most of the important colliery towns where classes in coal mining are held in Yorkshire. The Leeds district is taken as an example because it is one of the most highly and carefully organized centres in England.

The County Council's first year Mining Course was given at 25 centres in the Leeds district; and more advanced Courses, up to fourth year, at some of these centres.

The regular course is supposed to occupy five years, the first two years in general work in mathematics, science and drawing, and the last three years chiefly on the subject of Coal Mining. Most of the work in the last three years is done at Leeds University. For those who have not had good training in the public schools the Preparatory Course is offered, thus making the whole Coal Mining Course for these backward students cover a period of six years.

The County Council makes grants to Leeds and Sheffield Universities, in return for which, free places are provided in their courses, external lecture courses are given, and local mining classes are supervised and examined. Twenty exhibitions are awarded tenable at the above Universities. Special classes are held at the Universities for teachers on Saturday afternoons, all classes being held in the evening or on Saturdays. There are in addition to the classes enumerated above, numerous evening preparatory classes.

Courses of Study at Leeds.

GENERAL PREPARATORY COURSE.

(Taken in Grade I Schools.)

The Preparatory Course is organized to give a thorough grounding in English, Mathematics, Freehand and Instrumental Drawing, Wood-work, Metal-work.

The Preparatory Course is intended for those students whose elementary education is defective. The subjects of the course are therefore for the most part the same as those which are taken in elementary day schools. Much attention is paid to English Composition, the art of quick, accurate, and concise expression being of the utmost importance to students of technical subjects.

The Mathematics are largely confined to Workshop Arithmetic, but Instrumental Drawing and Geometry are combined with them, and the Course is arranged so as to be of direct practical benefit to artisans. Freehand and Model Drawing are also taken, and the work in these subjects is closely correlated with the instruction in Manual Work.

The Manual subjects taken include Wood-work. The lessons deal with the use of the commoner tools and with the character of the materials used; neat and accurate workmanship is required throughout.

FIRST AND SECOND YEARS.

(Taken in the Branch Artisan Schools.)

First Year,—	Hours per week.
Experimental Mathematics, Practical Mathematics, Practical Plane and Solid Geometry, and Hand Sketching..............	4
English..	2
Second Year,—	
Experimental Mathematics (as above)................	3
Mechanical Laboratory..........................	2
English..	1

After the first and second years, taken at the Branch Artisans' Schools, three years of more advanced work is done, most of which is provided for at Leeds University. Since special attention at the beginning of the course is drawn to the importance of Mathematics, the following paragraphs regarding that subject are presented:—

Re Mathematics.

No student can possibly make any progress in Technical Education without a sound knowledge of the various branches of Elementary Mathematics, and as this subject is one in which students often experience great difficulties, the Education Committee has made special arrangements for teaching the subject in a new and thoroughly practical manner.

The term Experimental Mathematics is used to denote a course of instruction in which "Practical Mathematics," "Practical Plane and Solid Geometry," "Practical Mensuration," and "Hand-Sketching" are taught not separately but as one subject. As far as possible each fundamental principle of Mathematics is first dealt with arithmetically, then algebraically, and then geometrically. The calculations and drawings which are made by the students are for the most part based on their own observations and measurements of simple geometrical models, and of common objects and materials which are used or produced in the chief industries of the neighborhood.

* * * * * * * * *

In the first, second and third years, it will often be found desirable to devote one hour per week wholly to the hand-sketching of machine and building details, and of other materials which are used or produced in the more important local industries.

In the third and higher years separate classes for each trade, or branch of a trade, should, if possible, be provided, and the syllabus should be varied to suit the requirements of the different categories of students who are in attendance at the school.

Three Years' Coal Mining Course.

This course is intended for miners and sub-officials who are occupied in or about collieries, and can only attend for one afternoon per week, but desire to qualify themselves for Managers' Certificates under the C. M. R. Act, and particularly for those who have attended complete courses of instruction in Mining at one of the local centres appointed by the West Riding County Council, or have attended the preparatory evening courses of the Leeds City Education Committee.

The course extends over three years. The first and third year students attend on Mondays from 3 to 7 p.m., the second year students on Tuesdays, during the same hours. The instruction in Engineering, Electrical Engineering and Geology is given in the respective departments, the remaining subjects in the Mining Department. In the class on Mathematics the subject is dealt with entirely from the mining point of view, the examples being taken from mining practice. Students are given mining data in the examples set, and are required to copy these out into an indexed pocketbook to form a nucleus for the observations which they subsequently make as a result of their own experience. A similar mode of treatment is adopted for the Chemistry course, the properties of matter and chemical change being illustrated as far as possible from ordinary examples to be met with at a coal mine. In addition to the course of Surveying Drawing, a course of practical work in the use of surveying instruments is given during the third term. Lectures are given in connection with the two Surveying courses as they become necessary to explain the work in hand.

SYLLABUS.

First Year.	*Second Year.*	*Third Year.*
Mathematics.	Mining.	Mining.
Engineering.	Chemistry of Coal Mining.	Electricity.
Engineering Laboratory.	Surveying.	Electrical Engineering.
Mining.	Geology.	Laboratory.

The courses extend from the beginning of October to the end of April with a Christmas and Easter Recess.

(2) DURHAM DISTRICT.

In Durham the organization resembles that of other coal mining inspectorate districts.

Evening classes are offered at thirty-two centres, at which instruction is given in preparatory work and in the principles of mining. Instruction is given in various subjects at twenty-seven other centres. Scholarships are awarded good for Courses in Armstrong College, Newcastle-upon-Tyne; also travelling scholarships and students' transfers; forty scholarships, three years' Saturday afternoon course for miners.

The minimum of the hours of instruction as required by the Department of Higher Education of the County Council of Durham is outlined below. The years I and II may be taken in most of the local evening Continuation Classes for miners, some of the Courses—III, IV, V, and VI, are given in some colliery centres. The three years' Saturday afternoon classes at Armstrong College cover years IV, V and VI.

A syllabus of the Course is appended.

Year.	PREPARATORY COURSE.	Minimum hrs. per week per subject.
I.	Practical or Commercial Arithmetic for the average student......	2
	English..	1
	Object Drawing and Elementary Geometry....................	1
II.	Practical Mathematics......................................	1
	Hand-sketching and Practical Geometry......................	1
	Elementary Mechanics and Physics (Theoretical and Practical) and English..	1½

The other 30 minutes must be given either to Mechanics and Physics, or to Hand-sketching and Practical Geometry.

Mining Course.

Year.		Minimum hrs. per week per subject.
III.	Mensuration for Miners	1
	Mining and Geology	1
	Chemistry and Mechanics for Miners	1
	(Connects here with Armstrong College Saturday afternoon class).	
IV.	Mining and Geology	1
	Mine Surveying (Preliminary)	1
	Magnetism and Electricity	1
V.	Mining III, and Geology	1
	Mine Surveying (Ordinary)	1
	Preliminary Electrical Engineering	1
	In South Kensington.	
VI.	Honors Mining and Mine Manager's Certificate	1
	Surveying (Honors)	1
	Electrical Engineering (Ordinary)	1

Three Years' Saturday Afternoon Course for Miners at Armstrong College, Newcastle-upon-Tyne.

1. The course extends over three winter sessions, each involving attendance for about 24 Saturday afternoons, from 3 to 6 p. m. Students may enter in any year of the course, each series of lectures being, as far as possible, entirely independent of the others and constituting a complete course in its own subjects.

2. The syllabus has been drawn up with the object of providing systematic courses of instruction for the benefit of those desirous of obtaining a careful training in the elements of the sciences upon which the art of mining is based.

3. The courses cover the whole of the theoretical requirements of the Colliery Manager's Certificate, and especially meet the case of industrial students elected to Evening Scholarships by the County Education Committee. 40 Scholarships, including renewals for a second or third session, have been reserved for the session 1911-12. These scholarships cover travelling expenses and fees.

4. Examinations in the respective subjects are held at the end of each course.

5. Students must be over 17 years of age, and must be *bona fide* working miners or mechanics or men earning their living by actual manual labor and should possess a preliminary knowledge of some of the science subjects dealt with in the course, such as may be acquired by attendance at an Evening Continuation School, and especially of Arithmetic, Algebra, and Mensuration, as follows:— (a) Arithmetic: the ordinary rules of arithmetic, including proportion, vulgar and decimal fractions. (b) Algebra up to and including simple equations, square and cube roots, and knowledge of powers of numbers, such as x^3 or x^4;

the use of logarithmic tables. (c) Mensuration: areas of triangles and rectangles; areas and circumferences of circles; surfaces of cylinders; volumes of cylinders and prisms. Students should possess a 1st Class Certificate of the Board of Education in the Second Stage of the Principles of Mining or hold what at the discretion of the County Education Committee may be considered an equivalent qualification.

6. Certificates will be granted to those students who attend satisfactorily and pass the examinations throughout the 3 years' course, and prizes will be awarded annually to the two students who do best in the aggregate examinations of the year.

7. The Board of Examinations for Colliery Managers' Certificates have agreed, by special resolution, to permit students holding college certificates, gained in connection with this course, to present such certificates along with their usual testimonials.

8. The following is a brief syllabus of the course of lectures for the session 1911-12.

The lectures are given between 3 and 6 p.m. The following is a list for those of the first year:—Geometry, 3 to 3.50 p.m.; Transmission of Power, 4.5 to 4.55 p.m.; Pumping and Ventilation, 5.10 to 6.00 p.m.

During the next term of the first year the subjects are: Elementary Trigonometry, 3.00 to 3.50 p.m.; Mine Surveying, 4.5 to 4.55 p.m.; Management of Horses, 5.10 to 6.00 p.m.

As an illustration of the matters treated of in the course of lectures, the subjects dealt with in Pumping and Ventilation are cited as follows:—

PUMPING AND VENTILATION—5.10 p.m. to 6 p.m.

Elementary notions of drainage, dams, reservoirs; syphons; baling; arrangement of pumps, driving, starting and working pumps; pipes; bucket pumps; plunger pumps; details, balance bobs, angle bobs, spears, catches, etc.; pump valves; direct acting pumps; electric, pneumatic and hydraulic pumps.

Principles of ventilation; movement of air currents; measurements of air-currents, anemometers, water gauges; natural ventilation; ventilating appliances, fans, furnaces; distribution of air-currents, splitting-currents, doors, stoppings, regulators; general considerations affecting ventilation.

The following courses will be delivered in the next two years to complete the three years' series:—

Machine Drawing,	The Steam Engine,
The Chemistry of Fuel,	Theoretical Electricity,
Boring and Shaft Sinking,	Exploitation of Mines,
The Principles of Geology,	The Geology of the Coalfields,
Experimental Mechanics,	The Chemistry of Mine Gases and Explosives.
Drifts and Levels,	Haulage and Winding.

SECTION 2: SCOTLAND.

The whole of Scotland is under one Mine Inspector, but educationally the two centres of Glasgow and Edinburgh control the Technical Education for coal miners in Scotland. The organization of the Continuation Schools for miners is much the same as in the colliery districts of England, but presents some distinct differences. The evening school work is affiliated with either the Glasgow Technical College in Glasgow or the Heriot-Watt College in Edinburgh. At Cowdenbeath in the County of Fife is a splendid local Technical School for coal miners which will be mentioned later.

County Continuation Schools for coal miners are provided at centres in three of the counties which are affiliated with the Glasgow Technical College. In Lanarkshire the classes are held at 19 centres; in Ayrshire the classes are held at 15 centres, including the sub-centres where the more elementary work only is provided for. In Dumbartonshire there are no classes conducted by the County Council Education Committee but the students are assisted to attend the Glasgow Technical College and other Central Institutions.

(1) GLASGOW AND WEST OF SCOTLAND TECHNICAL COLLEGE.

Preparatory courses are held three nights per week from 7.30 to 9.30. These are followed by three year courses which provide for Mathematics, Drawing, Coal Mining, General Science, Machinery, Mine Surveying, Mining Engineering, and Electrical Engineering as applied to Mining. As a great deal of attention is paid to Mathematics and Drawing, the following paragraphs are cited from the courses for the first year:—

COURSE 1. (FIRST YEAR) MATHEMATICS.

ARITHMETIC.—Vulgar and decimal fractions; their meaning and application for practical purposes. Percentages. Averages. The use of decimals; the fallacy of retaining more figures than are justifiable. Contracted methods of multiplying and dividing numbers, omitting all unnecessary figures. Exercises in areas, weights, and volumes. Mental arithmetic. Calculation of numerical values from simple formulae. Extraction of square roots.

ALGEBRA.—Meaning and use of algebraic symbols. Addition, subtraction, multiplication, division. Use of brackets. Substitution of numerical values for letters in formulae. Easy fractions. Factors. Easy equations of the first degree in one unknown. The plotting of points, and the construction of simple graphs on squared paper, with application to the solution of simple simultaneous equations of the first degree.

MENSURATION.—The simple properties of a triangle, parallelogram, and circle. Simple plane, and solid figures—rectangles, triangles, circle, cube, prism, and cylinder. Exercises have special reference to the various occupations of the students attending the class.

Geometry.—Forms of simple solids; straight lines and angles. Symmetry of figures. Isosceles triangles. Construction of triangles with even parts. Parallel straight lines; sum of angles on a triangle. Problems of construction; Euclid, I, 47, by measurement and calculation, etc.

Stress will be laid on drawing to scale.

All drawing work should be to a large scale to obtain reasonably accurate results.

The pupil should have the following instruments:—A pair of dividers, a pair of compasses, a protractor, two set squares, and an accurate scale graduated in inches and tenths of an inch, and in centimeters and millimeters.

Drawing in Geometry.

Geometry is an integral part of all the Drawing Classes, and is interwoven, throughout the session, with the technical drawing so as to produce a systematic and progressive course.

The examples in the solid work will, in the first instance, be demonstrated by the use of the paper models made by the students, and then exemplified and extended by exercises chosen, where possible, from the technical models or from actual practice.

Instruments—testing accuracy of set squares—different methods of dividing a line—construction of scales.

Explanation of the three co-ordinate planes, with illustrations by means of paper models. Points—plans and elevations on the three co-ordinate planes; example—cube resting on the horizontal plane with all the corners lettered. Lines—inclined lines, true length of a line, traces of a line, position of a point on a given line, angle between two straight lines; illustrated by means of paper and thread models, arranged by the student in his model of the three co-ordinate planes.

Study of solids, such as cubes, cones, pyramids, prisms, tetrahedron, and octahedron. Students will make their own models in paper, and with them determine the projections and true shape of oblique sections, a paper plane representing the cutting plane. Development of the surface of some of the above solids. Inclined sections of simple technical models. These sections will be determined by the student with the model in front of him.

All drawing work should be to a large scale, and on half-imperial sized sheets.

Technical Drawing for Miners.

All technical drawings must be carefully dimensioned and made to correspona to complete working drawings, and should be drawn to as large a scale as the half-imperial sheet of paper will allow.

Making a freehand dimensioned sketch from the metal technical models: the student will be directed to have sufficient information in his sketch to enable him to produce from it, without further reference to the model, a working drawing of the piece of machinery under discussion. The technical examples will be chosen with special reference to the industries of the students.

(2) MINING SCHOOL AT COWDENBEATH.

This school deserves special mention because it is such a school as might be established in one or more of the mining centres in Nova Scotia, such as Glace Bay. This school is doing a great work among the miners, not only in training officials but also in elevating the general average of intelligence of the miners.

The equipment of the school was substantial and very complete for the purposes of the school. There were many special pieces of apparatus designed by the principal, Mr. Joseph Parker, especially those connected with instruction in fire damp detection, which reflect the greatest credit on the designer. The principal has had a long practical career as a mine official and is retained in charge of the school because of his unselfish desire for educational and social service.

There is an excellent Mine Rescue Station with all the most modern mine rescue apparatus where the students of the school may be thoroughly trained in this line of work.

The idea of giving the mine firemen or "fire bosses" a special Course in the examination of mine air is especially to be commended. It means much for the elimination of danger in the mines of the vicinity because of the greater intelligence of these important officials.

Objects of School.

The school is established for the purpose of carrying out a liberal scheme of Technical Education in Mining and in the several branches of industry closely related thereto.

The organized Courses of Instruction are based on the requirements of Division III of the Code of Regulations for Continuation Classes issued by the Scotch Education Department. Systematic Courses extending over three or more years are provided, and in addition there is a Preparatory Course for those whose previous attainments do not fit them to enter at once with profit on the specialized work of their particular course.

The Laboratories are fitted in a thoroughly modern manner, and comprise:—

- Chemical Laboratory.
- Physical Laboratory.
- Mechanical and Strength of Material Laboratory.
- Hydraulics Laboratory.
- Electrical Engineering Laboratory.
- Mining Laboratory.

The school is affiliated with the Heriot-Watt College, Edinburgh, and arrangements have been made for students who have completed the Course at Cowdenbeath to attend Saturday afternoon Classes as follows:—

Laboratory Courses in Prime Movers. October to Christmas.

Laboratory Courses in Electrical Engineering (Alternating Currents). January to April.

Course of Lectures in Mining. October to April.

Travelling expenses are allowed to students attending these Classes.

ORGANIZED MINING COURSE.

1. Preparatory Year's Course, comprising:—English, Arithmetic, Drawing, Mensuration, and Physics.

2. First Year's Course, comprising:—Applied Mathematics, Class I; Mining, Class I; Physics and Chemistry (Lecture and Laboratory work).

3. Second Year's Course, comprising:—Applied Mathematics, Class II; Mining, Class II; Mathematics and Steam, Class I (Lectures and Laboratory Course); Summer Class in Practical Surveying and Drawing, Class I.

4. Third Year's Course, comprising:—Applied Mathematics, Class III; Mining, Class III; Technical Electricity (Lectures and Laboratory Course); Summer Class in Surveying, Class II.

5. Fourth Year's Course, comprising:—Applied Mathematics, Class IV; Mining, Class IV; Mining Laboratory, Class I; Electrical Engineering (Direct Current), Lectures and Laboratory Course; Summer Class in Surveying and Levelling, Class III.

6. Fifth Year's Course, comprising:—Mining, Class V; Mining Laboratory, Class II; Mechanics and Steam, Class II (Lectures and Laboratory Course); Electrical Engineering (Alternating Currents), Lectures and Laboratory Course.

7. Saturday afternoon Classes at the Heriot-Watt College for students who have successfully passed through the above Course. These Classes comprise:—

(1.) Half-session Course in the Mechanical Laboratory, making tests on engines, boilers, fans, etc. October to Christmas.

(2.) Half-session Course in Alternating Currents in the Electrical Laboratory. January to April.

(3.) Series of Lectures on Mining throughout the session.

Arrangements have been made with the Local School Boards, whereby the student may take portions of the above course at the Board School, and the remaining portions that cannot be dealt with at the local centres, at the Mining School, Cowdenbeath.

Students working under these arrangements must be careful to complete the full Course of each year before proceeding to the next year's Course.

Students may take their classes in Mining and Mathematics of the first year of Division III at local centres where such classes are held, and attend one evening each week at Cowdenbeath for Chemistry and Physics to complete the first year's Course.

Similarly, Mining and Mathematics of the second year's Course may be taken at the local class, and the student travel to Cowdenbeath for Mechanics and Steam to complete the second year's Course.

The organized Mining Course in the Preparatory Year includes English, Arithmetic, Drawing, Mensuration, and Physics. In the first year it includes Applied Mathematics, Mining, Physics and Chemistry. As illustrative of the work covered in all the subjects of the organized Course the details of the subject 'Mining' for each of the five years are cited. They contain information as to subject matter and arrangement which should prove useful in Canada.

Mining—Class I.

1. Geology of Coal Mining.—Classification of rocks. The geological formations. The igneous rocks: their origin and characteristics. Fossils: their origin, method of preservation, and use. The carboniferous formation and its subdivisions. Occurrence of this formation in Fifeshire. Coal-bearing strata of Scotland and of England. Coal in formation other than the carboniferous. The origin of coal. Classification of coals. Strike. Dip. Outcrop. Lamination. Cleat. Faults, normal and reversed. Throw. Thrust. Wash-outs. Nip-outs. Rolls. Swellies. Balks, etc. Dykes. Sills. Useful minerals associated with coal.

2. Prospecting for Coal.—Outcrop. Surface indications. · Examining ravines, cuttings, etc. Effect of surface contour on outcrop. Application of knowledge of geology to the search for coal. Boring. Methods. Tools. Chisel bores. Tubing the bore-hole. The lever and the spring pole in boring. Diamond drilling. Davis-Calyx drill.

3. Sinking and Shaft Fitting.—Ordinary methods of sinking and securing rectangles and circle shafts. Means of ensuring safety. Division of shaft into compartments. Fitting guides and buntons in a shaft.

4. Drainage.—Bucket and plunger pumps: their construction and action. Discharge of pumps.

5. Ventilation.—Composition of the air. The noxious gases found in mines and their properties. Testing for noxious gases: quantity of air required to dilute and render harmless. Coursing the air in a mine. Intakes and returns: stoppings, doors, overcasts, brattices. Laws of ventilation. Simple applications of the water gauge. The anemometer.

6. Lighting.—Lamps and candles. The safety lamp, principles of. Effect of high velocity explosive current on a safety lamp. The Davy, Clanny, and Stephenson lamps.

7. Breaking Ground.—Tools: picks, hammers, chisels, shovels, ratchet boring machines, multiple wedge, roller wedge.

8. Mine Supports.—Propping and securing the working face. Erecting sets of timber in roadways. Chocks. Packwalls.

9. Haulage.—Tubs. Rails. Self-acting and balance inclines. The cut-chain system. Horse Haulage. Main rope and tail rope system of haulage.

10. Winding.—Cages. Ropes. Drums and brakes. Detaching hooks. Plan. Section. Elevation. Application to production of drawings of mine tubs, cages, pumps, pipes, rods, collarings, shaft timbering and walling, and mine supports.

Mining—Class II.

1. Boring.—Uses of bore holes. The American and Canadian systems of boring. Mather and Platt system. Fauk's 'Rapid' system. Wolski's hydraulic system. Free fall cutters. Keeping the journal of the bore. Accidents in boring. Cost of boring. Determination of dip and strike by three bore holes. Surveying bore holes.

2. SHAFT SINKING.—Sinking and walling together. Use of rock drills in sinking. Flottman and other types of drills. Walker's patent scaffold. Ventilation of pit sinking. Tubing shafts; forms of tubing, and methods of building up. Coffering. Piling. Sinking by freezing methods. Kind Chaudron method of sinking, and later improvements. Triger's method of sinking. Pattberg method. Use of pulsometer in sinking. Galloway's pneumatic barrel. Peacre's barrel. Closing the top of sinking pit. Balanced folding doors. Preserving perpendicularity of shaft.

3. DRAINAGE.—Fixing shaft pumps. Travelling a bucket set. Rods, buffers, guides, counter-balances, regenerators, special pumps (various types).

4. VENTILATION.—Noxious gases of mines. How to deal with each. Special precautions against carbon monoxide poisoning. How to provide a ventilating current. Natural ventilation. Furnace ventilation. Description of various types of fans.

5. LIGHTING.—Safety lamps (various types). Cleaning, lighting, locking and relighting of safety lamps. Handling and examining safety lamps. Statute Regulations regarding safety lamps.

6. BREAKING GROUND.—Tools. Power drills. Blasting. Explosives. Some types of coal cutting machines.

7. MINE SUPPORTS.—Timber. Varieties in use. Stocking timber. Preserving timber. Iron, steel, brickwork and reinforced concrete as mine supports. Strength of mine supports. Statute Regulations regarding timbering. Systematic timbering.

8. MODES OF WORKING COAL.—Stoop and Room and Longwall Methods. Single and double stall methods working thick seams by square work.

9. HAULAGE.—Endless rope system of haulage. Details of working. Various forms of clips. Pulleys, rollers. Management of curves.

10. WINDING.—Engines. Drums. Ropes. Cages. Keps. Koepe system of winding. Loading several decks simultaneously.

11. PREPARATION OF COAL FOR THE MARKET.—Tripplers (various types). Bar screens. Picking tables.

MINING—CLASS III.

1. SHAFT SINKING.—Shaft sinking in difficult cases. Reclaiming collapsed shafts. Calculation of the necessary thickness of barring, tubing, and walling for given cases.

2. DRAINAGE.—Pumping plants for specific cases. Details of construction. Air vessels. Calculation of size necessary. Charging air vessels. Suction air vessels. Cavitation in pumps. Causes, and how avoided. The syphon. The hydraulic gradient. Pump valves; relative advantages of various types. Special pumps. Electricity in pumping. Drainage during sinking; pumps suspended by ground spears and worked by rods from the surface. Pumps of various types suspended on wire ropes and chains. How installed and successfully operated.

3. VENTILATION.—Laws of ventilation. Supply of air required per man per minute. Coursing the air, in stoop and room and in longwall workings. Doors,

crossings, stoppings, regulators, etc. Splitting the air. The equivalent orifice, the equivalent airway and the mine temperament ideas. Duplicate and auxiliary fans. Surface and underground arrangements for reversing the direction of air currents. Fans: theory of. Quantity of air produced by given fans when operating on mines of given resistance.

4. COLLIERY EXPLOSIONS, AND RESCUE WORK.—Historical review. Part played by coal dust in colliery explosions. Recent confirmations of truth of coal dust theory. Prevention of explosions. Arresting of an explosion in mid career. Recovery of miners after explosions: rules for. Rescue apparatus of various types. Organization of rescüe parties.

5. FIRE DAMP.—Methods of testing for fire damp. 'Caps' formed on various lamps by given percentages of fire damp in air. Removing accumulation of fire damp underground.

6. LIGHTING.—Lamp cabins. Cleaning, storing and handling of safety lamps. Electric safety lamps.

7. METHODS OF WORKING.—Shaft pillars. Laying out. Position, number, and inclination of main roads. Stoop and room, and longwall methods of working; their respective advantages and disadvantages; seams best suited to each. Longwall: working outward; working home; complete stowing; partial stowing; hydraulic stowing. Size of packwalls, width of roadways, height of ripping. Spontaneous combustion: causes of. Wax walls and draught board packing. Working thick seams by longwall. Working contiguous seams. Stoop and room. Size of stoops, and width of rooms. Methods of removal of stoops. Influence of thickness and inclination of seam on the method. Roof control: nature of the problem; straight face line; stepped face; angle with cleat and dip.

8. TECHNICAL ELECTRICITY.—Properties of magnets. Magnetic induction. Lines of force. Maps of magnetic fields. Laws of inverse squares. The earth's magnetism. Primary cells. Current of electricity. Magnetic field surrounding a conductor carrying current. Electro-magnets. Electric bells. Electrolysis, secondary cells. Current measurement. The tangent galvanometer. Fall of potential in a current-carrying conductor. Ohm's Law. Comparison of E. M. F. cells. Clark's standard cell. Measurement of resistance. Wheatstone's bridge. Specific resistance. Ammeters. Voltmeters. Wattmeters. The Potentiometer. Heating effects of a current. Efficiency of lamps. Induced currents. Introduction to theory of dynamos and motors.

MINING—CLASS IV.

1. TRANSMISSION OF POWER.—By steam: fall in pressure due to friction and condensation; disadvantages of steam. Steam pipes, traps, and expansion joints. Fixing of pipes in shaft; covering pipes. Condensation of the exhaust; water required. Condensers.

By Compressed Air.—Losses during compression; adiabatic and isothermal curves. Examination of diagram and sight of operations; deductions. Air compressors: good forms; forms to be avoided. Stage compression. Intercoolers. Receivers. Losses in transmission in pipes. Reheating. Temperature resulting from expansion of air. Prevention of formation of ice.

By Electricity.—Direct and alternating current installations. Forms of cables used. Support of cables in shafts and levels. Gate-end boxes; trailing cables. Earthing. Fault detection. Efficiency of transmission. Electrical rules for mines.

By Hydraulic Power.—Hydraulic machines. Turbines. Pelton wheels. Losses due to friction.

By Ropes and Rod.—Disadvantages; limits of application. Size of ropes and rods; general arrangement of efficiency.

The Oil Engine: mining applications; the exhaust from.

Comparison of methods; safety, convenience, initial cost, upkeep, efficiency.

2. Haulage.—Tubs; wheels; journals; axle lubrication. Self-acting inclines; their equipment. Brakes; fundamental equation to belt friction; friction brakes; block brakes; strap brakes; breast brakes.

Mechanical haulage: horse-power of engines required for. Driving pulleys. Various forms of clip pulleys. Clifton pulley. Laying haulage roads. Arrangement for branches and bends. Pulleys, rollers, etc. Clips.

Application of electricity to haulage. Compressed air and other locomotives.

Signalling. Haulage accidents. State Regulations on haulage.

3. Methods of Working.—Inclined seams. Working edge coals. Rearer workings; rabatage; inclined slices; horizontal slices; chambers.

Machine Mining.—Laying out the workings. Organization of the work. Size and type of the machine. Direction of the face. Economic influence of coal-cutters.

Coal Conveyors.—Various types: their application and installation.

The Coalfields of Scotland.—The Fife coalfield in detail. Short description of the Lothian, Clyde, and Ayrshire coalfields. Short description of the coalfields of England.

Mining—Class V.

1. Winding and Shaft Equipment.—Ropes and attachment; adjusting screws. Strength and size of winding ropes. Cages, various forms. Catches for tubs on cages. Guides and shaft railway. Keps, various forms. Detaching hooks. Safety cages. Headgears, principles of design. Typical headgears of wood, rolled joists, and lattice work. Pulleys, their construction. Drums, their construction, size, and weight. Counterbalancing: conical and spiral drums; flat and tapered ropes; balance ropes, Koepe system. Winding from several depths. Whiting hoist. Winding engines, simple and compound. Calculations regarding winding engines. Indicators. Gears for the prevention of over-winding. Automatic cut-off gear. Application of direct and alternating currents to winding. Angling of ropes, methods of prevention. Arrangement of roadways on surface and on pit bottom.

2. Preparation of Coal for the Market.—Banking arrangements. Creepers. Tipplers. Screens: bar, Briait's, Baum-Briairt's, Coxe's, Humbo-

lat's, Karlick's. Shaking screens. Prevention of jar. Picking tables: of steel plates, of canvas; Cornet's picking band. Coal washing. Fall of minerals in water. Rittenger's Laws. Borne's rules deduced from Pernolet's Formulæ. Types of modern coal-washing plants. Accessory arrangements: bunkers, drainage screens, settling pond, elevators. Dry cleaning of dross.

3. Coke Making.—Coking coals. Principles involved in coke making. Types of ovens. Their respective advantages. Prevention of dead ends. Charging and discharging the oven. Quenching the Coke. Recovery of by-products. Details of the process.

4. Surface Arrangements. — Boiler plant for collieries. Types of boilers used. Setting and building of boilers. Chimneys, their dimensions and construction. Forced draught and balanced draughts for boilers. Power house for collieries, its nature and equipment. Central condensing plants. Utilization of exhaust steam by Rateau turbines. Workshops: relative position and equipment of the various shops. Lamp rooms. Stores. Offices. Sidings.

5. Strength of Material used in Mining Operations.—Design and strength of tie for axial and non-axial loads, beams, struts. Strength of brickwork, masonry, cement, reinforced cement. Earth pressures. Thickness of retaining walls, and dams. Depth of foundations.

6. Legislation.—Coal Mines Regulation Acts. Workmen's Compensation Act. The Colliery Manager and the Law.

7. Condition of the Workmen.—Health and diseases of the miner. Housing and education of the workmen.

8. Accidents.—Classification. Statistics. Means of prevention of each class of accident.

(3) HERIOT-WATT COLLEGE, EDINBURGH.

Fifth Winter Session.

Students who have completed the organized Course in Mining at Cowdenbeath are admitted to the Fifth Session Winter Course, held on Saturdays in the Heriot-Watt College, Edinburgh, and commencing on the last Saturday in September.

This course includes:—

(*a*) Mining Lectures.............................6.40 to 7.40 p.m.
(*b*) Mechanical Engineering Laboratory (September to December)..........................4.40 to 6.40 p.m.
(*c*) Electrical Engineering Laboratory (January to April)...................................4.40 to 6.40 p.m.

Syllabus of Mining Lectures.

1. The Classification of Fuels.—The meaning and utility of proximate and ultimate analysis. Sampling. Classification from analysis; carbon-hydrogen system; fuel-ratio system: Seyler's, Parr's, and Gront's methods. Connection of calorific power and analysis. Oil-shale analysis.

2. Advanced Ventilation.—Discussion of the ventilation tests conducted in the Fourth year. Limitations of Atkinson's theory. Application of Bernouilli's theorem to mine ventilation; application to *évasés* and fan passages. Mechanical ventilators; derivation of general formula for manometrical efficiency of fans with non-radial vanes. Relation between manometrical efficiency and useful effect. Principles of fan design. Fans of the propellor type. Secondary ventilation; installation of auxiliary fans; power and quantity relations. Working gauge pressure from plans. Equivalent orifice.

3. Calculations on Winding Plant.—Discussion of some recent tests of winding engines; their help in calculating the size of such engines. Counterbalancing; proportions of conical and scroll drums; flat and taper ropes, etc.; overbalancing.

4. Advanced Power Transmission.—Air compression; isothermal and adiabatic laws; energy losses; forms of compression; Reavell's hot transmission system. Electricity; relative advantages of direct and alternating current for mining purposes; the revised special rules for electricity; mining switch gear; transformers and transformer stations; voltage regulation; load diagrams, etc.

5. Applied Electricity.—Applications of electric power to machine-driving in mines. Specifications of mining motors; rating; plate and other protection; upkeep of electrical plant. Electrical winding; Siemens-Ilgner, and Westinghouse systems.

6. Preparation of Coke.—Suitable coals; principles involved in coking. Coke making in bee-hive and retort ovens. Nature of by-products and their recovery.

7. Shaft Sinking in Difficult Cases.—Kind-Chaudron method and modifications. Pattberg and Hydraulic methods. Sinking through running ground by piling and spiling. Caisson sinking. Triger's and Poetsch's methods. Cost of special processes.

Laboratory Work.—During the first half-session the students undertake tests of boilers, steam and gas engines, and perform experiments on the strength of pit timber, coupling chains, etc.

During the second half-session the practical course includes the testing of ammeters, voltmeters, fuses, circuit breakers, accumulators, arc and glow lamps, wiring insulations, direct-current dynamos and motors, impedence coils and induction motors.

Economic Mineralogy.—A class in this subject is held during the Winter Session on alternate Saturdays, 3 p.m., to 4.30 p.m. The course includes practical work in the detection of minerals, and a number of short lectures on their characteristics.

Special Courses.

The following Special Courses will be given:—

1. A Class forming a preparation for the Colliery Manager's Certificate.
2. A Class forming the preparation for the Under Manager's Certificate.
3. A Half-Session Course (Jan. to April) in Strength of Materials, for colliery managers.

4. A Half-Session Course (September to December) in the Examination of Mine Air, for colliery managers.

5. A Special Class in Electrical Engineering, for colliery officials.

6. A Class forming a preparation for the Fireman's Certificate.

For the convenience of men in official positions, who find Saturday afternoon the only free time during the week, the classes for special Courses 1 and 2 will meet on Saturdays from 4 to 6 p.m.

The curriculum includes: Coal Mines Act. Ventilation. Lighting. Sinking, fitting, and pumping. Haulage. Winding. Modes of working. Mine gases and coal dust. Strength of materials. Applications of electricity to mining. Surface arrangements. Surveying and levelling.

Special classes for colliery managers, special electrical classes for mine officials and a course for mine firemen, are also held.

The co-ordination of the work of the Continuation Classes throughout the County of Fife with the work at the Cowdenbeath Mining School and the more advanced work of the Heriot-Watt College together provide appropriate courses of instruction and training for mine workers from the elementary grades up to the highest technical qualification necessary for practical work as superintendent or manager.

SECTION 3: GERMANY.

The Collieries Provide the Funds.

In Germany the schools for the training of mine officials, especially in colliery districts, are provided by the mining corporations without any grant from the Government. The companies form an association for the establishment and maintenance of a mining school for their district. The members of such an association usually include representatives of all collieries with a certain minimum output per year. Then a tax of 20 pfennige per thousand metric tons (in Essen 4 pfennige per 20 metric tons) is levied on the output of the mines which are represented voluntarily in the association.

The buildings and equipment which were visited in Aachen and Essen were in every way adequate for the purpose. Beside the central schools, preparatory schools are maintained by the mining companies in various localities in the district.

Uniforms and Wages.

At the preparatory schools the instruction is usually given in the evening, but at the central mining school the training is given in the daytime for 20 to 24 hours a week for 2 or 3 years. In Aachen the students are given a uniform and are paid a small sum of about 50 cents a day for every day they attend the school. This sum, together with the money they earn by working regular shifts in the mine on days when the school is not in session, enables the students to support themselves while obtaining their education even though married.

In Essen the yearly report of the mining school for 1910-11 shows about one third of the entering students as married men. These schools are usually free to students who work and live in the district in which the collieries provide the funds, and pupils from outside pay a small fee.

The mining organization in Germany is different from that of Canada, with more minor officials than is the custom here. The pay of miners and foremen in the collieries is also less than here. In the Essen district a coal cutter (hand work) earns about $500 a year. An assistant foreman (*Hilfsteiger*) gets $650 to $750 a year, underground manager or a foreman (*Steiger*) receives $800 to $1000 annually and the manager (*Obersteiger*) is in receipt of a salary of $1250 to $1500.

Nearly all Officials are School Trained.

There are scarcely any officials who have not been through the regular course in a mining school. The examination is conducted by a board on which are the government mining inspectors, local or district government officials, the faculty of the school and representatives of the coal mining operators. The man who passes through the school and examination receives a government certificate of proficiency and is accorded some social prestige according to his grade of diploma. The instruction in the school is of such a high order and so thorough that very few fail in the examination.

No boys are received into the mines until they are 16 years of age, so that they usually stay in the public schools until that time. Then they attend some Continuation School until they are about 18 years old. In Prussia the mine operators are compelled by law to allow any boy in their employ to attend a Continuation School which is recognized by the state or local authorities until he is 18 years of age. At 18 they may enter the Mining Preparatory School and get ready to enter the Mining School. No students are received into the Mining School who are not 20 years old and who have not had 4 or more years of practical experience in mining. Some do not enter until they are much older, as in the report of the Mining School at Aachen the ages of the pupils run from 20-35. The men who attend the Mining School cannot enter unless they are recommended to do so by the mine operators, because the schools are supported by the latter. This introduces a condition which would not be accepted in Canada.

There are in Prussia 10 schools for the training of intermediate technical mining officials, with 2 years in the lower classes and one year's course in the higher classes. As introductory to these schools there are in Prussia 43 Preparatory Schools in which also the lower kind of mining officials can be trained.

Regulations for Safety.

One of the State mining regulations provides that the mine air in any colliery must not have more than 1 per cent of fire damp in any part of the mine that is working. A sample of the mine air has to be analyzed every 3 months. The sample is taken by the Fire Boss in the mine and sent to a laboratory sustained in each district by the mine operators. This laboratory is usually included in the mining school building of each district. The coal mining industry of Germany is in a very flourishing state at present. In the Aachen district the increase in the last few years has been about 20 per cent a year. With the increase in depth and extent of working in the mines the problem of coping with fire damp has also grown more difficult so that the Mining Schools have been sorely taxed to provide the necessary number of mine officials. Germany is noted for the low loss of life per 1000 employees and the Director of the School attributes much of this satisfactory condition to the thorough education of the miners and mine officials.

(1) AACHEN (Aix-la-Chapelle).

The Mining School here is a splendid building erected, equipped and maintained by the Coal Mines Association of the Aachen District (*Vereins der Steinkohlwerke des Aachener Bezirks*). The principal coal mine operators are the contributing members and the upkeep is provided by a light tax on the output of this district. The association was formed in 1867 and used to conduct a school in another town. The present building was erected in 1904 at a cost of about 225,000 marks.

There are five Mining Preparatory Schools in the district under the direction and control of the Director of the School.

Courses for Foremen and Managers.

There are two and three year courses in Mining. The two year course prepares a man for his certificate as foreman or underground manager (*Steiger*) and is the one most largely attended. The three-year course prepares a man for his certificate as superior foreman or manager (*Obersteiger*). There is also a one year course for the training of mechanical foremen (*Maschinensteiger*) to superintend the mechanical equipment and mechanics necessary for the operation of a colliery. This course is offered only every other year, so that there shall not be more men trained for this position than is necessary. It has only a small attendance.

Character of Attendance.

There were 83 pupils in attendance in 1910. There are no fees except to outsiders, i. e., men who come from mines outside of the Aachen district, and these pay 250 marks per year tuition. There were 17 of these at the time the School was visited.

For the year which opened April 17, 1911, there were forty-eight applicants and forty-two of these were from the five affiliated Mining Preparatory Schools. Of these twenty-five were selected who had attended the Mining Preparatory Schools and five from outside this territory. Only five of the applicants were accepted for the course for mechanical foremen (*Maschinensteiger*).

In the Mining Preparatory Schools at surrounding colliery centres the following attendance was recorded in those under the inspection of the Aachen Mining School:—

At Kolscheid	25
At Herzogenrath	11
At Mariadorf	25
At Nothberg	23
At Homberg-Hochheide	18
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The School conducts a regular three years course—24 hours each week. The two lower classes are called "Unter" or elementary, the upper class "Ober".

The instruction is given to each class for three whole days a week and on the other three days the students work on regular shifts in the mine. Students are paid 2 marks per day for days they attend school and they make 12-15 marks more per week on regular shifts in the mine.

There are 3 regular professors on the staff and 3 assistants who give part of their time to the work. The Director has had a long and distinguished practical experience, and each teacher is a specialist in his line.

The equipment of the school is very complete, especially in the splendid library of 5000 volumes and in the collection of mine models, boring machines, and models of special arrangements for sinking through watery strata.

Content of Courses.

The courses in the German Schools are so much like those which have been described in connection with the English and Scotch Schools that details of them have not been given here beyond a syllabus showing the division of time per week to the various subjects in each of three years in the general courses and in the first year of the course for mechanical foremen.

FIRST YEAR.	Hrs. per week.
German	2
Arithmetic	1
Mathematics (Algebra, Plane Geometry, Trigonometry, Solid Geometry)	2
Machines	2
Machine Drawing	3
Mineralogy and Geology	2
Mining	7
Mine Regulations	2
Surveying	3
	24

SECOND YEAR.	Hrs. per week
German	2
Arithmetic	2
Chemistry	2
Physics	2
Mathematics	6
Mechanics	2
Mining	2
Surveying	3
Machine Drawing	3
	24

THIRD YEAR COURSE.	Hrs. per week
German	2
Technical Chemistry	2
Physics and Technical Electricity	2
Machines	2
Machine Drawing	3
Building Construction	2
Mineralogy and Geology	1
Mining	3
Ore Dressing	2
Mining Regulations	1
Surveying and Plotting	3
Mining Accounting	1
	24

The syllabus for the Course for mechanical foremen is as follows:—

FIRST YEAR.	Hrs. per week
German	2
Arithmetic (applied)	1
Mathematics	2
Physics and Chemistry	2
Electrotechnics	2
Mechanics and Strength of Materials	2
Elements of Machines	2
Theory of Machines	2
Workshop Science	1
Machine Drawing	6
Mining	2
	24

(2) ESSEN.

Sources of Funds for School.

The Mining School is under the control of, and supported by the Essen Mining School Association (Essener Bergschule Verein.) This Association was formed in 1810 but was disorganized in the fifties and later resurrected in 1863. The present building was erected in 1908 at a cost of about 550,000 marks. A sinking fund was provided for the amortization of the capital cost of the building in 10 years. There are 40 contributing members and the sum for maintenance is raised by a levy of 4 *pfennige* on every 20 metric tons produced in the mines operated by the members. (There is a production of about 25,000,000 metric tons per annum in this district.)

The present Director, Königlicher Bergrat Gerlach, was responsible for the establishment of the school. He started the campaign among the members of the Association and in two months had the requisite amount of money promised. In two months more the site was purchased and the plans ready so that construction started at once. The city of Essen granted the school a remission of street taxes and the unearned increment on the land.

The Mining Preparatory Schools in this district are supported by and under the control of an Association called the *Bergwerkschaftscasse* with headquarters at Bochum. The preparatory classes in this district are held in the afternoon generally but sometimes in the evening. The classes are held 2 or 3 times a week for two years and each session lasts 2 to 3 hours.

Courses and Equipment.

Only a two years' course in mining is offered at present leading to certificates of assistant foremen (*Hilfssteiger*) and foremen (*Steiger*.) The men in the courses work a shift in the mine from 6 a. m. to 2. p. m. and then attend school from 4 to 8 p. m. on 5 days a week in the first two half-year terms and 6 days a week in the last two half-year terms. Some of the students work on night shift from 10 p. m. to 6 a. m. instead of the morning shift.

It is not required at this school that a matriculant shall have attended the preparatory school.

There are 160 pupils in attendance, 40 in each half-year course. Owing to the great expansion in the coal industry, the demand for mine officials can be supplied with difficulty.

The men in each half-year course make ten hours of inspection of a geological nature or to notable installations of power machinery, coking plants, boring and shaft sinking operations, etc., during the term.

Each student must present a carefully kept account of his practical work in the mine in a special book provided for this purpose.

The equipment of the school is very costly and extensive although it is being added to each year. All of the lecture rooms and laboratories are fitted up in the most modern manner.

At the school, a separate building is used to illustrate mine working and also as a rescue station. The building contains a short shaft, two short levels, a clinte and an air crossing. All the different kinds of timber sets are shown together with modern methods of supporting levels which are in permanent use in a mine by means of steel and concrete. A furnace is attached by means of which the whole model mine may be filled with smoke and a practice obtained in the use of rescue apparatus. There is also a long room with a glass front which is filled with smoke and demonstrations of rescue apparatus of different kinds carried out.

Subjects of Instruction.

	1st. ½ yr.	2nd. ½ yr.	3rd. ½ yr.	4th. ½ yr.
Mining, including prevention of accidents	6	6	7	7
Mining and Industrial Regulations			1	1
First aid to the Injured				1
Rescue work	part time on free afternoons.			
Mathematics	4	4	3	3
Mechanics, Machinery and Electricity	2	2	2	3
Surveying		3	4	3
Physics and Chemistry	2	2	2	2
Drawing	3	2	3	3
Mine Accounting				1
German	3	2	1	
	20	21	23	24

The instruction in the school is given from 4 to 8 p. m. In the mornings the students work a day's shift from 6 a. m., to 2 p. m. concerning which they keep a record in a day book. In this way care is taken that the theoretical and practical training of the students goes hand in hand.

The attendance is very regular. Some of the teachers are engaged for part time instruction. All are experts in the special subjects which they teach.

The students make a number of visits, usually ten, to noteworthy mines, power plants and industrial establishments in the vicinity and must hand in carefully prepared reports on the same.

Details of Cost of Maintenance.

Although the character and scale of expenses would be different in Canada from Germany, the following particulars regarding these two schools at Aachen and Essen are submitted as illustrating the relative amounts spent on different divisions of the work there. A mark is equivalent to about 24 cents.

AACHEN.

The cost of maintenance of the school is given in the following statement.

	1909 Marks.	1910 Marks.
Salaries	19698.02	25565.34
Materials for instruction	240.00	85.05
Maintenance, upkeep and additions to Museum	4102.98	9261.44
Maintenance of school building	1565.43	1530.65
Water, gas, electricity, heating	1228.26	1112.38
Excursions and inspection of Mining Preparatory Schools	915.70	758.20
Sundries	517.00	715.73
	28,267.39	39,028.79

ESSEN.

The expense of carrying on the school in 1909-10 is given in the following statement.

	Marks.
Management	4500.00
Teachers' salaries	18624.98
Apparatus	5063.75
Excursions for students	1776.06
Representation	3000.00
Books	379.05
Janitor service	2493.20
Heating, lighting, water	3872.46
Taxes	2305.77
Maintenance of building, etc	1047.13
Interest on loan	10900.05
Sundries	4319.59
Construction	43742.34
Amortization of loan	57500.00
Balance	32971.76
	192,496.14

If the last three items are deducted from the total it will be seen that the actual maintenance of the school is about 60,000 marks per year outside of the expenses attendant upon the new building.

SECTION 4: FRANCE.

(1) ST. ETIENNE MINING SCHOOL.

This is a national school intended to train directors and engineers for the operation of mines and metallurgical factories. It is managed by a chief engineer of mines, and is located in one of the most important industrial cities in France, in the midst of one of the richest coal basins, and of industries of the most varied character. The pupils, moreover, enjoy the inestimable advantage of being able to verify continually by practical application the theoretical lessons they have received.

As a matter of fact, it is the ex-pupils of the St. Etienne School of Mining who today guarantee to France the working of her coal mines. Out of the 450 engineers who, it was calculated, were directly engaged in the extraction of coal throughout France, 278 came from the school at St. Etienne, 32 from the Central School, 72 from the Superior School of Mining, and 28 from the schools for master miners. The other 40 came from various other schools or from none at all. This school also furnishes engineers to metallurgical establishments and also to chemical industries in France and abroad. According to statistics of the metallurgical industries of the Loire, compiled some years ago, out of 56 superintendents or engineers who were graduates of the large schools, 32 had belonged to the school at St. Etienne.

The school accepts French pupils appointed by competition, and foreign pupils accepted after examination, also outside students (visitors).

From the very foundation of the school the tuition was free, although the majority of the pupils came from families which were not in straitened circumstances, but since 1908 the financial law provides for an annual fee of 200 francs from each pupil, while visiting pupils pay 50 francs for each course.

Qualifications for Admission.

The qualifications for admission to the school at St. Etienne are similar to those of the Central School, with chemistry in addition, but the places are more strenuously competed for and it is more difficult to gain admission here than to the Central School, the examination in mathematics being often as difficult as that of the competition for admission to the Polytechnic School. The difficulty of maintaining one's position in the St. Etienne or Central School is about the same. The exclusions are about one-fifth of the promotions.

The number of places is determined each year by the Minister of Public Works. These were 40 in 1906 and 35 in 1907, 1908 and 1909.

Candidates must be of the full age of 17 years and not over 26 years of age on January 1 of the year of competition.

The examinations for admission consist of (1) a problem in mathematics; (2) a problem in physics and chemistry ; (3) French composition; (4) dictation; (5) a diagram in descriptive geometry; (6) a freehand drawing of any object-

(7) a calculation in trigonometry. The two first problems entitle to 2 marks, one for the groundwork and the other for the form, the latter having in view the order and clearness of the explanation, correctness of language, orthography, material, execution, etc.

The special marks assigned to each composition are as follows:—mathematics, groundwork 8, form 2; physics and chemistry, groundwork 6, form 2; French composition, 8; dictation, 4; diagram in descriptive geometry, 6; freehand drawing, 4; calculation in trigonometry, 2.

The number of pupils admitted to the oral examinations may not exceed 2½ times the annual number determined on for admission. Pupils who are eligible undergo two oral examinations in mathematics bearing on geometry, algebra, analysis, trigonometry, analytic geometry of 2 and 3 dimensions, mechanics, descriptive geometry; one oral examination in physics; and one examination in chemistry. The coefficient of the two first examinations is 18, that of the examination in physics being 10, and chemistry 8.

Pupils who desire it may request permission to undergo an oral examination in German or English, the coefficient for which is 3. The examination may bear upon both German and English; the best mark obtained is then multiplied by the coefficient, 3; and the second enters into the total marks with the coefficient, 1.

Graduates from the Polytechnic School, either in the preceding year if they have to do military service, or in the same year if not, may be admitted directly into the second year of studies here, the number so admitted being determined by the number of places available. The school is for day-scholars.

Courses of Studies.

The course of studies takes 3 years.

The first year is more especially devoted to theoretical courses in mathematical analysis, rational and applied mechanics, construction, physics, chemistry, mineral analysis, mineralogy, and surveying.

The other two years are devoted exclusively to applied courses, viz: construction, industrial electricity, working of mines, applied mechanics, metallurgy, mineral analysis, geology, railways, mining legislation, and industrial economy.

Pupils are trained in chemical manipulations, especially in the analysis of mineral substances and chemical products; in practical electric measurements; in the various sorts of drawing, machine drawing, and the drawing of subterranean and surface plans. They are obliged to make projections on the practical courses. They pay numerous visits to the mines and to metallurgical establishments, and make geological expeditions.

At the end of every year the pupils undergo examinations, which they must pass in order to be promoted into the higher division. All pupils who do not obtain at least 60 per cent of the possible marks during the year are obliged to remain 2 years in the same class, while those who obtain less than 50 per cent are excluded.

At the end of the second year and during the third year the pupils make two trips for study throughout France or abroad: the first permits residence at a mine or a factory. Each trip forms the subject of a special report.

Pupils are recommended to spend their holidays abroad during the first year, in order to perfect themselves in modern languages.

Expenses, Uniform, Diplomas, etc.

All pupils are obliged to prove at the end of every month that they have paid their board and lodging, generally about 100 francs per month.

Uniform costs about 200 francs. In undress the pupils wear the cap only, having two gold stripes with the pick and hammer as a coat-of-arms.

The two principal preparatory centres for the St. Etienne School of Mining are the Lyceum of St. Etienne and the secondary free school of the Point-du-Jour (called des Anglais), at 5 rue des Massues, Lyons. Pupils may also be prepared in any class of special mathematics, or in a division devoted to preparation for the Central School.

The Minister of Public Works, on the completion of the course, grants a diploma of *ex-pupil of the School who is qualified to exercise the functions of civil engineer* to those only who have obtained at least 65 per cent, of the total possible merit marks during the whole course of study. Those obtaining less than 65 per cent receive a certificate of studies. Though the management does not guarantee positions to the young men entrusted to its care, yet through the medium of the school all pupils leaving obtain, without difficulty, positions as engineers at a salary of 2,400 francs, which is afterwards gradually increased.

(2) SCHOOLS FOR MASTER MINERS.

There are two practical schools in France for training master miners and miner geometricians. They are situated at Alais (Gard) and at Doyai (Nord). They were reorganized by decrees of March 29, 1907. They are for boarders. Tuition is free, but board is charged for. Scholarships are awarded by the State, the departments and mining companies.

The course lasts two years, comprising four practical stages, during which the pupils are distributed among various mines in the locality where they are received as workmen under the control of the working heads, but are under the supervision of the school, and when they return they give an account of what they have observed.

The theoretical instruction comprises: (1) a rapid review of the subjects on the entrance program, followed by algebra and geometry; (2) trigonometry, numbered geometry, topography and laying out plans; (3) elements of mechanics, physics, chemistry, mineralogy, and geology; (4) linear drawing and machine design; (5) working of mines; (6) French. This instruction is conducted in an essentially practical spirit, so that it is always readily understood by the pupils.

The marks given by the professors during the year, those obtained for good conduct and diligence, and those earned during the practical periods, all contribute, with the marks at the final examinations, towards the position of the pupil in the final classification table. Those who at the end of the first year have not obtained a sufficient number of marks are permitted to remain another year in the same class, or are finally excluded.

At the end of the second year diplomas of master miners are granted by the Minister of Public Works, Post-offices, and Telegraphs to pupils who have obtained at least 65 per cent of the total merit marks, the classified rank and number of diplomas granted being mentioned on the diploma. Those who have obtained less than 65 per cent and over 55 per cent receive from the prefect a certificate of studies.

Admission, Examinations, etc.

Candidates for admission to the two schools must be French, at least 18 years of age on the first of January of the year of competition, and prove that their habits and conduct are good, and that they are suited for working in mines. They must have completed at least 500 days of paid work in underground portions of mines in France, Algeria or Tunis, and must have a good elementary education.

An eliminatory examination is held during July at the chief town of each department or district where candidates have been enrolled. It consists of two written compositions, dictation, and a paper in mathematics bearing on the subjects required at the oral examination.

The final examination is held at the schools. It bears on the theoretical knowledge hereinafter specified, and on the practical elements acquired by the candidates in the course of their work in the mines. The tests and coefficients are as follows:

Written Examination.—

Dictation: orthography 5, writing 2, problems 8; total 15.

Oral Examination.—

French: explanation of an ordinary text, 3; Arithmetic: decimal numeration, the four rules, divisibility, prime numbers, greatest common divisor, least common multiple, ordinary fractions and decimals, ratios, and proportions, 5; Metric system: length, surface, volume, weight, and currency, 3; Practice in calculating: problems in application, interest, distributions, etc. 5; Geometry: the straight line and the circle; measuring surfaces and volumes, 6; Algebra: algebraic calculus, resolution of degrees without discussion, 3; Practical knowledge of the working of mines, 10. Grand total 50.

In order to be able to follow the courses of the school profitably and without difficulty, it is essential for candidates to have a good elementary knowledge of the mathematical sciences as above.

(3) SCHOOL OF CANDIDATES FOR HIGHER POSITIONS IN MINES, ST. ETIENNE.

In 1891 the difficulties and dangers of all kinds, which were increasing with the extension of the underground work and the deepening of the workings, induced the directors of mining companies of the St. Etienne basin to recognise the fact that the former "overman"—an ordinary workman with more experience and intelligence than the rest—no longer sufficed for the mission which he had to fulfil, and which had become so important. Therefore the mineworkers who belonged to the Committee of the Collieries of the Loire decided in 1892 to organise courses in order to give some of their workmen the general and special rudiments necessary to fill the functions of deputy-overman and overman.

Every mineworker who belongs to the Committee may send one workman to those courses for each 200,000 tons or fraction of 200,000 tons extracted annually. Those mineworkers who are not on the Colliers' Committee may ask to have their workmen admitted.

The courses last for one year, from November 1st to September 1st. The instruction is given in common every day from 3 to 6 p.m. The pupils spend the morning at work in their respective workings. They receive 5 francs for every day they are present at work and at the courses.

The knowledge required for admission comprises ordinary reading, writing, the practice of numeration, the four rules of arithmetic, and the metric system. Candidates must have worked for at least two years in a mine, and have completed their military service or have been exempted from it.

The instruction comprises: arithmetic 30 lessons, geometry 30, mechanics 10, physics 10, chemistry 10, working of mines 50, accounting 10, elements of laying out plans 10, thorough and detailed study of the laws relating to the safety of mines 20.

The school has been in regular operation since 1892, with an average attendance of from 16 to 18 pupils a year. It has given the best results from the point of view of the operation of workings and the safety of the workmen.

CHAPTER LXXII: SCHOOLS FOR FISHERMEN.

SECTION 1: INTRODUCTORY.

The fishery interests of Canada are important, not only because of the annual value of the catch and of the by-products, but because of the large number of men employed in them and of the population depending upon revenues from them. As illustrative of this, the following quotation is made from the testimony before the Commission of Mr. John Sinclair, M.P., and at that time Chairman of the Parliamentary Committee on Fisheries.

No system of Technical Education in Nova Scotia would be complete if it did not deal in some way with the Fishery industry which annually produces some eight millions. Nova Scotia stands first in all the Provinces of Canada as a fishing Province employing about 25,000 men, who represent 125,000, or about a quarter of the population of the Province. The fishermen are scattered all along the coast in villages on the Atlantic, the Gulf, and the Bay of Fundy. The business has changed of late years by the introduction of motor boats, and it is necessary that fishermen should understand the machinery of them, and also build their own boats, as well as market and pack their catch.

That there is great room for improvement, and need of improvement, in the way in which the curing and other preparation of fish for the market, is carried on, is made evident by the testimony before the Commission of Mr. Howard H. Smith of Halifax. The following are taken from his statements.

"The Government should collect and distribute more intelligent information with regard to habits and movements of mackerel, herrings, cod, etc. The prevailing winds, currents, and temperature of the water all affect the bait fishes, and govern the movements of the food fishes. Our fishermen are quite ignorant of the known fact that fish are only obtainable in water of a certain known temperature, and that it is wasting time to try for them otherwise.

"The Norwegian Government takes a fatherly interest in the industry there and by technical education and practical demonstration secures best results for its men. Norwegians never think of setting nets for mackerel, herring, etc., without testing the temperature of the water. They split their pickled fish a few hours after capture, and wash it in running water, thereby attracting all blood, and making the flesh perfectly white; then pack immediately in export packages, keeping the original pickle on the fish and conserving its pristine flavor. Result:—Norway Mackerel commands 100 per cent more money than equally fat and exactly similar (out of the water) Nova Scotia cure.

"Our fishermen put mackerel in puncheons to soak in bloody water, and pack weeks afterwards, losing the entire flavor of the fish. They *economize* by buying a cheap barrel which will not hold pickle. Result:—rusty, discolored fish, worth $6 a barrel instead of $15. It sounds strange, but is absolutely true.

"Listen to this also. A Lunenburg Banker will wash 1,000 qtls. of green fish in the same water, in order to save a few barrels of refuse for fertilizing:—value 50c. per bbl., total, $2.50; and deteriorate value of catch 50c. per quintal, total, $500; nett loss, $497.50. I can prove the absolute truth of this happening time and again. The old fishermen refuse to change their antiquated methods; the Government will have to educate the young by training several brainy, enthusiastic young men who will devote their time to teaching up-to-date methods to the fishermen and their children."

The same question, as applied to another kind of fish, was touched upon in the testimony of Dr. Edward E. Prince, Dominion Commissioner of Fisheries. In reference to herrring he said that several schemes had been attempted by the Government for the improvement of the curing and packing of them.

"One was to improve the salt sea herring of Canada, which packed in barrels brought only $3 or $4 a barrel while Scotch cured herring realised from $10 to $15 a barrel. When the question was put as to why Canadian herring were so low in price and so little esteemed, it was said that they were inferior fish and that our Canadian herring are not equal to Scotch herring when in the sea; that the fresh Scotch herring is a better fish. On my suggestion to the Minister of Marine and Fisheries, it was arranged to bring out an expert curer and cooper to make barrels, and six or eight girl curers who gut the herring—what we call "gutters" in Scotland—and they were stationed at Canso and down at Clark's Harbour. They also went out to B.C. and different points. They fixed up a small curing establishment and put up herring. A great many fishermen went there and saw this, and the result of the experiment was that herring quite equal to any cured herring in the world were produced out of our Canadian herring. Good barrels of herring were put up and shipped away to New York, some to St. Petersburg, etc."

SECTION 2: SOME CONCLUSIONS.

From the testimony submitted to the Commission, the needs of those directly engaged in fisheries appear to be of two kinds. One is connected with the catching, curing, packing and marketing of fish, and the other with the managing of engines or other machinery used in modern vessels and having sufficient knowledge of navigation.

The testimony of Professor Prince sets forth with considerable fulness the situation and needs in Canada and how they might be met. It also indicates something of what has been done in other countries.

The statement from Dr. T. Wemyss Fulton of Aberdeen describes what is being done in other countries, and presents some valuable suggestions as to lines of work that might be taken up, particularly in connection with schools and school courses.

The Commission is of opinion that, in the interests of the fishermen and the fisheries of Canada, further improvements and extensions of what is at present being done should be made by the following means:—

1. The issuing of simple and well illustrated Bulletins for the service of fishermen, similar in plan to those issued by the Experimental Farms and Agricultural Colleges.

2. The employment of Travelling Instructors to give short courses of demonstrations suitable for fishermen at centres easily accessible to them.

3. The provision of Short Courses of from one to two weeks' duration similar to those which are described as being given at Piel, near Barrow-in Furness, England, and at Aberdeen, Scotland.

4. The inclusion of Nature Study, in connection with marine life and fishing and some suitable practical work for the pupils in the Elementary and Secondary Schools in fishing communities.

5. The provision of Middle Winter Schools for fishermen having courses of instruction of two kinds, one kind dealing chiefly with the life and habits of fish, methods of catching, curing, packing and marketing; the other kind dealing with matters of navigation, and including courses of instruction in the use of engines, machinery and mechanical plant used in the industry.

6. The establishment of one or more Central Schools (*a*) for the Maritime Provinces, (*b*) for the St. Lawrence, (*c*) for the Great Lakes, (*d*) for the Pacific Coast, to provide courses of instruction similar to the Winter Schools, but more advanced in character.

After a time one or more of these Central Schools might provide the highest forms of scientific instruction for those who would be required as technical experts. Either the Winter Schools or these Central Schools, if located near a fish hatchery, could be used for the technical and scientific instruction of hatchery officers.

SECTION 3: STATEMENT BY DR. EDWARD E. PRINCE.

The Chairman of the Commission:

DR. PRINCE has been in charge of the scientific and some other branches of the Fisheries Department for nearly 20 years. During that time he has become personally familiar with the conditions under which men follow fishing, and also with the conditions which make for the conservation of the fishery resources. He has also knowledge of the legislation and regulations which have been enacted towards that end. He knows of the assistance offered to the fishermen in opportunities for training or guidance as to how best to catch, cure, or market fish. In Canada we have been rather meagre in the provision we have offered to fishermen in these three respects, but what we have done can be stated better by Dr. Prince than by any other man in Canada.

EDWARD E. PRINCE, Dominion Commissioner of Fisheries: I may state my past relation to the fisheries both in this country and in Britain to indicate to you in what particular directions it seems to me Technical Education might benefit the fishermen and their industries. I speak with some knowledge of this subject, because I was a scientific investigator in the early days of sea fisheries investigation. I am not claiming too much when I say that I probably was one of the pioneers in this work. There are a great many most important facts in regard to fish life, especially in the sea, which came to my knowledge in the course of the investigations carried on about 30 years ago, chiefly in Scotland, and also in England. One important fact which came to my notice, which had really not been known before, either to fishermen or scientific men, was that all the most important food-fishes in the sea, instead of depositing their eggs on the bottom of the sea—as most fishermen believed and the general public still believe—deposit eggs which float near the surface of the sea. That was so important a fact, and so contrary to the belief of fishermen and the public, that the scientific men who first announced it were denounced very strongly, and one distinguished scientific friend of mine had his effigy publicly burnt by the fishermen for announcing that fish spawn floated. That is all ancient history now, and the fishermen have adopted the views of experts on this matter—that with the exception of the herring, all the food-fish in the sea have floating eggs. I instance that to show how much need there was for accurate information in regard to fish life in the sea.

Then I had some experience in regard to Technical Instruction, because I think I was the first to give some lectures to fishermen along the Scottish coast at the suggestion of the late Lord Tweedmouth, who was the member for Berwickshire in the British House of Commons. He had a lot of fishermen in his constituency, and he arranged with some of the County Councils for lectures to them. The object was to inform fishermen as to the most accurate information which had been obtained in regard to fish life, the habits, the structure of fishes, and so on. The structure of the fish is of some interest to fishermen because in curing fish the fishermen often leave what is called a streak of blood below the backbone of the fish. That streak of blood is really a very important organ; it is the kidney of the fish, and when decayed, it is perhaps the most offensive organ in the body, and being left there, it taints and ruins the cured fish. Technical Education on this point would stimulate fishermen to see that fish were properly cleaned. Many other little facts of that kind would be of value for the information of fishermen.

When I came to this country, Sir Hibbert Tupper was Minister of Marine and Fisheries, and he laid stress on the importance of imparting that kind of instruction to fishermen along the sea coast; but I soon found that the most pressing duties expected from me were those of administration, so that I soon became the head fisheries official in the Department, and had largely administrative duties, and any connection I had with the scientific or technical side was during the time which I could spare from pressing duties in the Department.

I found that fishermen were a very peculiar class among whom to carry on work of technical instruction. They are a class to themselves and are isolated and largely take the view that only a man who has been brought up in a fishing boat can know much about fish and fishing; so that those who address fishermen with a view to instructing them have to combat this strong prejudice. They have a very poor opinion of educated or expert information or knowledge.

After I came to Canada, one very important attempt was made in England in the University of Liverpool, and also in the Isle of Man, when Professor Herdman instituted a course of lectures for fishermen. He got a grant from the County Council in Lancashire of about $1,500 in a year for that scheme. When there was a Royal Commission on Fisheries Investigation in London in October, 1909, Dr. J. T. Jenkins, who was secretary of the Lancashire Fisheries Council, when asked about the result of these lectures, said "We got the fishermen to come to the classes and see the results of destroying immature fish, for example, and when they leave the classes they lecture to their own fellows about the subjects they have heard discussed in the lectures."

Professor Herdman and others had also been called before the Committee of the House of Commons on the Fisheries of the United Kingdom in 1907. Mr. C. P. Ogilvie, who was a member of the Sussex Board of Fishery Conservators, said that Technical Education for fishermen was desirable all along the coast, and that he would willingly give up time to help in that way, the object being to get fishermen interested in fishery investigation, and what it is doing. At present they have no interest; they do not like Government arrangements; but if interested they would co-operate. The lectures given were with a view to gathering information in the direction that was wanted in the future. The witness said he did not think the fishermen could be instructed in the direction of making them more expert, because they are tremendously conservative; they go on year after year, and will not introduce a new net or anything else until they are assured that it is going to be a success. Professor Herdman in his evidence laid stress on impressing the fishermen with the idea of returning little fishes to the sea, and he thought that would result from teaching them the life history of fishes, and that they would be inclined to stop that great waste of fish which has been going on. He said he wished the fishermen to understand what instruments like the microscope were and what such instruments accomplished in showing the nature of a fish's eggs. He said that one day in the course of the lectures they examined the egg of a fish and the young fish inside the egg showing where the egg is found and what the young fish is like. In that way they got the fishermen to appreciate the value of scientific work and to agree with their conclusions. In this way he hoped to gain their confidence and get them to help in carrying on further observations and to take the necessary steps to avoid waste of fish life in the sea. The instruction was a series of demonstrations connected with practical advice based on these demonstrations, and the men see everything for themselves and are not merely lectured.

Dealing with what may be termed the less scientific side of the matter, there have been some very practical steps taken in respect to trying to make fishermen more expert in their calling by taking young fisher boys and instructing them in the different kinds of bait they can utilise and different methods of fishing, etc. Perhaps the most important institution in that respect was the Baltimore Fishery School, which a Roman Catholic priest, Father Davis, founded on the west coast of Ireland. Baroness Burdett Coutts aided this fishery school by grants of money. I fear very much that though Father Davis accomplished some good work, the results were rather disappointing and that the fishermen in Ireland did not take up very generally the instruction given in that school.

In France over half a century ago, the great Coste, a very important scientific investigator in fishery matters, gave technical instruction to the fishermen, but there was no national system of Technical Education so far as I know.

In Germany there have been a number of experts who have laid themselves out for instructing and training men in regard to fish culture and expanding the fishery resources by utilising ponds and streams and that kind of thing. That has been largely carried on in Germany and Austria and to some extent in Italy, where the fresh-water fisheries have been of chief importance; a fishery school exists at Venice, and lectures on fish culture are given in Rome, Milan, and Messina. But with regard to sea fisheries I do not think much very has been done.

Q.—Can you suggest any lines whereby courses of instruction could be made available to Canadian fishermen for their benefit?

In the early days of my connection with the Department of Marine and Fisheries, Sir Hibbert Tupper wished to arrange for lectures to fishermen and the public on these very matters of fish culture and the development of fishery resources; but the only way in which I have been able to carry out that is by giving at random a lecture here and there when I went down to Canso, Lunenburg, or other fishing towns; I may take lantern slides and give a lecture and thus interest the men. Apart from that, the only Technical Instruction I have been able to give is in the shape of reports appended to the Fisheries Report. I have published probably 20 or 30 of these reports; for instance, not long ago one of them was on the unutilized fishery resources of Canada, calling attention to the number of resources that are not utilized by our people.

In the U. S. there has been really no Technical Instruction to fishermen, so far as I know, in regard to curing or utilizing fish products; but there have been courses of instruction of a scientific nature on fish and fisheries at Wood's Hole, and at some other U. S. institutions. The Fisheries Bureau at Washington, though regarded by most people as a wonderful organization, carrying on its work on a very extensive and widespread scale, has really very limited lines of operation. It has absolutely no administrative and licensing or leasing duties; it does no active protective work; it is confined largely to the carrying on of hatcheries and of fish culture, and the publication of technical reports which are of great value, but which I do not think very largely reach the ordinary fishermen or fish people proper. They are appreciated by experts and by scientific men the world over; but, as compared with the Fisheries Department at Ottawa, its work is confined to one or two lines, while at Ottawa the Fisheries Department has 20 or 30 vast fields of work, especially in regard to licensing, fishing privileges and administration, the enforcement of fishery laws, prosecutions, and all that kind of thing, in regard to which the U. S. fisheries bureau is not concerned. The Boston School of Technology instructs in the utilization of fish products, oil, glue, manure, etc.

The most remarkable example of Technical Education in regard to fisheries is furnished by Japan. It has a very elaborate system. There is an Imperial Fisheries School at Tokio with five professors and four lecturers, 59 lecture rooms and living rooms, indeed quite an elaborate institution. There is also another school at Hokkaido, which includes some interesting departments. Apart from the museum and lecture rooms, it has a cannery for giving instruction in canning fish; a drier for instruction in drying fish; a glue plant for utilizing glue products; and a refrigeration department for showing how to preserve fish in cold storage. Japan really has done more than any other country in regard to that. It was founded largely through the National Fisheries Society of Japan, an organization begun in 1881 as a voluntary organization with not quite 500 members at the beginning, but with 5,000 members now. It has meetings for discussions, and the Government submits to this voluntary society topics for discussion among its members. It also provides lectures, exhibitions, demonstrations, etc., for its members, and with aid from the Minister of Agriculture it carries on the training of young men in catching and preserving fish and in fish culture. It sends commissioners to study the fisheries in other countries. We have had many of these Japanese visitors in Canada; one was here not long ago, Dr. Kitahara, and I saw him also in Scotland enquiring into the development of the fisheries and recent methods of capturing and handling fish. They have a systematic course in Japan, leading to a diploma. It is a three years' course, and the student graduates in one of three departments—practical fishing, the preservation and marketing of fish, and the preparation of fish oils, or in fish culture. Many of the fishermen in Japan take out the students in their fishing boats, and for this they receive a bounty from the Government. That seems to be quite a good scheme—giving a bounty to fishermen to take young students out to instruct them in the working methods of fishing.

In going over the statistics of these schools, I cannot see that they are really interesting the whole of the fishing population. Where you have only a few hundreds who are trained and educated, it seems a very small number to affect tens of thousands of fishermen, and I do not know that Japan has yet carried out an elaborate scheme for trying to teach the whole of the fishing population.

Q.—How long has it been in operation?

A.—Since 1891 or a little later. I have figures for 10 years back. They must have been going on with that work for 20 years and they publish a journal of the Fisheries Society of Japan subsidized and circulated by the Government, and printed partly in English and partly in Japanese.

Q.—How long do these students attend that institute?

A.—It has a three years' course. I do not think they have any short courses at the two great schools I speak of. The men are supposed to go through a thorough course of instruction. I think it is open to anybody to go there, and then when they get this instruction, they become managers of canneries and actually enter into the industry. It really trains them for becoming directors.

Q.—What was the attendance?

A.—Ten years ago, 72 passed in fishing in one year. About 100 passed in the technical practical instruction and about 34 in the year in fish hatching and fish culture. That would mean six or seven hundred in attendance.

Q.—Would you call that an institution for higher instruction?

A.—Yes. That does not claim to teach the lower class of fishermen at all. In B.C. we have a large number of Japanese fishermen—three or four thousand of them—and these men have not been trained in that institute, but I think many of them have been directly affected by those instructors, because they come over very well qualified to carry on fishing and they are generally regarded as more expert fishermen than our own white fishermen.

In regard to other fishermen that I know, such as Scotch and Canadian, generally they are not very ready to receive instruction and you have to overcome that opposition with the practical fishermen of which I have spoken. This has come up very prominently in many ways. I have had several schemes attempted by the Government. One was to improve the salt sea herring of Canada, which packed in barrels brought only $3 or $4 a barrel while Scotch cured herring realised from $10 to $15 a barrel. When the question was put as to why Canadian herring were so low in price and so little esteemed, it was said that they were inferior fish and that our Canadian herring are not equal to Scotch herring when in the sea; that the fresh Scotch herring is a better fish. On my suggestion to the Minister of Marine & Fisheries, it was arranged to bring out an expert curer and cooper to make barrels, and six or eight girl curers who gut the herring—what we call "gutters" in Scotland—and they were stationed at Canso and down at Clark's Harbour. They also went out to B.C. and different points. They fixed up a small curing station and put up herring. A great many fishermen went there, and saw this, and the result of the experiment was that herring quite equal to any cured herrring in the world were produced out of our Canadian herring. Good barrels of herring were put up and shipped away to New York, some to St. Petersburg, etc.

Part of our scheme was to adopt the Scotch method of following the schools of herring and capturing them at all times. In Scotland they do not wait for the herring to come close in-shore, as we do in Canada, and only catch them when they come to the nets. The Scotsmen go out after the herring,—hunt for them as it were—and after long years of experience, they know pretty well where they will meet the schools of herring, but in Canada that has still to be found out. Our fishermen have very little notion about the movements of the schools of herring at 20 or 40 miles from shore. They fix up their traps and apparatus close inshore and wait till the fish come in. The point is this; I consider our fishermen are quite expert, and perhaps some instruction as to the habits and structure of fish, even though it does not bear directly upon their actual work, would be of great benefit; that knowledge is always a good thing to have, and our fishermen really have not that knowledge at present; they have very little idea as to the conditions of fish life and the structure and habits of fish, because they have not the time and means for getting that information.

As to other practical methods of handling fish, the Dominion Government, at my suggestion, built a Whitman Patent Drier on Prince Edward Island, the object of it being to dry fish in all kinds of weather. Ordinarily fish can only be dried with favorable weather conditions; in damp and foggy weather fish will not dry out on the rocks, or on the flakes, and the consequence is that many fish spoil and inferior fish are produced by bad weather conditions. The fish drier really circulates heated dry air among the fish as they hang in the chambers. It is an admirable method of curing fish especially if already partially dried on flakes. However, it has not resulted in the adoption of fish drying sheds anywhere else. It seems when the Government started this institution, all the fishermen thought they had a right to take their fish there to be dried and they wanted the Government to do the drying for them whereas it was intended as an object-lesson only.

We have also made some attempt to ensure a permanent supply of unsalted frozen bait for fishermen on the Atlantic coast. A scheme of bait freezers was started some time ago and a Parliamentary vote provided in 1900, but they did not succeed very well. The idea of the Fisheries Department was to start these small freezers and place them in the hands of small committees of fishermen, but fishermen are not good business men, and in almost every case the freezer was mismanaged; something happened, and it caused a great deal of trouble. Not only so, but the bait when frozen was regarded as inferior bait. I admit that the freezers in the hands of committees of fishermen were not successful; they proved a failure on account of mismanagement. For instance, fishermen relied on each other for securing their supply of ice, and there was no ice provided, while in some cases when the fishermen came in, they thought somebody else had put in the ice, and there was a lot of mismanagement. At the biological stations I put to the test the statement that frozen bait is not as good as fresh bait. Professor Knight, of Queen's University—who has done a great deal of work at our biological station gratis—carried on in Gaspé a series of experiments with frozen and fresh bait, and found that frozen bait was almost as good, and in many cases better because firmer and tougher than fresh bait; and the fishermen who went out with Prof. Knight in the boat had to admit that hooks baited with frozen bait often made a better catch than the fresh bait in a strong tidal current. There were some cases where the fresh bait made a better catch than the frozen bait, but the conclusion was that the frozen bait was cheaper and about as good as the fresh bait, and therefore fishermen need not suffer from the lack of bait if they could only rely upon a supply from the freezers. When the scheme was started, I had had experience with what we call mussel bait in Scotland, and I thought if only mussel societies there could be got up among the fishermen to supply themselves with bait, instead of paying some company high prices for bait, it would be a great advantage to them. A number of societies were founded, but there was only one case of success. They were all a failure on account of lack of business ability and of quarrels that occurred among the fishermen; they cannot run these things and someone else had to come in and run them for them. I anticipated there might be trouble among the Canadian fishermen; I said so in some of my reports to Sir Louis Davies, who was then Minister of Fisheries (1899) and I said it might come to this, that the bait freezers would have to be managed by officers of the Department.

About 10 or 12 years ago a scheme of the highest importance was approved by the Government for founding stations for investigating fish life and marine biology, and at St. Andrews, N.B., a laboratory on a scow was stationed at a selected point and then moved to other points, and gradually progressed around from St. Andrews in the Bay of Fundy to Canso and around to Prince Edward Island, and then to Gaspé and lastly to the north shore of the Gulf of St. Lawrence. In each place a number of biologists from the universities came there without salary or fee to carry on researches such as they could conduct in regard to fishes and fish life. The Government merely paid the travelling expenses of these people, and contributed also to their board. We have produced two publications and the third, which is now in hand, will embrace quite a large and elaborate series of scientific papers bearing on all kinds of subjects more or less relating to the fisheries, with a record of the biological station on the Atlantic Coast and a similar station founded more recently on the Pacific Coast at Nanaimo on Vancouver Island, and a station on the Great Lakes and Georgian Bay. These have been quite successful, considering that they have practically no salaried workers and that you cannot get systematic and fruitful work in this field of investigation unless you have adequate salaries paid to workers. Young men in our universities cannot afford to spend some years in research merely for the fame or name of the thing; they like to be getting some salary, and we have no fund for salaries for those men to carry on scientific work; hence, there have been no salaries paid except to the curator of the station, who is usually a distinguished student of McGill or Toronto University, and he is paid because he does a lot of routine work, attends to the other workers, etc. I imagine that if some kind of scholarships could be provided, this biological work would be much more effective, as some young men would then be able to devote themselves to this work.

The Biological Board is not really encouraging technical instruction to fishermen or other people, because the research men do not like a bustle about the place, and to be crowded or disturbed by visitors. It has been really a research station, and we have had some of the very ablest workers in Canada down there, distinguished scientific men like Professors McCallum, and Ramsay Wright of Toronto, Professor Knight of Queen's, and Prof. McBride of McGill. There has been no reward except purely scientific results.

Q.—How many fish hatcheries are there?

A.—About 40 from ocean to ocean.

Q.—How are they administered; that is, are the men in charge technically trained?

A.—They were for a time under my charge, and I found that the officers in charge of these hatcheries were largely men who had been trained under a self-taught man, Mr. Samuel Wilmot, who was an enthusiast and a very rare type of man. He had no scientific knowledge and many things that he did appeared to a scientific man a little mistaken, but he was an enthusiast and he certainly had a lot of men taken from farms and elsewhere, who became enthusiasts also, and they were the best officers we had. Most of them are old men now, and are dropping out. Mr. Wilmot's staff was one such as is very rarely secured. As they dropped out, of course appointments were made of various kinds, and not always satisfactory to the service, and at present quite a number of hatcheries are no doubt in the hands of men who are really learning the business, which is a very serious disadvantage. We have no actual training of fish culture officers at all.

Q.—Is there any reason why there should not be a school or other means for the training of people to take charge; that is a form of technical instruction suited to their needs and the needs of the public service?

A.—I consider that the training of hatchery officers is really one of the most essential things possible; but of course appointments are made by Government, of an urgent nature, I suppose, and the men who are appointed have not time or inclination to take any training at all. Anybody can see that such delicate processes as breeding young fish and taking care of them is a scientific matter.

Q.—Having a man of average intelligence, with probably a High School general education, what institutional course would be necessary to enable such a man to be competent and qualified to be a fish hatchery officer and manager?

A.—I think any intelligent man could be sent to a good hatchery and learn the practical process; and if some means were taken to give technical instruction also a man could be trained I think in 9 or 10 months to be qualified to take charge. I say 9 or 10 months, because that would cover the taking of the eggs and the incubation of them.

Q.—In the organization of a hatchery, would it be difficult to have one hatchery expert and retain two or three or four such learners?

A.—It would be quite easy for half a dozen learners to be accommodated in a hatchery.

Q.—Would they be able to give sufficient service to make their services worth any wages?

A.—No; they would be required to do work for a very low rate of pay; it would not really be a salary. They could get their living.

Q.—Would the scientific instruction necessary consume a great deal of time, or could a good deal be done by a course of reading and occasional visits? For instance, if there were four or five hatcheries with a number of learners in each, could a travelling scientific and practical instructor meet the situation?

A.—Yes, that would be quite possible. He could travel round from one to the other. It could not be done solely by reading books. The feeling often in our hatcheries is that there are so few of our officers who realise what an ovum or egg really is; and Members of Parliament, who speak about them, speak of them as they would of peas or vegetables, and especially the public, forgetting that ova and young fish are more in the nature of young, tender infants that have to be carefully treated and cared for. In regard to planting, the same applies—if you placed a whole lot of tender children in a frozen waste, people would think it very foolish. People often speak as though young fish could be planted out in any place where a Member of Parliament wishes. The wonder is that fish culture is doing such good service. The fact is that our hatcheries are doing very good work. I do not think the U.S. has any more zealous officers or any better. I think that these early officers trained under Mr. Wilmot were quite equal and ahead of most of the U.S. officers. I do not think we have anything to learn from the U.S. in regard to the actual practical operation of a hatchery.

I have just returned from the great Fisheries Congress at Rome and looking over the program again, I am struck by the fact that there is not any such thing mentioned in that International Congress as instruction to fishermen, or any training in fishing at all. It is a matter to which very little attention has been given in most countries. I noticed the same at the previous Congress in Washington and St. Petersburg; there were no papers on the training of fishermen or of fish culture officers. The only paper on training hatchery officers was one I read at the Washington Fishery Congress, September 24, 1908. In other words, it seems to be taken for granted that the fisherman knows the practical part of his business.

Q.—Is there anything in the hunting of fish to be learned from testing temperatures of water—getting plotted areas as to where certain temperatures might prevail at certain periods?

A.—The attempt is being made to plot out the North Sea in that way. I am prepared to await the official results of the work that is going on. In the meantime I am rather of the opinion that there is not enough regularity in the conditions of the sea to make it a practically reliable method of going about the fishing. I know that in Norway some years ago it was said a man could find out the schools of fish (herring) by testing the temperature. Some experiments in regard to temperatures carried on in the Gulf of St. Lawrence show that there is quite a good deal of erratic character about some of the temperatures and I fancy the movements of the fish will be a little erratic on that account, and that so far as we know at present the only reliable grounds for expecting fish in a certain locality is that the fish are accustomed to school in certain places for feeding or for spawning and that may involve conditions of temperature there; but when the fish are about to spawn on the Labrador coast, for instance, we know where fish gather for spawning, and there the fishermen make their good catches. On Prince Edward Island fish come for spawning, and they also feed on the small life at the surface of the sea. These two facts,—spawning and feeding—depend on conditions of temperature; but I regard the fishermen's calling as depending rather upon his observing whether certain food is about, than testing it by temperatures. For instance, on the Labrador coast, when the schools of capelin come in, then the fishermen operate because where the capelin are, the cod follow. A good deal of scientific work has been done and conclusions have been drawn which I think are rather premature. One Danish observer has told us how much per cubic mile of fish you may expect in the sea, and that kind of thing, which cannot possibly in the long run be borne out. I have been reading over the reports of the International North Sea Fish Investigations of the most elaborate nature, but I consider that perhaps the fisheries will not receive the benefit from some of these investigations that is anticipated by many. I consider that fishery research in the sea and practical fisheries are two separate departments, and one may or may not give light to the other; it may relate to facts which are of interest in themselves but without interest to the fishermen practically.

Q.—There is another field of investigation, in regard to the protection or improvement or extension of existing oyster beds and also as to the feasibility of seeding down or otherwise laying out oyster beds in areas not at present occupied profitably with that fish; is there any need for technical instruction in connection with that?

A.—In the U.S. they have really solved that problem. Chesapeake Bay is a model of what can be done in encouraging culture. We have Mr. Ernest Kemp, who was brought out from Whitstable, England, many years ago to improve our oyster fisheries in Canada, and he has been a hard-working officer and has done a great deal to clean various beds, and work upon them and prepare areas in certain localities, but the result of his labors has been largely nullified by this fact, that oyster beds can not be leased to private parties, and without such leases it is not worth their while to spend money and time upon them, and oyster culture can never be carried on. The cultivation of public oyster beds which are open to everybody that likes to fish, renders hopeless any attempt to improve the oysters. That has been the initial difficulty in Canada—the public claim that they have a right to these beds, and the Government do not appear yet to have taken the matter adequately in hand.

The beds produce some values, but 10 times or 100 times more might be obtained, provided they were looked after properly.

There is another disastrous feature—the mussel mud digging. Farmers all claim that they can dig fertilising material from the beds and a great many of the farmers in P. E. I. claim that as a right. Still, I think that the oyster industry is of such tremendous value and importance that the question of taking over these areas and of getting over the difficulty of alleged mussel mud rights and dividing the beds out as much as possible among the residents along the shore and giving them leased areas, is a solution which will have to be reached some day. There is no other solution for it. If the Government could show how much benefit it was going to be to the residents, they would get their support in the matter and an increased supply of oysters in Canada would be a public gain, especially if lower prices followed.

When I was first connected with the Fisheries Department, we thought the Dominion had property rights to these beds and we issued leases for 9 years. At the end of 9 years they terminated. These leases worked very well. There is no doubt the people spent money and time on these areas which they had leased for 9 years. The oyster reaches its maturity in three years, so that a man will have three harvests before his lease expires. When it was found that the Dominion Government had no well-defined rights in the matter, that all it could do was to make regulations for the Provinces to enforce, then the end came to any system of preservation of the beds. We have fishery laws now, a man cannot sell an oyster under a certain size and can only fish at certain seasons; and these regulations are good, but as in the case of the Shediac oyster bed, prepared during several years by Mr. Kemp, the Department's expert, at the conclusion of the period of preparation, the whole of the inhabitants went in and in three days undid the whole work of many years. They got oyster licenses. The Minister of Marine and Fisheries was passing through Shediac at the time and was aghast at seeing the immense number of barrels of oysters waiting to be shipped from Shediac. The Government, as a matter of fact, had prepared the harvest to be immediately utilized by the local people. If, on the other hand, that could have been leased after it had been prepared, and a fee paid upon it, there might have been nine or ten people interested in that lease, and they would not have destroyed the beds, but taken off a good proportion of oysters and kept the beds in good order for the future. These details are really administrative matters, but that is where the crux lies—the difficulty of encouraging cultivation where you cannot give an exclusive lease or right.

Q.—Has your Department taken any steps to instruct the fishermen in Navigation and aids to Navigation, etc.?

A.—Yes. There have been a number of courses given in various towns in the Maritime Provinces and on the Lakes, at Kingston and other places, under Capt. Demers, who had charge of instruction in nautical matters and navigation; a lot of apparatus was provided to illustrate these lectures, but I do not think they were as largely taken advantage of by the fishing population as was expected—I am speaking now without full official knowledge. The instruction in navigation and nautical matters was a distinct branch of work carried on for several years. I think it has been given up to some extent now.

Q.—We were told that the Provincial Department of Technical Education in Halifax were giving instruction to the fishermen in the use of gasoline engines as an adjunct to their sail-boats and also that the principles of a submarine telephone were being explained to some of these men; has your department ever taken any interest in bringing these things to the attention of the fishermen?

A.—No. I do not think that the Dominion Government Department has taken any interest in teaching the management of gasoline launches and those matters. Gasoline launches have been very largely adopted recently, but whether that was the result of Technical Instruction or not, I do not know.

SECTION 4: THE FISHERY BOARD FOR SCOTLAND.

The Commission had an interview with Mr. Angus Sutherland, Chairman of the Fishery Board for Scotland. From his statements, as well as the official reports of the Board, it is evident that the Fishery Board has been a powerful influence in the development of the fishery interests of Scotland and in bringing the industry to its present state of acknowledged superiority. In this connection it is more than interesting to observe that the Scottish Board, although considered everywhere as perhaps the most advanced and best organized body for public service in fishery affairs, is more than willing to learn from what other countries have done and are doing. At about the time of the Commission's visit, a Committee of Enquiry was appointed for the following purposes:—

The North Sea Fisheries.

The Secretary for Scotland has appointed the following gentlemen—

Mr. Angus Sutherland, Chairman of the Fishery Board for Scotland (chairman);

Mr. J. E. Sutherland, M.P., for Elgin Burghs;

Mr. H. M. Conacher, Scottish Office;

Dr. T. Wemyss Fulton, Scientific Superintendent to the Fishery Board; and,

Mr. James Moffatt, of the Scottish Education Department—

to be a Committee to inquire into and report upon,—

. The character and national importance of the inshore and deep-sea fisheries of Norway and other countries engaged in the North sea fisheries, and the efforts made for the development of the fishing and fish-curing industry in all branches including,—

(1) The systems of fishery administration, including the constitution and function of the local committees formed for this purpose in Norway, and of any similar organizations in the other countries;

(2) The facilities provided for research and for educating and training those engaged in these industries by the establishment of technical schools, museums, laboratories, classes, or other special facilities;

(3) The nature of the various means of capture employed, and the methods (including any use of State credit) by which fishermen obtain the necessary capital to maintain the efficiency of their vessels and equipment;

And to report in regard to each of the foregoing matters whether it would be advisable for similar action to be taken, with or without modifications, in the case of the Scottish fishing industry, and, if so, what means should be adopted.

SECTION 5: STATEMENT BY DR. T. WEMYSS FULTON.

The Commission had the advantage of "Conversation" with Dr. T. Wemyss Fulton, who in addition to being the Scientific Superintendent to the Fishery Board for Scotland is recognized as one of the leading authorities on fishery questions in Europe. The important points in the wide range of information furnished by Dr. Fulton are as follows:—

Fishery schools exist in practically all European maritime countries—France, Germany, Belgium, the Netherlands, Denmark, Norway, Sweden, Spain, while by far the best and most thoroughly organised are in Japan. Their scope is varied and in most cases they aim at the instruction of fishermen or those directly concerned with the fishery industry.

France.

Some years ago, with the concurrence of the Minister of Public Education, a course of instruction in fisheries and fish-culture was established in the primary schools along the coast—over 400 such courses being provided. This was in addition to the fishery schools proper, of which a dozen or more exist. Several of these are under the Société de l'Enseignement Professionnel et Technique de Pêche, a society which supervises fishery education, the establishment of fishery museums, conferences, exhibitions, etc. The program of a school is adapted to the requirements of the district in which it is situated, but always includes certain subjects prescribed by the Minister of Marine, as the navigation and landmarks, etc., of the district, the fitting up of rigging and fishing-gear, the principles of health and social economy, the methods of preserving fish, and fishery regulations.

Schools which receive the patronage of a Chamber of Commerce get a subvention from the Ministry. They are administered partly by local societies and partly by a constituted body. Those at Marseilles and Sables d'Olonne are municipal; those at Rochelle, d'Arcachon, Groix, and Phillippeville are under local societies, while at Fecamp and Dieppe they are under the Chambers of Commerce. At Boulogne-sur-mer the school is associated with the Station Aquicole (a government institution) and is attended by men from Dunkirk, Gravelines, etc., who are taught such subjects as navigation, fishing grounds, the methods of preserving fish, the use of fishing appliances, etc. An old government vessel is used as a floating school. Various researches on the application of science to fisheries are carried on. The Marseilles school has attached to it a most complete museum, containing models of fishing vessels, fishing gear of all kinds, and from various countries; models; photographs illustrating methods of fishing; charts and instruments used in navigation; collections of fish, crustacea, baits; and various fish products, as isinglass, manures, glues, as well as marine algae. Lectures and demonstrations are given.

Belgium.

Schools exist at Nieuport, Blankenberg and Ostend. The last named is most important, and possesses a "teaching vessel," where pupils are trained. There is also an experimental laboratory where various researches are made, as, for example, the barking or curing of nets, the best oils for preserving fish, etc.

The Netherlands.

The number of schools is increasing—as indeed is the case in most countries They now exist at Ijmuiden, (where the expenditure in 1908 was 8,393 florins and where there are two "school ships" lent by the Department of Marine), Vlaardingen, Maassluis, Scheveningen, Noordwijk, Enkhuisen, Marken, Volendam. The schools are attended, chiefly in the winter, by lads from 12 years old and upwards as well as by men.

The subjects taught are navigation, the determination of latitude and longitude, distances, courses, charts, the coasts and banks of the North Sea, fishing grounds, and some more purely fishery subjects.

A few years ago the Society for the Promotion of the Fisheries of the Netherlands petitioned that the government should so modify the law as to enable fishery instruction to be included in the primary schools at fishing places.

Norway.

Special attention is given by various local societies, which receive State aid, to fishery education, partly by schools or school-ships (Trondhjem) and partly by sending delegated fishermen to other districts or to foreign countries for instruction.

There are schools at Bodo, Vardo, Christianssund, and at some other places. Fishery museums have been established at Bergen, Bodo and Trondhjem, and at the experimental stations at Bergen and Trondhjem such subjects are investigated as the preservation of fish, fungoid growths on dried cod, the chemical changes in pickled fish, the production of oil, new kinds of tinned fish products, etc. There are competitions and prizes.

Sweden.

There is at least one fishery school in Bohuslan, chiefly to teach navigation in connection with the North Sea banks, and especially around the Shetlands.

Germany.

There are quite a number of schools under the Sea Fishery Association, a semi-official organization, partly on the North Sea coast and partly on the Baltic. The main instruction is in navigation, fishing grounds, methods, etc. The Association publishes annually an instructive "Almanac" for the use of fishermen; it is a volume containing a great deal of varied information. At Altona there is a large and beautifully arranged fishery museum, in which are shown among other things, models of the actual fishing operations. In Germany popular courses of lectures and demonstrations are often given in regard to fisheries, and include instruction as to the cooking of fish.

Japan.

It is in Japan that the greatest and best organized efforts are made in connection with fishery education. The chief institution is the Imperial Fisheries Institute (Susian Koshujio) at Tokyo. It aims at educating the young Japanese in everything pertaining to the fisheries, as well as in carrying on a great variety of investigations, not only on the natural history of fishes, but in the preparation and curing of fish, fish-culture, and, in short, on everything relating to the fisheries. A few years ago the government expended £17,000 ($85,000) for a new building for the Institute, which has several vessels and fishing boats attached to it. There are two lecture rooms for general use, and other lecture rooms and laboratories for pisciculture, chemistry, biology, fisheries technology, as well as museum, library, and cold storage rooms. There are three courses of study: (1) in connection with the department of fishing, (2) the department of pisciculture, (3) the department of fisheries technology. In the first the pupils receive a practical training in all the arts and methods of fishing; in the second, in the various processes of fish-culture; and in the third in the methods of preparing all kinds of fishes, shellfishes, seaweeds, etc., for the market.

There are about a dozen stations for fishery instruction in the neighbourhood of Tokyo—one, for example, to teach the methods of preserving, curing, and canning fish; another for the management of boats, gear, etc. The students from the schools and the lecturers visit various parts of the coast and arrange for instruction as required; usually two or three of them are in Scotland every summer.

England and Scotland.

Courses of instruction for fishermen are carried on at Aberdeen and at Lancashire, the former under the Fishery Board for Scotland, the latter under the Lancashire Sea Fisheries Committee. There is also a Lectureship at the

University of Aberdeen on the Scientific Study of Fishery Problems consisting of six lectures annually to the advanced students of Zoology, but open also to the public.

Courses for Schools.

The following scheme was suggested by Dr. Fulton as being suitable for fishery instruction in general schools in communities of fishing folk.

1. *Historical and Commercial.*

An historical introductory sketch might be given, which should include the relation of the fisheries to the settlements, etc., and be illustrated by maps and if possible by lantern slides, showing the countries from which the fishermen came, the length of the voyage, the reason for journeying so far in those early times for fish, the great abundance of cod fish, the demand in Catholic Europe for fish in Lent and on fasting days.

Then the great commerce in the products of the fisheries and what is brought in in return, the export of the staple product to foreign parts, chiefly consumed by the Latin races in Europe—Portugal, Italy, Spain—and in South America —Brazil—contrasting with the preference for pickled herrings among the Teutonic races and the Russians.

Cod: oil cod roes used for bait in the sardine fishery.

Herrings: frozen and pickled — chiefly to the United States, and West Indies.

Lobsters: chiefly to the United Kingdom and Europe.

Seals: oil and skins. Whale oil.

2. *The Fishery Industry.*

The situation of the fishing grounds.

Topography: depths, relation to currents, temperatures.

The fish caught: codfish, herring, lobsters, halibut, seals.

Methods of fishing: lines, trawls, hand-lines, baits, seines, traps, drift-nets. Otter-trawling (as by French). Sealing.

How the products are prepared for market: heading, splitting, salting, washing, drying, artificial drying for cod, smoking, pickling.

The scientific basis of fish-preservation: methods used, tinning oils, etc.

How put on the market: statistics of the fishery industry.

3. *The Natural History of Fish.*

Simple lessons on the structure of fishes, say, a codfish or a flounder (or halibut); the osseous system; the blood, heart and gills; circulation; the breathing of fishes by the gills; composition of the air; air dissolved in water (may be accompanied by simple experiments); the fins.

Generation of fishes: viviparous forms, ovoviviparous, oviparous. The soft roe or milt; the hard roe or ovaries. The spawning season; the spawning places. The eggs—various kinds—demersal or bottom, adhesive, as herring; pelagic or floating, as cod, halibut and most commercial fishes. Fishes that guard their eggs—by carrying them, as in mouth, by constructing nests, usually the male; examples. The fertilization of the egg-development of the embryonic fish; influence of temperature on the rate of development, duration, hatching. General characters of larval fishes, the transformation of flatfishes.

Fecundity of fishes: cod, ling, turbot, eel, many of which produce millions; herring, 20,000 to 30,000. Great destruction in nature.

The food of fishes: the minute floating life in the sea (plankton); herring lives on this chiefly; cod on crustacea and fish; ling, turbot, brill, John Dory, etc., almost only on fish. Primary source of food is plant life, especially the minute floating plants (phytoplankton); invertebrates and larval forms live on this and fishes on them in turn. Vegetable feeders very rare.

The growth of fishes: how investigated; keeping in tanks, marking experiments, study of hard structures, "rings" in ear-bones, scales and bones, as vertebræ, caused by intermittent growth, as with trees. Rate of growth, influence of temperature, growth slow or arrested in winter, rapid in summer.

Age of fishes: herrings may reach 15 years and over; also cod, plaice, 25 years. Size and age at sexual maturity varies in different species and in the two sexes. Immature or undersized fish and their protection. Protection of breeding fishes.

The migrations of fishes: different kinds, irregular wanderings and definite migrations, relation to feeding and reproduction, certain examples of known migrations—anchovy in a season migrates over 1,000 miles in Europe; salmon in rivers of Alaska and British Columbia; eels migrate to the depths of Atlantic; determination by marking experiments; cod in America, Iceland, etc; plaice in North Sea; movement against currents, reasons for; rate of movement determined in certain cases; migration of crabs and lobsters—may go 100 miles and more.

4. *Fishery Legislation and Regulation.*

The problems of overfishing and impoverishment of grounds; importance of scientific statistics. The reasons for close-times. The action of certain apparatus in relation to immature or breeding fishes—seines, otter-trawls, lines, trap-nets. All regulation should be based on knowledge of fishes. The question of pisciculture—fishes, shell-fish.

SECTION 6: SCHOOLS FOR FISHERMEN IN ENGLAND.

It has been already mentioned elsewhere in this Report that the Commission had the advantage of being accompanied during part of its enquiries in Europe by Professor Frederic H. Sexton, Director of Technical Education and Principal of the Technical College of Nova Scotia. Professor Sexton, in company with members of the Commission, and also by himself, paid special attention to the provisions for the education of miners and fishermen. He made a full report, as published in the Annual Report of the Superintendent of Education for Nova Scotia (1911.).

As the portion of that Report on *Schools for Fishermen*, which extends to 56 pages, contains in well arranged form substantially the information gathered by the Commission by visits to the schools described, supplemented by enquiries and investigations carried on by Professor Sexton, the Commission, with his consent, avails itself of the arrangement of some of the material from official sources as prepared by him.

Apprenticeship is Disappearing.

The system of regular apprenticeship of boys in the fishing industry has almost altogether disappeared. It is more or less of an unwritten law among trawlers that boys will not be taken on until they are 16 years of age. As is often the case in all industrial centres the boys leave school at the age of 14 years and engage in casual, unskilled labor for the intervening two years to the detriment of the modicum of knowledge they have already acquired and their habits of thrift and industry. In the fish markets they do all sorts of odd jobs on "the stage," as the fish wharf is called. In Hull there are between 80 and 100 boys under 16 who are given intermittent employment on "the stage" between the hours of 7 in the forenoon, and 1 o'clock. very few of whom will attend a technical school for fishermen in the afternoon or evening. The apprentice is supposed to serve a period of 5 years (from 16 to 21). He gets no wage during that period, but is supplied with a good uniform and gets a little spending money each time he returns from a voyage. The attention which he receives from the officers or crew on board in the way of instruction is generally of an indifferent character.

Fifteen Technical Schools.

Following is a list of the communities in England where some instruction is given in navigation, Seamanship, Netmaking and Mending or some other subject pertaining to the fishing industry. Hull, Grimsby, Kings Lynn, Winterton, and Wheatacre in Norfolk Co.; three schools in Great Yarmouth; Lowestoft, Oulton Road, Upper Kessingland, and Carlton Colville in East Suffolk Co.; Fleetwood, Morecambe, and the Piel Marine Laboratory at Barrow-in-Furness.

At the last mentioned place lectures and laboratory demonstrations, as well as instruction in navigation, are given to fishermen in a short course lasting two weeks and taking the full time every day. This is the only place in England where they give courses dealing with the life history of fish. In the earlier days of the school at Hull, the head of the school attempted something more or less elaborate along this line, but dropped it after a fair trial because he could not find any interest in this subject among his pupils. The two schools at Hull and Grimsby are by far the most important in England. The school at Grimsby will be described more or less in detail.

(1) GRIMSBY TECHNICAL SCHOOL FOR FISHERMEN.

Grimsby, the greatest fishing port in the world, is a city of about 100,000 people and almost entirely dependent on the fishing industry. There are about 5,000 men engaged in trawling who are residents of Grimsby, a somewhat greater number than reside at Hull. The active development of the fishing industry here is due in a great measure to the enterprise of the Great Central Railway. The railway owns the fish docks, the locks, the market lines of steamers to the different ports of Hamburg, Antwerp, etc., and thus completely controls the situation.

The apprenticeship system obtains at Grimsby, and there are about 150 apprentices on the trawlers sailing from Grimsby. Seventy per cent. of these attend the technical school for fishermen, but are under no compulsion to do so.

The school was opened in 1907 under the Grimsby Education Committee.

Equipment.

The equipment is simple and efficient for the work, but meagre compared with some other Navigation Schools visited in Scotland and on the Continent. The principal of the school has developed some very ingenious apparatus to illustrate some of the more difficult parts of the instruction. Among these was an annunciator board with different colored spots and connecting electric circuits so that any combination of ship's lights could be thrown on the board in order that the student who stood at the other end of the table with a small steering wheel on a model boat could learn the proper duties of steersman.

Courses.

According to the leaflet issued by the school the courses are given every week day except Saturday from 2 p.m. to 9 p.m. and are as follows:—Use of Sextant and Adjustments. Use of Charts. Logarithms. Traverse Sailing. Parallel Sailing. Current Sailing. Mercator's Sailing. Latitude by Observation of Sun, Moon and Star. Longitude by Observation of Sun or Star. Position by Sumner's Method. Position by Johnston's Method. Latitude by Ex-Meridian Altitudes. Compass Correcting by Amplitude and Azimuth. Tides and Reductions of Soundings. Ocean Currents. Great Circle Sailing. Coast Line Drawing. Definitions of Nautical Astronomy. Rule of Road, Sail and Steam. Lead and Log Line. Hand Flag Signalling. Night Signalling. Morse Code. Breakdowns, Stranding. Jury Rudders, Collisions. Rocket and Mortar Apparatus. Variation and Deviation of Compass. Use of Deviascope. Rules and Manoeuvres in Docks. River Buoyage, Courses and Distances. Netmaking, Splicing, Knots, Bends, Serving, Marling, etc. Seamanship, etc., etc.

Room No. 1 has been specially fitted for deck hands and apprentices, and contains a large model of the river, showing the buoys, lightships, shoals, courses and distances, and approaches to docks.

The subjects include Rule of Road, Use of Charts, Use of Sextant, Hand Flag Signalling, Netmaking, Knotting, Splicing, Serving, etc., Map Drawing, Dock Manoeuvres, and any subjects in navigation desired.

Room No. 2 is for the use of the captains and mates. A full or part course of navigation can be entered on.

All nautical books, charts, instruments, writing and drawing material are provided free.

Room No. 3 has been fitted up for Netmaking and Mending.

Members of the trade have kindly promised prizes, consisting of Sextants, Watches, Binoculars, Nautical Books, etc., which are presented to those who show the most marked ability at the end of each term.

The books, charts and instruments are at the disposal of any Master or Mate, and the instructor is pleased to give advice on any nautical matter.

Courses are also offered three afternoons a week in steam and marine engineering for those who are qualifying for Board of Trade certificates as engineers.

Attendance.

The attendance in navigation, seamanship and netmaking was about 750 the first year the school opened, 900 the second year, 850 the third year, and about 850 the present year, 1911. Of these, the larger number (450) take the class in navigation, and the rest (400) take net making. A few (50 or 60) take both sections of work. About 250 men attend the classes in steam engineering. The attendance makes this school easily the largest technical school for fishermen in Great Britain.

Of the men who attend not over a dozen are present more than the maximum of 160 hours a year set for a basis of grants by the Imperial Treasury. About forty per cent of those on the roll attend less than the minimum of 14 hours a year set by the same authority.

Instructing Staff.

There are three instructors:—

The headmaster and instructor in navigation, nautical astronomy, rule of the road, etc., has had a long experience as master on steam trawlers and other steam vessels for many years.

The instructor in net-making, knots, splices, etc., has also had a long practical experience at sea as master and is an expert in his work.

The instructor in steam engineering is a consulting engineer and at one time was engineer in charge of all the steamship lines of the Great Central Railway.

Cost.

The total expenses of the school are about £600 a year. Of this amount about £500 a year is granted from the Imperial Treasury, leaving only £100 for the Borough of Grimsby to appropriate.

The basis of the grant from the Imperial Treasury for instruction in navigation is 7s. 6d. for every 20 hours that a student attends a class and 3s. 6d. for every 20 hours in Steam Engineering up to a maximum of 160 hours for any one student in one year.

(2) PIEL MARINE LABORATORY.

Following is a general outline of the courses offered to fishermen by the Piel Marine Laboratory (near Barrow-in-Furness).

One class for fishermen will be held during the spring of 1912. This class will be conducted by the Lancashire and Western Sea Fisheries Joint Committee and by the Education Committee of the Lancashire County Council, and is open to fishermen resident in the Administrative County of Lancaster.

FIRST DAY.

Introductory Lesson.

Some little practice is required in using the microscope and dissecting instruments. During the first day students are enrolled and common objects will be examined miscroscopically, so as to practise the students in the use of the instruments.

SECOND DAY.

The Mussel.

The following points will be considered:—

1. The general structure of the mussel.
2. The feeding of the mussel.
3. The breathing of the mussel.
4. The reproduction of the mussel.

Chemistry of the atmosphere and sea water. The air. Oxygen. Nitrogen. Carbonic acid gas. Sea water. Pure water.

THIRD DAY.

The Whiting or Haddock.

The structure of the fish. The digestive organs.

Reproduction of fishes.

The male fish. The female fish. Fertilisation. Fecundity of common fishes. The time of incubation.

FOURTH DAY.

The Food in the Sea.

Diatoms; peridinians; noctiluca; copepods; larval crabs; other larva shellfish; young fishes and fish eggs. The plankton as food for fishes. Differences between plants and animals.

FIFTH DAY.

Diatom ooze; globigerina ooze; deep sea soundings; the temperature of the sea; the use of thermometers; the saltiness of the sea; deep sea trawling and dredging.

SIXTH DAY.

Shrimps, crabs and lobsters.

Structure of the shrimp; male and female shrimps; spawning.

The crab.

Differences between male and female.

The lobster.

Differences between male and female; casting of shrimps, crabs and lobsters.

SEVENTH DAY.

The structure of fishes continued.

The skate, rays and dogfishes.

Sense-organs of fishes; electric and sting-rays; breeding in skates, rays and dogfishes.

EIGHTH DAY.

The structure and life histories of fishes.

Plaice and other flukes.

Mature and immature flukes. Plaice. Dabs. Flounders. Age of plaice in the Irish Sea. Size and weight of plaice; weight of Irish Sea plaice; sizes at which fishes spawn for the first time; the sole and solenette; times of the year when fish spawn.

NINTH DAY.

Circulation of the blood in fishes.

The mussel, cockle and other shellfish.

Eyes; groats; the "Moss"; clams.

Spawning of shellfish.

Male and female cockles and mussels.

Other edible shellfish.

The clam, scallop (or queen), horse-mussel, spiny, cockle and razor-fish.

TENTH DAY.

Development and transformation of flukes.

Different kinds of spawn found on the shore.

Worm spawn; whelk spawn; dog-whelk spawn; sea-slug spawn; spawn of the hen-fish; shell-fish spawn and cuttlefish spawn; fish spawn.

Jelly fishes.

Star fishes and sea urchins.

Lesson on collecting specimens.

NATURE OF INSTRUCTION.

The instruction given relates to general marine biology, so far as it concerns sea fisheries. The structure of fishes and other useful marine animals, their manner of breeding and feeding, their growth and their habits, are explained. Each fisherman selected is allowed the use of a microscope and dissecting tools, and examines everything for himself. Simple chemical experiments illustrating the breathing of animals are shown. Lantern slides illustrating various particulars dealt with in the course of instruction are shown by the limelight lantern.

The instruction given is practical, and the fishes and other animals studied are examined by the fishermen. Each man is provided with a microscope, a magnifying glass, glass slides and cover glasses, dissecting dishes, and a set of dissecting instruments—a knife, forceps, scissors and needles.

As a rule, each fish studied forms the subject of a separate lesson. Two lessons are given each day except on Saturdays.

ALLOWANCE.

Each fisherman selected is given an allowance of £5 to pay his expenses and to make up for the loss of his fortnight's work, provided his attendance is regular and his conduct good. This scholarship allowance is paid in two instalments, half at the end of the first week, and the balance at the end of the second week.

SECTION 7: SCHOOL FOR FISHERMEN IN SCOTLAND.

In Scotland the greater part of the deep sea fishing is carried on by steam trawlers, as in England. The fishing smack is rapidly disappearing. The centre of the steam trawling business is Aberdeen. There is a growing tendency in the smaller ports for co-operative ownership and operation of steam trawlers. A number of fishermen club together and buy a trawler, which will cost them from $4,000 to $6,000 for a 200 to 250 ton vessel. They operate the boat on shares, the owners often constituting part of the crew. The great advantage of the steam trawler over the sailing vessel is the greater power of catching fish per man employed, the enlarged sphere of operation, and the fact that the men can practically work all the year round.

The herring industry in Scotland is also one of considerable proportions. These herring are famous the world over. At present with the steam vessels the fishermen follow the fish along the coast wherever they migrate, and thus fish almost continuously for 9 or 10 months, where they used to have only 4 or 5 months' fishing. The fishermen sell their catches to curers, who move along from place to place with the boats. Most of the preparation of the fish is done by Scotch lassies, who follow this special line of work for 5 or 10 years before marriage. Regular living quarters are provided for the girls in the different places, and they live under very comfortable and favorable circumstances.

A great many herring and other fish are cured and canned continuously in large establishments in Aberdeen and elsewhere. This work is also done mainly by girls. There is no regular apprenticeship in the business of curing. Young girls of 14, 15 or 16 years of age are taken on to do the more unskilled work and are promoted to better positions as they show capacity and as vacancies occur. The work is all more or less of a routine character, and there is not very much for any single individual worker to learn. The intimate knowledge of the whole process is possessed only by a few foremen. From the general robust appearance of the girls, the work seems to be congenial.

Fish Hatchery, Aberdeen.

The Fish Hatchery at Aberdeen is under the administration and control of the Fishery Board for Scotland, whose offices are in Edinburgh. The hatchery is under the direction of Dr. T. Weymss Fulton and provides a short course in marine biology for fishermen under the instruction of Dr. Williamson, assistant to Dr. Fulton.

This course was started about 1905. It lasts for one week full time in the winter of each year. Thirty or thirty-five men from all along the coast and from Shetland are sent from the fishing centres to take the course. They are practically all mates or masters of fishing vessels. The County Councils in the respective centres select the men, pay all their expenses of transportation and board and give each man about £1 a week for his time. There is no tuition charge made for the classes.

The instruction consists of lectures and laboratory demonstrations from 9 to 12 each morning, and excursions to the artificial ice plants, curing establisments and other points of concern to the fishermen in the afternoons.

The plaice is taken first as a type fish. The eggs are first fertilized and then the evolution of the fish is shown by preserved specimens illustrating the different stages. The question of fecundity and rate of growth is dwelt upon to a considerable extent. especially in connection with herring, and all the points illustrated by eggs and fry. Other fish are studied, also the lobster, crab and mussel. The microscope is used constantly in all this work.

Other subjects dealt with are the chemistry of water, the digestion, circulation of fishes; the tanning of nets; the putrefaction of fish; elementary bacteriology, etc.

SECTION 8: SCHOOLS FOR FISHERMEN IN FRANCE.

These schools of vocational and technical instruction in maritime fisheries are of recent formation. They were founded with the help of gifts from private individuals or grants made by the municipalities and by the State under the auspices and patronage of the Boards of Trade of their locality and of the Society for Professional and Technical Instruction in Maritime Fisheries, whose office is at 97 Boulevard de Port-Royal, Paris.

Their aim is to raise the level of education of marine fishermen from a technical and vocational point of view, to improve the conditions of their existence, to enable them with the aid of their new acquirements to render their work more productive, so as to be able to save and thus prepare themselves against sickness, accidents, and old age; and, finally, to reduce the number of personal accidents, which are so frequent in their calling.

The courses and lectures are attended by pilots, masters of fishing boats, sailors, ship-boys and teachers. They are free, and are open to all enlisted naval men.

The schools at present open are those at Boulogne-sur-Mer, Dieppe, Fécamp, Concarneau, Groix, Le Croisic, Les Sables-d'Olonne, and Arcachon.

Other schools of the same character are in process of formation. Elementary courses of instruction in navigation have been established in the primary schools at Trouville, Villerville and Honfleur. Adult courses have been opened at Tréport and at St. Valery-en-Caux.

Those fishing schools whose establishment was brought about by the Society obtained subsidies from the Marine Department.

The importance of instruction in sea fishing has not escaped the attention of the Minister of Public Instruction and by a decree of September 20, 1898, it was decided, that, in certain elementary schools on the sea-coast, lessons would be given in matters pertaining to seamanship and fishing, according to the following program.

I. INTERMEDIATE COURSE.

1st. *The trade and things:*

Various advantages of the fishermen's calling: personal interest and national interest (familiar talks); naval enlistment; rudiments of hygiene, diet, clothing etc., necessity of swimming; sea fishing, deep sea fishing and coastal fishing; navigation: ocean travel and coasting; description of a local fishing boat (inspection of a boat and a lifeboat); definitions and use of the various parts of the boat; different kinds of ships, brigs, schooners, sloops, etc.; port, its different parts; nautical terms; the ordinary nautical words of the English language; foreign flags.

2nd. *Practical rudiments of seamanship:* practical astronomy, constellations, polar star, apparent movement of the sun, inequality of days and nights; equinoxes; the moon and its phases; the sea tides, flood-tides, ebb-tides, almanac of tides, equinoctial tides; charts and their use; elementary exercises; depths, sounding lines, light-houses, beacons, semaphores, and buoys; magnets and their properties; compass, declination, and variation; logs.

3rd. *Local practical instruction:* study of the geography of the neighbouring coasts in the English Channel, for instance, of the French and English coasts visited by the coastal fishery; local fishing places, walks along the seashore; animals and plants.

4th. *Practical exercises:* manual work; the sailor's knot, demonstration and exercises, anchoring, splicing; blocks, tackle, mounting and unmounting of tackle; nets, making and mending (visits to the sail-lofts, rope walks, forges, etc.); demonstrations of running manœuvres; principles of swimming.

II. SUPERIOR COURSE.

1st. *Rudiments of navigation:* movements of the stars, the equator, parallels, meridians, position of a star; ecliptic, position of the sun with reference to the horizon and the vertical; computation of time; charts, indicating the position within sight of land, reducing the sounding-line to zero of the chart; use of the compass, course by the compass, magnetic course, true course, course of the ship, drift; sextant, use, practical determination of the position at sea; barometers, knowledge and forecast of the weather, cyclones; international code of signals.

2nd. *Rudiments of maritime law:* legal status of mariners; naval enlistment, personnel subject to enlistment, military obligations of those who have enlisted, benefits granted to naval recruits, organization of the service; navigational and coastal fisheries police.

3rd. *Rudiments of hygiene:* hygiene for sea fishermen; first aid to the wounded and the sick; use of the principal remedies on board fishing vessels; preservative processes on board.

Navigation in Primary Schools.

The decree of September 20, 1898, was put into execution in over 400 primary schools on the coast. The rapid development of the educational courses in navigation in these schools is due in great part to the efforts of Inspector-general Coutant and to the devotion of the directors of the fishing schools at Groix, Dieppe, and Arcachon, who trained primary teachers by means of lectures and courses.

Furthermore, the Sea Fisheries Congress held at Bordeaux in 1907 requested that the method of instruction in sea fishing be reorganised on new bases from both the vocational and the theoretical points of view, and that there should be established for the benefit of the pupils fishery diplomas of several grades, which should confer advantages on them during their working career, *e.g.*, by promoting them to be sailors of the 2d. class. The study of these various questions was entrusted to a commission appointed by the Minister of Marine.

The following is an illustrative sketch of the organization and system of education of three of the French schools of fishing.

Municipal School at Sables-D'Olonne.

This school, 67 rue du Port, and la Chaume, route de l'Ermandèche, receives naval recruits from the department of La Vendée, from 12 years of age upwards.

The courses and lectures are held at two periods, one in March at Sables, and the other in November at la Chaume.

The course of instruction comprises the following subjects: dictation, composition, and marine reports; practical arithmetic and geometry; geography; English nautical terms and ordinary words; practical navigation; school of seamanship; manœuvring, and coastal navigation; fishing apparatus; repairing damages to boats and rigging; regulation of navigation and coastal fishing; life saving; hygiene and first aid to be given to wounded or sick sailors; fishing economics; edible marine species; processes for preparing and preserving fish; economics for fishermen (insurance, provident societies, and relations between the master and crew).

Exercises and applications are carried on at sea. At the end of each period of the courses, recruits who have followed the instruction with the most profit are awarded prizes consisting of either boxes of mathematical instruments, charts, marine glasses, compass, sextant or octant, etc.

Fishing School at Groix.

The course of instruction here (Ile de Groix, Canton of Port Louis, Morbihan), comprises the following subjects: composition, practical arithmetic and geometry; use of charts and instruments, determination of the position of a ship at sea; fishing nets; regulations concerning fishing and signals; regulations concerning fires; to prevent collisions at sea; fish conservation; repairing damages; life-saving apparatus; pouring oil; head anchor; maritime hygiene; aid in case of accidents; abuse of alcohol; and swimming.

Maritime Fishing School at Dieppe.

The school of maritime fishing at rue de l'Entrepôt, Dieppe, is an annex of the school of hydrography. It was founded, as was also the latter, by the Board of Trade.

The courses comprise the following: the use of charts, and of the almanac of tides and the octant; problems of routes; life-saving apparatus; pouring of oil; rudiments of the construction of fishing boats and small boats; on the repairing of damaged rigging, masts or hull; on pilotage and landing; on fire regulations; fog signals and maritime fishery regulations; also a practical rudimentary knowledge of the action and management of those machines with which sailors must prove they are acquainted in order to be authorized to command a steamboat (decree of July 17, 1908).

Practical lessons on the making and mending of nets (trawls, seines, stake-nets, etc.); on the preparation of lines for catching whiting, cod, dogfish, etc.; on the preparation and preservation of fish; on the cooper's art; maritime hygiene; aid to be given to the sick or wounded before the arrival of the doctor, and the use of a small medicine chest.

CHAPTER LXXIII: SCHOOLS OF NAVIGATION.

There are four technical schools in Scotland where navigation is taught, viz.:—at Glasgow, Leith, Dundee and Aberdeen, all founded in 1855. Outside of the chief fishing centre of Aberdeen they train men mostly for certificated positions in the mercantile marine.

SECTION 1: NAVIGATION SCHOOL AT ABERDEEN.

This school has three distinct branches of work, viz.:—

1. Classes in navigation and seamanship for men who are preparing themselves to qualify for Board of Trade Certificates as mates, masters and extra masters.

2. Short courses in navigation for public school teachers during three weeks in the summer.

3. Extension continuation classes for 8 weeks in January, February, and March in neighboring small ports:—Peterhead, Buck Head, Lossiemouth, Findochty and Port Essay.

The work in the regular classes in navigation for candidates for Board of Trade Certificates is much the same as at Hull and Grimsby in England, except that net-making and mending are not taught.

Classes for Public School Teachers.

The classes for public school teachers were instituted in 1910. They came in response to a demand for evening Continuation Classes in navigation in fishing communities. This demand came about by a regulation in 1909 of the Board of Trade that all mates and masters on steam vessels of 50 tons or over should have certificates. (The Board of Trade at this time offered to give equivalent certificates of service to mates and masters who had served a certain number of years, but it was greatly to the credit of the men entitled to these certificates that they almost universally chose to study and take the regular examinations.) There had also been a rumor that the Scotch Board of Education intended to require a knowledge of navigation on the part of public school teachers in fishing districts.

The summer course is carried out under the authority and at the expense of the Aberdeen Training Centre of the educational district of Aberdeen (one of the five districts into which Scotland is divided for educational purposes).

The teachers who attend the summer course usually receive a grant from their respective county councils to cover transportation expenses. This grant is given after the teacher has produced evidence that he has attended the class. The course covers the time of two summers. The usual procedure is to give the teachers navigation from the mathematical and theoretical standpoint and then to take them out on a tug for two days where they learn the different operations that usually fall to the mate and master of a steam vessel. After this the rest of the instruction deals with the applications of theory to practice. A few of the public school teachers are women who acquit themselves quite as well as the men. A number of these teachers had initiated evening Continuation School work in their respective communities after taking this course.

Classes at Auxiliary Centres.

In the evening Continuation Schools held under the direction of the Navigation School at the six neighboring ports the subjects taught were those which would qualify the students to take the examinations for mates and masters. Each student paid a fee of 10s. and the classes were self supporting.

The teachers were, with one exception, former students of the Navigation School and in actual charge of vessels. The students, with almost no exception, had had only the training given in the elementary schools. Many of them successfully passed the examinations after the winter's training. In each community the public school rooms were used for the classes for which the Navigation School paid only the extra cost of heating and lighting.

Building and Equipment.

The Navigation School is conducted in three rented rooms on the second floor in close proximity of the docks. The principal said that it was absolutely necessary to the success of a Navigation School that it be situated close to the docks to preserve the atmosphere to which the seafaring men are accustomed. The amount of money necessary for a new building (£7500) had been granted a number of years ago from the Scottish Education Board and other sources but the actual construction has been held in abeyance, awaiting the reorganization and new buildings of a new Technical College under the control of Gordon College. This new scheme is expected to come to fruition within two or three years, when the Navigation School will have adequate commodious quarters in a new building near the docks under the general management of Gordon College.

The school is well equipped with apparatus in the way of instruments and models for teaching navigation, nautical astronomy, and seamanship.

Attendance.

The school has about 200 men on its roll who are attending the classes for mates and masters. About 5 or 6 men a year prepare themselves for the examination for extra master. These are about equally divided between men following the mercantile marine and fishing. The first year the summer courses were opened, there were 41 teachers in attendance, among whom were 4 women and 3 of H. M. Inspectors of Schools. This year (1911) there are 29 teachers in this class, 2 of whom are women.

Instructing Staff.

The staff consists of the headmaster, two regular assistant instructors and a doctor, who gives part time services in holding the lectures in first aid to the Injured.

The headmaster secured his early technical training at the Leith Nautical College and was at sea for 15 years in all different capacities in fishing boats and in the mercantile marine. He has been engaged in teaching at the Navigation School in Aberdeen for 15 years and is an enthusiastic teacher and good organizer.

Cost.

The total cost of the school is about £850 a year. The main part of this expense is met by a direct grant from the Scotch Education Board.

SECTION 2: NAUTICAL COLLEGE AT LEITH.

Leith is really the harbour of Edinburgh, the two cities being only a few miles apart. Leith has a shipbuilding industry of considerable proportions and many other manufacturing establishments. The Leith Nautical College is recognized as one of the Central Institutions by the Scotch Education Board.

There are really three departments of work:—

(1) Navigation, Nautical Astronomy, etc., as preparation for candidates for Board of Trade Examinations; higher nautical education including Naval Architecture and Ship-building and Design of Marine Motors, etc.

(2) Short Summer Course in Navigation for public school teachers;

(3) Extension classes in the form of evening Continuation Schools in Navigation for fishermen in neighboring ports.

The work in Departments (2) and (3) is very similar to that already described in the account of the work of the Navigation School at Aberdeen.

Courses of Instruction.

The teaching arrangements are framed to suit the needs of the migratory seafaring community. Students can enter at any time, and can attend for long periods, or for recurring short periods, as may be convenient to them.

The program of instruction is as follows:—

(A) Preparation for the Board of Trade Examinations,
(B) Higher Nautical Education, including Naval Architecture and Marine Engineering,
(C) Elementary and Special Nautical Instruction.

(B) THE HIGHER NAUTICAL EDUCATION.

(i) The Mathematical basis of navigation and nautical astronomy.
(ii) Navigation, nautical astronomy, and spherical astronomy, in all their branches, including practical observation, calculations, and graphic methods.
(iii) Marine surveying.
(iv) Physics:—
(*a*) Oceanic metereology and instruments; bearing of meteorological elements on ocean routes and on ship manoeuvring in cyclones.
(*b*) Sound and light in their relation to the marking of sea dangers.
(*c*) Heat in its relation to fuels in ship propulsion and in relation to dangerous cargoes.
(*d*) Magnetism; general laws; terrestrial magnetism; ship's magnetism.
(*e*) Electricity; properties and effects of electric currents; measurements of electric currents; electric pressure and resistance; electric measuring instruments for ship use; generation of electricity; wiring of vessels; electric lighting and electric motors in ships; long distance signalling (ethergrams); transmission of signals through water.
(*e*1) Electricity on board ship, chiefly practical (evening course).
(*f*) Seamanship; treated as a branch of applied mechanics.
(v) Shipping and Commercial Law; the commercial duties of a ship master.
(vi) Naval Architecture and Shipbuilding; a course leading up to, and including original design (day and evening courses).
(vii) Marine Engineering; the Board of Trade Examination for Extra First Class Engineers (day course).
(vii) Marine Engineering; the original design of marine motors (evening course).
(viii) Ship surgery, medicine, and hygiene at sea, with hospital visits; one summer course (day) and two winter courses (one day and one evening).
(ix) The new courses in first aid, made compulsory by the Board of Trade, are also provided, the classes meeting three times weekly during the whole year.

(C) THE ELEMENTARY AND SPECIAL NAUTICAL INSTRUCTION.

(i) Special classes for fishermen, in fishermen's navigation, weather knowledge, knotting and splicing and rigger's work; and a short course in ship surgery and medicine.
(ii) Courses of instruction to teachers in the fishing and smaller sea ports.
(iii) A short course of popular evening lectures on nautical subjects.

(iv) A short course of elementary navigation and rope knotting and splicing for boys who will shortly go to sea. Boys who are going to sea and come to the Nautical College for a period not exceeding six months before going to sea, for this specialized instruction, find their teaching on board, by the shipmaster, easier and pleasanter.

Electricity on Board Ship.

An experimenta' course, including such verbal instructions as are necessary for understanding and performing the experiments, is arranged to suit engineers and others who can attend only when their vessels are in port. The instruction is therefore chiefly 'individual instruction.' Such students may join at any time, attend as they can, and complete their course in the present or succeeding sessions.

Ship Surgery, Medicine, and Hygiene.

A course of about 16 lectures and hospital visits, specially arranged for, is open to all persons connected with the sea. To suit the convenience of those in active service, seafaring students may join at any time and complete the course at any time.

A short course of public lectures is given on subjects connected with navigation, shipbuilding or marine engineering in January. These are free to all.

Fishermen's Classes.

Special classes are held at the College, or at any of the fishing ports, where arrangements are made by the Local Education Authorities. Fishermen who attend at their own option may come to the College at any time.

INSTRUCTING STAFF.

The Instructing Staff consists of nine men, four of whom give full time to the work. The departments are:

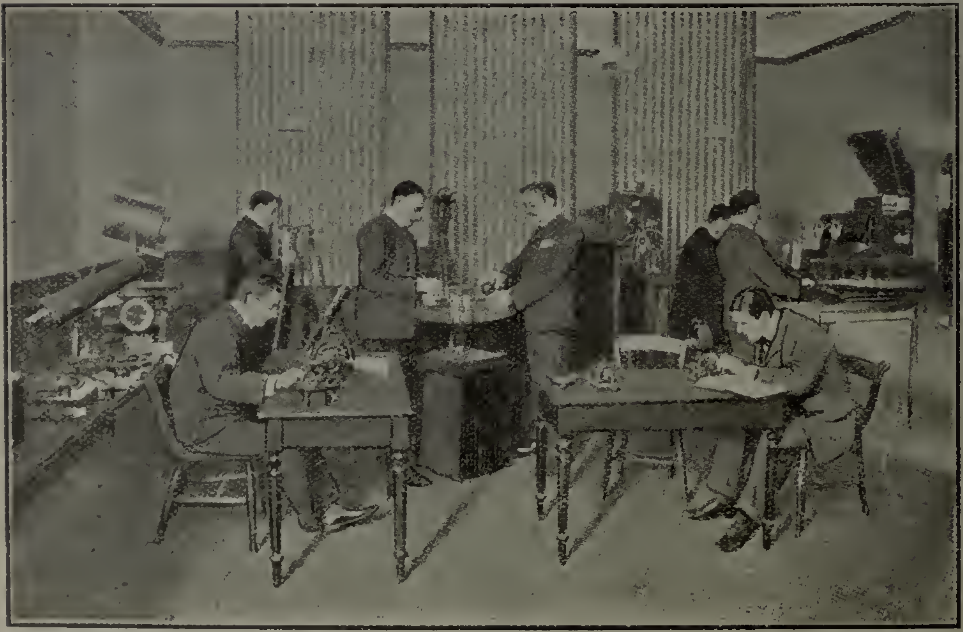
Nautical Subjects, Naval Architecture, Marine Engineering, Electricity, Ship Surgery, Medicine and Hygiene, Riggers' Work, Signalling.

The Instructors in nautical subjects are old students of the Nautical College and have extensive practical experience also. The Instructors in Naval Architecture, Marine Engineering, and Electricity occupy responsible posit ons with leading industrial establishments or are in consulting practice

BUILDING AND EQUIPMENT.

The present building occupied by the college is a very handsome stone structure, erected close to the principal docks in 1902-3. The building was

OFFICERS' CLASS: "DEMONSTRATION IN THE MECHANICS OF SEAMANSHIP."



OFFICERS' CLASS: "EXPERIMENTAL WORK IN PHYSICS LABORATORY."
LEITH NAUTICAL COLLEGE

Adult Fishermen's Class: Lecture on "Weather."

Fisher Boys' Class: "Knotting, Splicing, and Riggers' Work."
Leith Nautical College.

carefully planned by the present headmaster, and is admirably suited for the work. The space is already inadequate to accommodate the growing classes in Naval Architecture and the authorities are planning an extension to the building for this purpose in the near future. The present building cost £5,000.

The College has a well equipped physical laboratory, a mechanical laboratory, and excellent class rooms, well supplied with appliances for every branch of nautical education. Special care has been taken in the physical laboratory to provide for experimental work in magnetism and electricity in regard to their seafaring applications, matters which every modern shipmaster and officer should be expert in; and, in the mechanical laboratory, for the teaching of seamanship, mechanical testing, and shipbuilding.

Electric current is supplied to the laboratories from the town mains, at 230 volts, experimental cables being taken to three switch boards. Electrically-driven fans secure pure air. All the windows are in the French style, and are double, to deaden street noises. They are provided with two sets of blinds, dense black and ordinary, to secure the darkening of the rooms in daylight when necessary for electric lantern work or other purposes.

During the session 1907–8 a large addition was made to the appliances for Navigation, Marine Engineering, and Naval Architecture, etc., including a full set of Lord Kelvin's navigational instruments, a complete set of meterological instruments (including those for deep sea work), a portable transit instrument and a fine $4\frac{1}{2}''$ Wray telescope; and in 1908–9 a splendid sectional model of a ship, costing £240, and a great number of working models of marine engines, were purchased.

The total cost of the equipment was about £15,000. It seems to be very complete and carefully selected for the work.

CHAPTER LXXIV: SCHOOLS FOR THE TANNING AND LEATHER INDUSTRIES.

One of the interesting and important departments of industrial and commercial life of Canada is the leather trade and its allied industries of harness making, boot and shoe manufacturing, upholstering, glove making, etc. A brief outline of some institutions which provide technical and practical training for boys intending to enter this field of industry should prove instructive.

The institutions visited by the Commission which provide special training for the leather trade were:—

(*a*) The Tanning School at Freiberg, Germany;
(*b*) The Pratt Institute, at Brooklyn, N.Y.;
(*c*) The Leather Sellers' Technical College, at London;
(*d*) Leeds University;
(*e*) The School of Tanning, at Lyons, France.

The School at Freiberg, the Pratt Institute and the Leather Sellers' College provide technical training with some scientific instruction of Secondary School grade to qualify for positions as foremen and managers. The University Course at Leeds is intended for the advanced scientific and technical training of specialists and experts.

A: THE TANNING SCHOOL AT FREIBERG.

The institution consists of three separate Departments devoted respectively to technical education, practical training and research work. In the first, boys or young men who have served their apprenticeship and are desirous of qualifying themselves to become foremen and superintendents can take a one year course of specialized study in the commercial and chemical aspects of their work. In the second they can supplement this learning by training in practical tanning.

In connection with the school there is a small leather works employing seven men. At the works leather is manufactured and the school authorities sell the finished product on the open market.

The small tannery is run on a strictly business basis, turning out about $12,000 worth of saleable product per annum. Being managed by a practical man previously in charge of a large tannery, it affords ample opportunity for the gaining by the students of practical experience under ordinary working conditions.

In the third Department there is an experimental research laboratory, where experiments are made for the Association of Tanners into all matters affecting their trade, and by means of which the students are kept in close touch with all new developments and problems under investigation.

All three Departments are supported entirely by the Association of Tanners, who consider it to be in their own interests to have such an institution in operation. The advantage of the School Tannery being run as a commercial business, and having its own staff of seven workmen apart from the school proper, is that it is thereby made almost self-supporting and that the students have an opportunity to do the kind and amount of manual labor necessary for them to learn properly the effect of the various processes.

The majority of the pupils are sons of former students now engaged in the tanning industry.

B : THE PRATT INSTITUTE.

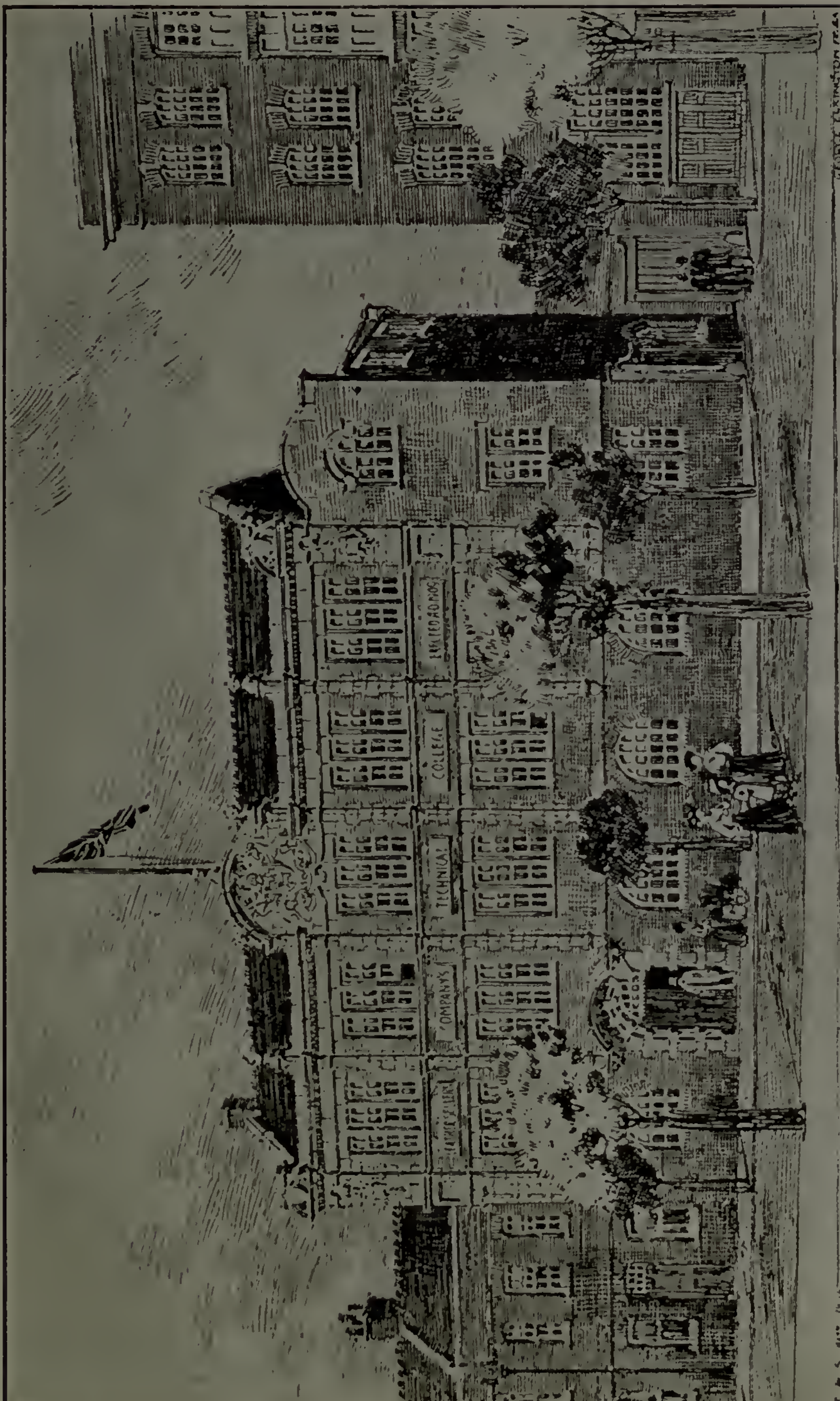
At the Pratt Institute the work in this Department is divided into two sections: a one year Day Trade Course, and a one year Industrial Course. The latter is available only to those who have graduated from a four year Chemistry Course in a College or Technical High School, or have had already an extensive training in general chemistry.

The Day Trade Course is intended to give practical working tanners a course of training in the art of tanning and finishing different kinds of leather, and to enable them to acquire a broader knowledge of the principles involved than they could hope to attain under the ordinary conditions of commercial manufacture. They are thus fitted for positions of greater responsibility and remuneration. Students in this class become familiar with every detail of the tanning and dressing of leather by actual work in the Institute's Tannery. This tannery is equipped with modern machines for leather production on a scale sufficiently large to render processes and results reliable.

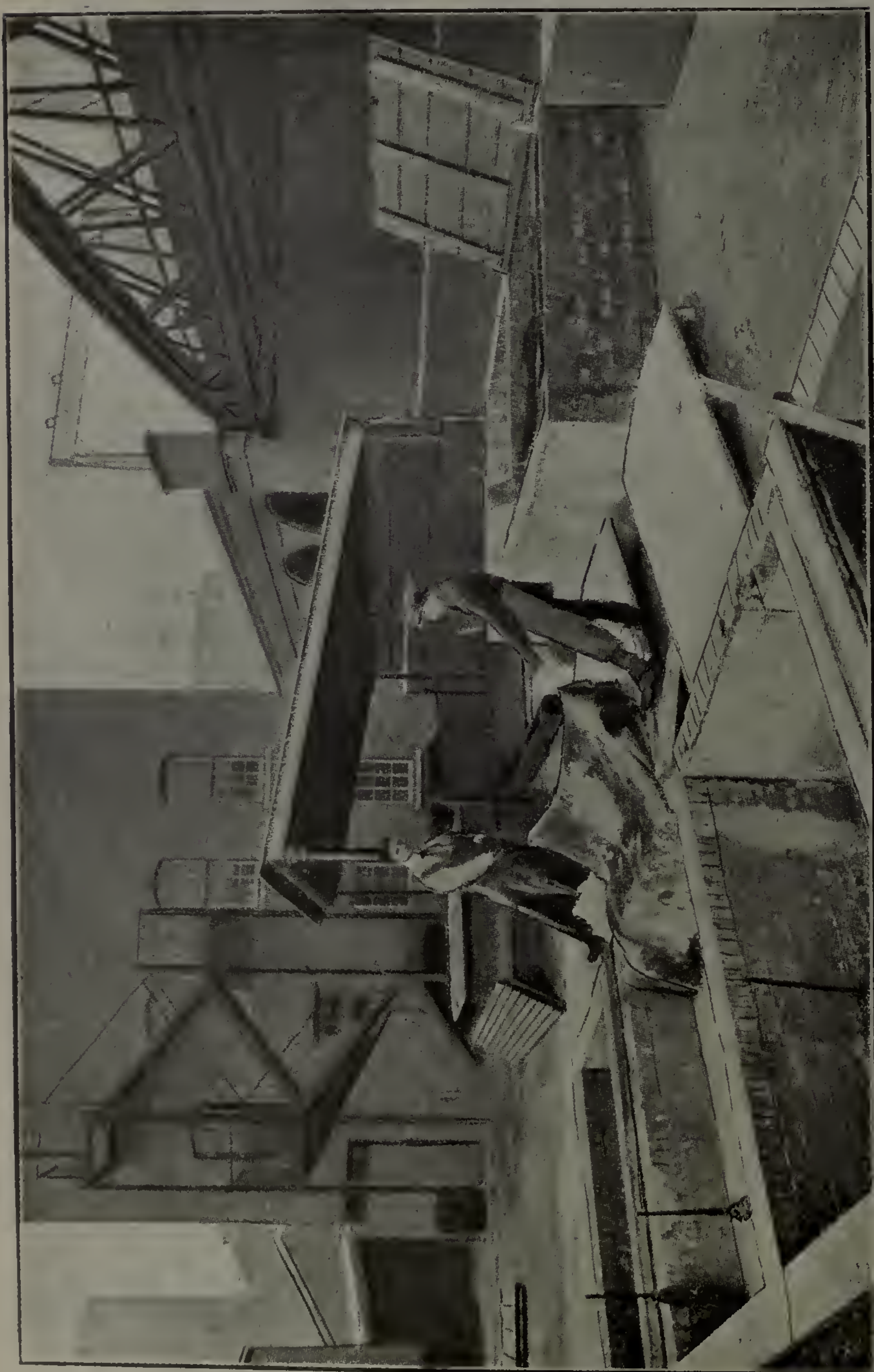
For the Industrial Course completely appointed laboratories provide for instruction in general chemistry as well as in the analytical and technical chemistry applicable to the tanning and manufacture of leather. The Course includes the testing of dyes, the manufacture of extracts, etc.

C : THE LEATHERSELLERS' TECHNICAL COLLEGE.

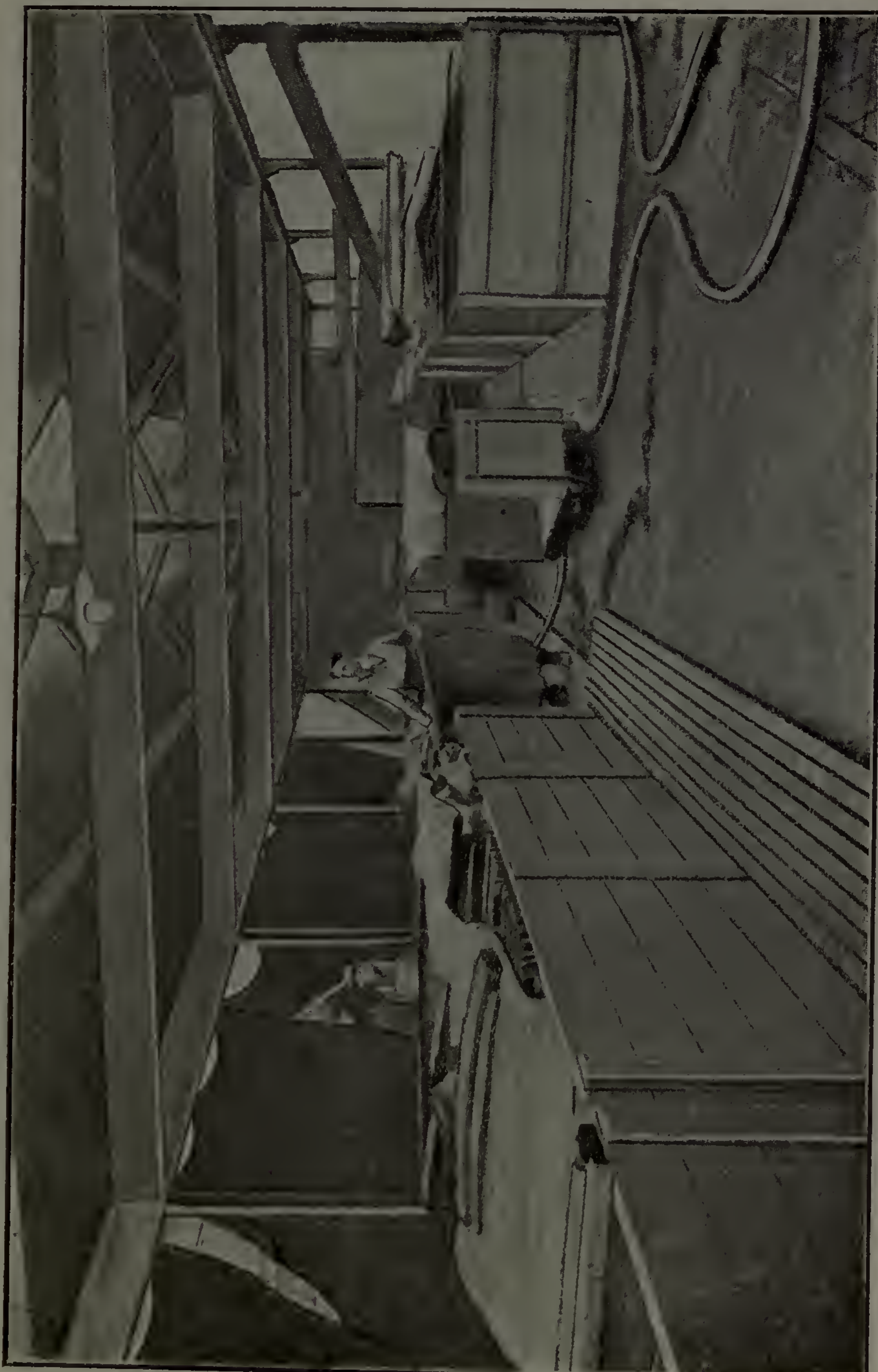
The Leathersellers' Company's Technical College, at London, has an up-to-date leather factory, equipped with modern machinery. It possesses also an adequate chemical laboratory for research work, a museum containing numerous exhibits showing in a very graphic manner the results of various mistakes in tanning and the effects of injuries to the skin of the animals. This institution was built and equipped by the Leathersellers' Company at a cost of about $100,000. Apart from a small annual grant from the London County Council towards the Evening Classes it is maintained by the Company.



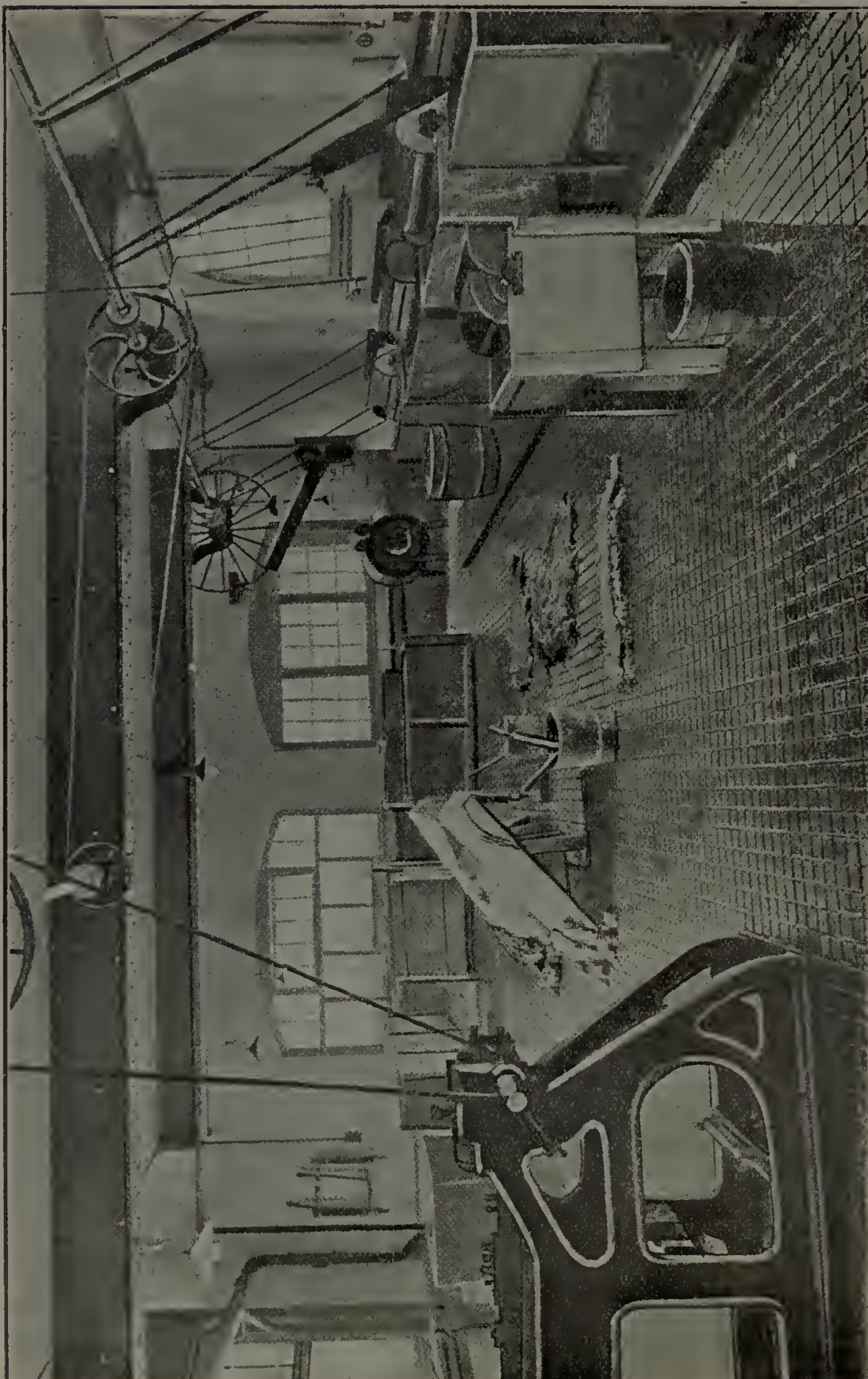
THE LEATHERSELLERS' COMPANY'S TECHNICAL COLLEGE.



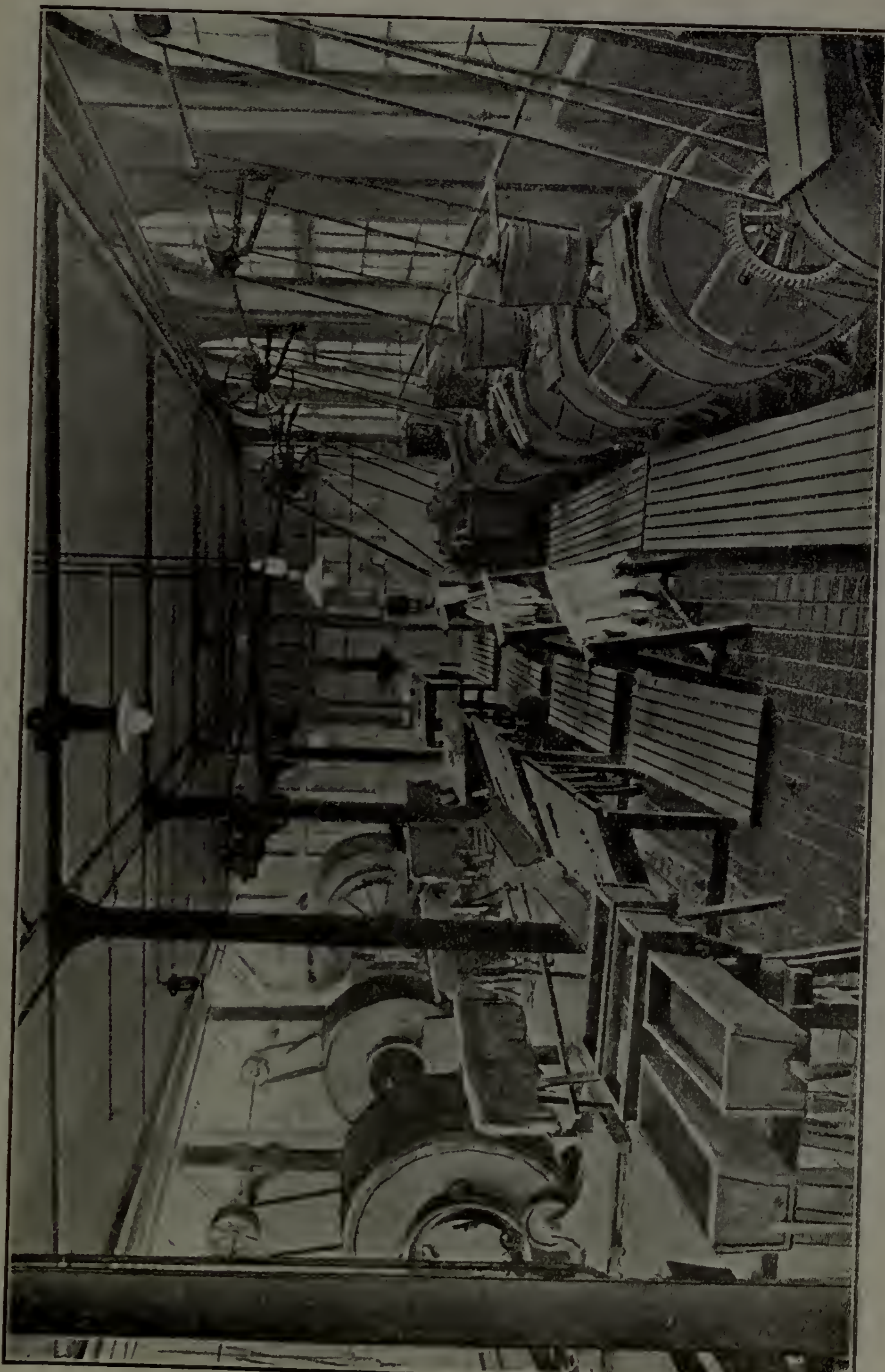
LIME YARD: LEATHERSELLERS' COMPANY'S TECHNICAL COLLEGE, LONDON.



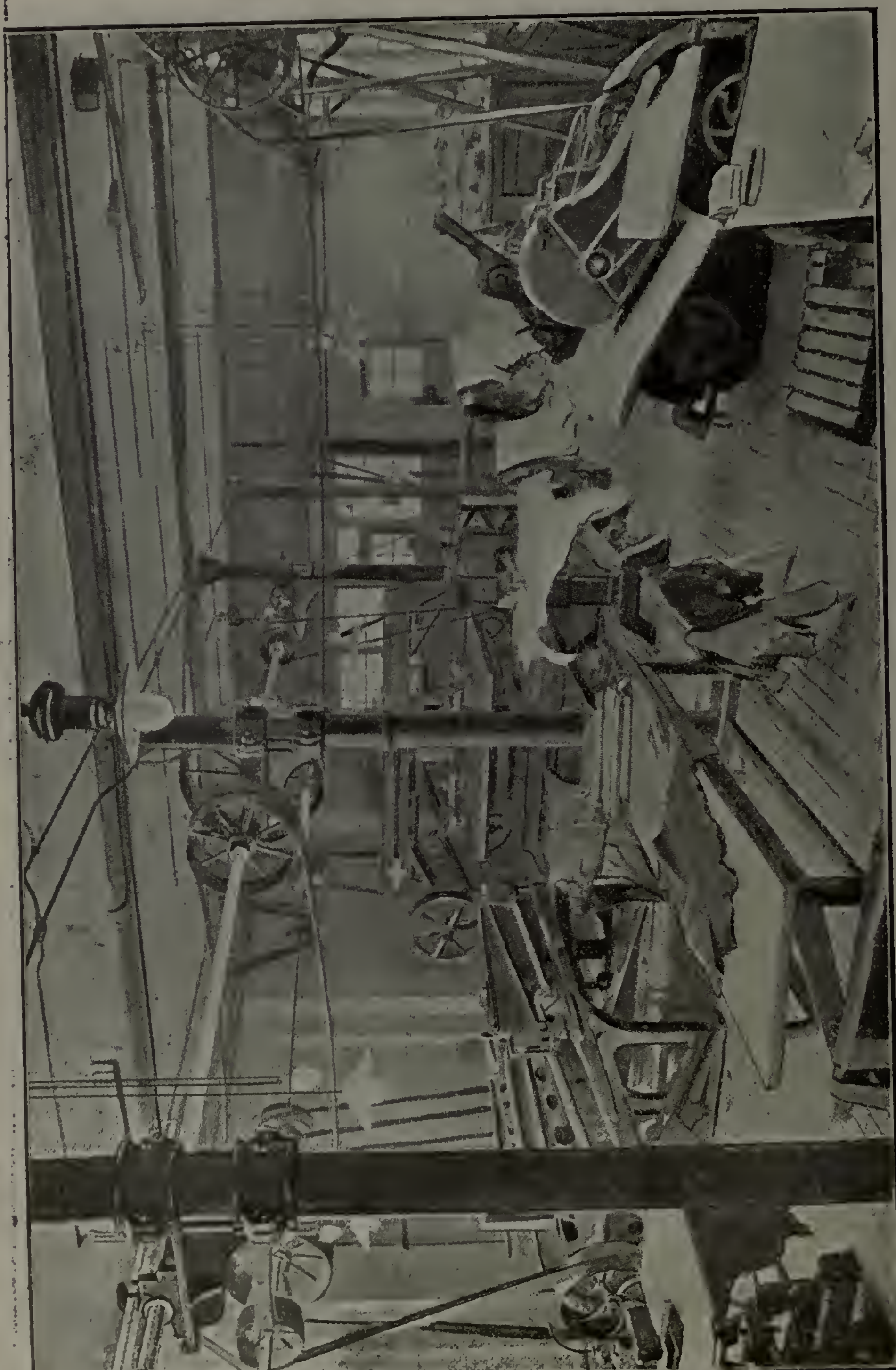
HEAVY LEATHER TAN YARD: LEATHERSELLERS' COMPANY'S TECHNICAL COLLEGE, LONDON.



LIGHT LEATHER TAN HOUSE: LEATHERSELLERS' COMPANY'S TECHNICAL COLLEGE, LONDON.



DRY HOUSE: LEATHERSELLERS' COMPANY'S TECHNICAL COLLEGE, LONDON.



FINISHING SHOP: LEATHERSELLERS' COMPANY'S TECHNICAL COLLEGE, LONDON.

GENERAL LABORATORY.

Young men of adequate educational qualification (Junior Matric.) can take a Course which will fit them to become superintendents and managers of tanneries or similar works. The full Course occupies two or three years according to the qualification of the student on entering. Graduates of the School have taken responsible positions in leather manufacturing establishments in China, India, Canada and the United States.

Men from all trades directly connected with leather, even to the mere selling of boots and shoes, may get a thoroughly practical training in their work at the Evening Classes. The Evening Classes have as their chief aim the making of better and more competent workmen, and it is to this department of the work of the school that the grant of $2,500 from the L. C. C. is devoted, in order to give working men with limited incomes an opportunity of training themselves for higher positions.

The College fits in with the more advanced scientific work at Leeds University and some of its students go there for that.

D : LEEDS UNIVERSITY.

At Leeds University the highest Technical Education in regard to the leather industries is obtainable. There is no practical manufacturing work. Instruction and training are provided leading to an understanding of the principles and methods of leather tanning, analytical chemistry and laboratory work generally in connection with the problems confronting the modern manufacturer. Students must have taken a previous four year course in chemistry or its equivalent in order to secure admission.

The Course is devoted chiefly to Analytical Chemistry, Bacteriology, and Microscopy in relation to the leather industry.

Classes are held in,—

Principles of Leather Manufacture, Physics and Chemistry of Leather Manufacture, Methods of Leather Manufacture, Analytical Chemistry of Leather Manufacture, Technical Bacteriology, Technical Microscopy with Laboratory.

In Evening Courses lectures are given on,—

The tanning and currying of light and fancy leathers; mineral tannage; glove kid, calf kid; formaldehyde tannage; and dyeing of different kinds of leather.

E : THE SCHOOL OF TANNING AT LYONS.

(Chemical Institute of the University).

This School was established in 1899, under the patronage of the general French Syndicate of Leathers and Skins. Its object is to train young persons for business in leather and skin manufacturing and for the allied industries that use these products, as heads of firms, as superintendents of workshops and professional chemists.

The Course occupies two years and is excluisvely for day scholars, who must attend the school on all days except holidays, from 8 to 11.30 a.m., and from 1.30 to 6 p.m.

Candidates must be of the full age of 16 years before July 1st of the year in which they present themselves. They are admitted by competition, comprising written and oral examinations bearing on the same subjects and the same program as for the Chemical School competition. Besides the obligatory examination candidates may undergo optional examinations in sciences or modern languages. Those who possess qualifications or diplomas are entitled to benefits in marks.

Those who desire to take only the special Courses of the school without laboratory work, may be admitted as outside students without examination, by authority of the general syndicate and the Director of the School of Industrial Chemistry.

Instruction is given at the faculty of sciences of the University, where pupils are registered and take Courses in Physics and Chemistry, open to all the students; also four Courses having reference to the leather industry, which were established for them by the syndicate.

Courses and Laboratory Work.

The following is a list of the Courses attended by the pupils each week:—

1st year: 2 Courses in general mineralogical chemistry, 2 in chemical technology, 4 in industrial chemistry, 3 in industrial physics, 1 in chemistry applied to tanning and 1 Course in micrography and natural history applied to the leather and hide industries.

2nd year: 2 Courses in organic chemistry, 4 in industrial chemistry, 1 in tanning and leather manufacture and 1 in analysis and testing of raw materials and manufactured products with relation to the leather and hide industry.

Outside of class hours the pupils work in the laboratory where their studies are as follows:—

1st year: Mineralogical analysis and its application to the study of the mineral raw materials used in the leather and hide industry; the preparation of the mineral raw materials used in the same industry; and the experimental portion of the Course in chemistry applied to tanning.

2nd year: The experimental portion of the Course in tanning and leather manufacture, and the experimental portion of the Course in analysis and testing of raw materials and manufactured products.

At the conclusion of their studies the pupils undergo a final examination which, being successfully passed, entitles them to the diploma of Engineering Tanning Chemist.

The annual fee is 950 francs. Available places may be assigned to foreign students for 1,100 francs a year. Fee for security against laboratory loss or breakages, 100 francs. The Departments of the Seine and the Rhone, the cities of Paris and Lyons, and the Boards of Trade of those two cities grant a certain number of scholarships to necessitous students.

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