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Vocational Education in Stockholm

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Vocational education in Stockholm provides both for full-time education or, alternatively, for part-time education for those boys and girls who have already entered an employment; some form of further education after the age of 12 or 13 is compulsory on all young people under the terms of an Education Act of 1918. The higher elementary school gives full-time instruction of a general character. The continuation school provides part-time instruction, mostly of a vocational character. The workshop school provides full-time vocational instruction for young persons who wish to enter a chosen trade and cannot find an employment in which they would receive the necessary training; in workshop schools trade conditions and trade hours are, as far as possible, reproduced, and the work is practical. Apprenticeship schools are run on similar lines, but only part-time instruction is here given as they are intended for those already apprenticed to an employer and working for him; in these schools special courses are also arranged for older workers. Trade schools give technical instruction courses, but their arrangements as to hours, etc. are more elastic, with a view to special subjects, special skill, and the requirements of workers already trained or partly trained. Finally, there are one-year full-time commercial and domestic training schools. Attendance at higher elementary, apprenticeship, and continuation schools is compulsory; at workshop and trade schools, voluntary. In the year 1921 Stockholm expended 670,461 kronor on vocational education, from which 1,873 pupils benefited during the school year 1921-1922. The work of the schools has been generally approved by both employers and workers.

IN 1901 a workers' organisation of Stockholm submitted to the Municipal Council a request for the establishment of municipal trade schools. This request was not granted, but a committee of the Council was appointed to consider the matter, and reported in 1906. In 1911, after thorough revision of this

report, the Council decided to establish municipal trade schools for three classes of workers: engineers, carpenters, and factory seamstresses. The organisation of these schools, which were opened in the autumn of 1912, was based on that of the one-day vocational schools of Munich.

Instruction was given on one day per week for forty weeks a year, and the course lasted three years. Each school consisted of three classes for each year of the course, with about twenty pupils in each. A workshop was attached to each school and the subjects taught included trade instruction in the school workshop, trade drawing and arithmetic, and other technical subjects, Swedish, arithmetic, theory of materials and of tools, hygiene, and civics. In 1913 two additional schools for electrical fitters and blacksmiths were established, in 1914 a school for plumbers and one for tinsmiths and sheet-iron workers, and finally, in 1919, one for needlewomen.

A new type of school was set up in 1913 with a two-year course, on six days in the week, to train girls who had completed the seven years' elementary school course for dressmaking in the homes of customers. The school enrolled ten pupils each year, and gave instruction in needlework, pattern cutting and cutting out, knowledge of materials and tools, drawing and theory of design, civics, hygiene, and gymnastics.

In 1915 the City of Stockholm established two-year courses in domestic economy for pupils who had completed the elementary school course. The classes were held from 3.30 to 8 p.m. once a week for 40 weeks a year in the kitchens of the elementary schools. Instruction was given in domestic economy, sewing, reading and writing, hygiene, and civics, with lectures on subjects of general educational value. In 1917 the municipal authorities took over a school for bricklayers established by the employers. The course covered 25 weeks per year for two years. Classes were held in the evenings four or five times a week, the subjects including practical bricklaying in the school workshop and theoretical instruction similar to that given in the trade schools established in 1912.

Evening classes were opened for pupils who had passed through the trade schools. These included classes in blouse, sleeve, and skirt making for factory seamstresses, in dress finishing, dressmaking, and cutting out for home seamstresses, and classes for electrical and telephone fitters. The classes were held for six hours a week and 30 weeks a year for two years. Adult workers were also admitted. A fee of 5 kronor per year was charged for these classes, but the trade schools mentioned above were free. No grants were received from the state, the cost of all the schools being met from municipal funds.

In 1919 a different type of school for watchmakers was established. The school, which took twelve pupils, gave instruction for five days a week, chiefly in the school workshop. On the sixth day of the week the pupils worked with different master

watchmakers. After a year's course in this school the pupils continued their training in a one-day trade school with a three-year course.

This marks the close of the first stage in the development of vocational education in Stockholm. For some years the Swedish Government had been considering means of systematising vocational education throughout the country. As a result an Act on vocational education for young persons was passed by the Riksdag in 1918.

DESCRIPTION OF THE PRESENT SYSTEM

Under the uniform system of vocational education introduced by the Act, the compulsory elementary school course covering the years from 7 to 12 or 13 must be followed by some form of further education. There are two alternatives, either full-time education in a higher elementary (non-vocational) or in a workshop (vocational) school; or part-time education in a continuation, and possibly later in an apprenticeship school and a trade school. Attendance at a continuation school is also open to those attending a workshop school.

Attendance at a continuation school is from 13 to 15 years of age. The pupils are not compelled to spend their whole time in these schools, as in the elementary schools; the hours of attendance are limited, so that the pupils can at the same time follow an occupation. The continuation school, in its turn, is intended as a foundation for apprenticeship schools for young persons who have entered employment in industry, handicraft, trade, or domestic service. The municipalities are not obliged to open such apprenticeship schools, but each municipality may make attendance compulsory for boys and girls up to 18 years of age, regulating it according to local conditions. Pupils who have attended apprenticeship schools and desire further training in their trade will be catered for in trade schools, attendance at which is entirely voluntary.

Side by side with the continuation schools, higher elementary schools may be established at which full-time instruction is given for from one to four years.

The apprenticeship schools, like the elementary and continuation schools, are always put under the municipal authorities, chiefly with a view to enforcing compulsory attendance. The higher elementary schools are also municipal. Workshop schools, trade schools, and the one-year commercial schools and domestic training schools may be either municipal or private. In addition to these types of school, other municipal or private schools for vocational training may be established.

All these schools for vocational training may obtain grants from the state amounting to two-thirds of certain fixed minimum salaries for the teachers, and up to two-thirds of the cost of educational supplies. Elementary schools, continuation schools,

and higher elementary schools are entitled under special regulations to a slightly larger grant from the state.

In accordance with the Riksdag decision already mentioned, a large number of schools of the new type have been opened all over the country. As an example, it may be stated that reports for the year 1921 were received from over 2,500 continuation and higher elementary schools. There are no less than fifty of the latter in the town of Stockholm.

The Municipal Council of Stockholm decided in 1920 to transform and extend vocational education on the new lines as proposed by the managers of existing trade schools. It therefore distributed instruction among the new types of school — workshop schools, apprenticeship schools, and trade schools. These have been combined in trade groups such, for instance, as engineering trades; all trades connected with the manufacture of household articles (cabinet makers, upholsterers, saddlers, coach makers, wood carvers, etc.); electrical and mechanical engineering trades; trades connected with personal service (barbers, hairdressers, bath attendants, etc.); clothing trades (two groups, one for men and one for women); food, tobacco and allied trades; printing trades; goldsmiths' and artistic trades; building trades; commercial occupations; domestic trades. Each group is under a group Supervisor whose duty it is to manage the schools under the Director of Vocational Schools.

The trade school proposals rejected the immediate introduction of compulsory attendance. Proposals for organisation included suggestions that the former three-year trade schools of the one-day type should be converted into two-year trade sections of the one-day apprenticeship school, that workshop schools should be opened, similar to the watchmaking school established in 1919, but with courses of varying length, and that special courses in the apprenticeship and trade schools should be started. These proposals were approved by the Municipal Council and a credit of 600,000 kronor was allocated in 1920 for putting them into effect. A state grant of about 130,000 kronor was made for the same purpose. These plans were carried out shortly afterwards.

CONTINUATION SCHOOLS

The period of instruction in continuation schools is limited to 360 to 540 hours spread over two or three years. The object is to prevent the continuation school from proving too much of a hindrance to the children's employment. The school districts are allowed wide liberties in distributing the periods of instruction over the year, week, and day, as rendered desirable by working conditions. As in the higher elementary schools, instruction in the continuation school is intended to "lay the foundation for the training of the young for practical trades and to promote their future civic efficiency". It is obviously impossible to achieve anything like the same results in the 360 or at most 540

hours allowed in the continuation schools as can be obtained in the higher elementary schools with their one or more years of training. But experience has already shown that the continuation school may be of great importance, not least in supervising young people in the dangerous period of transition when they are particularly in need of the support and encouragement that the continuation school, even in a limited form, is able to give.

The period of instruction in the continuation schools is too short to afford much hope of giving training in practical work. On the other hand, the practical nature of the instruction given and the information as to different trades and possibilities of training supplied may prove of value in the choice of occupation.

WORKSHOP SCHOOLS

It is now possible to open workshop schools for persons who wish to take up a trade but who, on account of their youth and the nature of the work, find it difficult to obtain employment in which practical training is possible. These schools are mainly intended to give the pupils a sound practical foundation in a given trade. The working hours coincide with the ordinary working hours in the trade, and the work must as far as possible aim at actual production, although it must of course be organised specially with a view to the education of the pupils. Attendance at the workshop schools is entirely voluntary, but even so their importance will be recognised, especially for town boys of 13 to 14 years of age, who are scarcely able to find other employment than as messengers, newsboys, etc. The workshop school may prove a useful supplement to the continuation school, and is at the same time of the greatest value in recruiting workers for industry and improving trade standards in every respect.

The standard of skill in the different trades was beginning to suffer severely from the ever increasing failure or refusal to give apprentices the training needed to produce skilled workers. In certain trades it was even necessary for the apprentice, if he was to obtain employment, to be able to carry out minor work on his own account. Almost all workers were employed on piece work, so that no one had time to devote attention to the apprentices. The position in factory industry was much the same, added to a very high degree of specialisation, so that the training of the apprentice was very one-sided.

These conditions were particularly fatal to young persons in the larger towns, and it was for this reason that the municipality of Stockholm tried, long before the state intervened, to solve the problem by establishing workshop schools for different trades. As a rule, such schools give only one form of instruction, namely, practical workshop training. Theoretical subjects are included only in a few cases, as, for instance, for goldsmiths and watch-makers. Instruction is given in a well-equipped school workshop,

usually with a skilled teacher in charge of a group of twelve pupils. The length of the course varies with different trades from two months to two years, as shown below in the table for workshop schools. School hours are eight per day from Monday to Friday and six on Saturdays, corresponding to the normal working week in an ordinary workshop. Courses for the training of teachers are given in each school. The training of the pupils consists largely in productive work, either to customers' orders, the chief customer being the municipality, or for stock, which is sold later, as convenient. The teacher also shares in the work. Experience has shown that a pupil in a workshop school learns far more than an apprentice in an ordinary workshop during the same period.

To take an illustration of the kind of instruction given, the workshop school for blacksmiths provides a training period of 5½ months, with a 46-hour week. The work is divided into the following sections.

(1) Work at the forge : making and keeping up the fire, use of implements for this purpose, fuel, making up the fire for welding and soldering, heating of iron for forging and welding, heating of steel for tempering, etc.

(2) Forging : training in such work as stretching, up-setting, drop forging, cutting off, punching, bending, etc. ; simple welding.

(3) Engineering : training in milling, such as plane, curve, and valve milling ; thread cutting of bolts and holes ; making of coach fittings and building ironmongery ; rivetting and screw mounting, etc. ; drilling and drill grinding ; work with other machines, such as lathes and planing machines, e. g. spherical and taper turning ; thread cutting, cutting off, planing level surfaces, etc.

In order to give the pupils a real insight into the nature of the work, articles for sale, such as plate fittings, coach fittings, building ironmongery, machine and tool forgings, are manufactured as far as convenient.

APPRENTICESHIP SCHOOLS

Training in the apprenticeship schools is intended to supplement the practical training to be obtained in employment. Two-year courses of eight to nine months per year are given for 6 to 12 hours a week. The time-table is adapted to working conditions and, if need be, concentrated in a shorter period of the year, which is of special advantage in seasonal trades. The employer must, if requested, allow his workers free time to attend the schools, but as far as possible the time-table is so arranged that it shall not interfere with the ordinary occupation of the pupils. Now that working hours have been limited to 48 a week, this should involve no particular difficulty. Instruction in the apprenticeship schools is to be entirely vocational and related to the work of the pupils outside the school. For this reason they are divided into trade groups, each of which is given separate instruction as far as possible. If the groups are too small, they can be combined into sections for mixed trades, but even so an attempt is made to give individual attention as far as possible. In every case definite

syllabuses of training are drawn up. The pupils are no longer allowed, as in the old evening technical schools, to choose what subjects and hours they like, but as in other schools they must follow the whole course in their particular trade section. In addition to the ordinary course, instruction is also given in voluntary subjects. Special courses for older workers who were unable to attend apprenticeship schools before they were 18 years of age may also be arranged.

In Stockholm both forms of training are given in the apprenticeship school — the trade sections and the special courses for older workers. The pupils in the former are given supple-

OCCASIONAL COURSES IN 1920-1921

Subject	Number of hours per annum	
	st year	2nd year
(1) Technical training		
(a) Work in the workshop, theory of materials and tools	117	117
(b) Engineering theory	—	23
(c) Technology	23	39
(d) Trade drawing with geometrical calculation, free-hand drawing, theory of design	78	—
(e) Composition	16	78
(f) Hygiene of the trade	16	—
(2) General training		
(a) Commercial arithmetic	39	—
(b) Commercial correspondence	39	—
(c) Estimates	—	39
(d) Book-keeping	—	39
(3) Industrial and labour legislation	23	16
Total	351	351

mentary instruction, that is to say, pupils who for five days a week are employed in industry and receive ordinary apprentice wages are given practical and theoretical instruction in their trade on the sixth day, every attempt being made to adapt the instruction to the progress of the pupil. The course is for two years and 39 weeks per year, but in some cases for a smaller number of weeks. The bricklayers' course is held on four evenings a week for 25 weeks in the year; the course in domestic training is for 35 weeks in the year.

The above time-table of the trade section for cabinet makers may be given as an example.

Special courses are instituted for older workers who are unable to attend the trade sections of the apprenticeship school, and they may afterwards extend their knowledge by attending the trade school. The length of the course varies, generally amounting to 180 hours spread over two or three evenings a week for 30 weeks. Some of the courses are not longer than 10 to 30 hours, and those in domestic work vary from 24 to 120 hours.

As an example, the following curriculum for workers in engineering shops may be quoted. The course is for one year of 30 weeks, averaging six hours a week, with the following time-table.

Subject	Hours
Trade drawing	60
Trade arithmetic	60
Technology	40
Theory of materials	20
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Total	180

Trade Drawing. Sketching of simple models, accompanied by a brief account of projective geometry; suitable geometrical problems such as the bisection of angles; scales of measurement; construction of models; determination of the real length of a line; simple sections: drawing of more difficult models from pupils' own sketches.

Trade Arithmetic. Brief revision of simple arithmetic; calculations of speed, sections, and gears; percentages; calculation of area and volume; consumption of material, given weight per unit of length or volume; wage calculation and simple costing; use of formulæ.

Technology. Turning processes, correct angles of action, cutting resistance, heating conditions for turning, correct shape of lathe steel; construction of drills, drill grinding, broaches and scrapers, reamers and taper reamers; milling machines, milling arbors; thread cutting tools of various kinds, files and scraping tools, chisels, grinding and grinding tools; thread cutting and thread systems. Measuring tools and their proper use.

Theory of Materials. Extraction and conversion of iron, cast iron as a raw material for refining and casting; structure of steel and its composition when treated in different ways, choice of carbon content for different purposes; qualities of speed-cutting steel, the most usual brands of steel, heat treatment of steel; the most usual alloys, their manufacture and composition; metals in commerce.

TRADE SCHOOLS

Attendance at trade schools is entirely voluntary. The schools may be organised in many different ways, either independently or combined with apprenticeship schools, the length of the courses varying with the requirements of the trade. Instruction can take the form either of trade courses for a whole trade, or courses in special subjects for a given side of the trade, or courses of training in specially skilled work for older workers who are already qualified or who wish to qualify as foremen or independent craftsmen.

The usual length of the courses in Stockholm is 180 hours; fees varying from 5 to 20 kronor are paid. The following curriculum in engineering may be quoted. The course lasts 30 weeks.

Subject	Hours
Trade drawing	40
Trade arithmetic	40
Theory of machine tools	60
General engineering theory	20
Workshop organisation and costing	20
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Total	180

Trade Drawing. Sketching of more difficult models ; suitable geometrical construction, such as sections ; pattern making from sketches and empirical formulæ.

Trade Arithmetic. Revision of simple arithmetic ; use of tables in extracting square roots ; elementary trigonometry, formulæ and simple equations ; simple differentiation ; simple examples of the theory of strength of materials ; use of the modulus in the calculation of gear wheels ; calculation of belting.

Theory of Machine Tools. Account of processes both for simple machinery and such work as cutting gear teeth with helicoidal cutters, etc. ; the construction of machine tools, with special reference to speed gears and the speed of roof shafting ; gas welding and cutting.

General Engineering Theory. Construction and working of steam engines ; types of boilers, internal combustion, expansion, and high pressure engines, electric motors, and heating appliances.

Workshop Organisation and Costing. Organisation of the workshop ; principles of costing, costs of a definite piece of work, general expenses and their allocation : depreciation.

OTHER SCHOOLS

In addition to apprenticeship and trade schools, one-year commercial schools and domestic training schools may be established for those who have no access to the other types of school, but who desire to obtain similar training in a shorter period. Full-time instruction is therefore given through a whole school year, its nature being very similar to that given in the corresponding apprenticeship and trade schools.

MANAGEMENT AND TYPICAL COURSES

The central management of the Stockholm schools is in the hands of a Board of nine persons, the chairman of which is a municipal councillor. The Director of Vocational Schools, who is also head of all the schools and courses of training, is *ex officio* member of the Board. More than half the members of the Board represent different trades. The Board is elected by the Municipal Council. Fifteen committees, one for each trade, each consisting of four persons, are appointed to supervise instruction in the different schools. The chairmen of these committees are appointed by the Board, and the Director of Vocational Schools is an *ex officio* member of all of them. The other two members of each committee are appointed by the employers' organisation and the trade union concerned. The courses given during the school year 1920-1921 (1) and the number of pupils are shown in the following tables.

(1) In 1922 a workshop school for milliners was opened with an 11 months' course.

PUPILS AND COURSES IN WORKSHOP SCHOOLS IN 1920-1921

Trade	Number of classes	Length of course (months)	Number of pupils
Engineering trades	14	5 ½	228
Instrument making	2	11	24
Blacksmiths' trade	3	5 ½	31
Tinsmiths' trade	1	5 ½	16
Coppersmiths' trade	1	5 ½	9
Electrical fitting	2	2	25
Electrical engineering	2	4	29
Watchmaking ⁽¹⁾	2	11	33
Goldsmiths' trade ⁽¹⁾	2	11	24
Cabinetmaking ⁽²⁾	3	5 ½	39
Upholstering	1	5 ½	13
Saddlery	1	5 ½	8
Coachbuilding	1	5 ½	10
Shoemaking	2	11	24
Workshop needlework	3	5 ½	36
Home dressmaking	2	24	20
Total number of pupils			569

⁽¹⁾ Course extended to 2 years in 1922.

⁽²⁾ Course extended to 11 months in 1922.

TRADE SECTIONS IN THE APPRENTICESHIP SCHOOL IN 1920-1921

Trade	Number of classes	Number of pupils
Engineering trades	8	168
Instrument making	2	23
Blacksmiths' trade	2	20
Electrical fitting	4	67
Watchmaking	2	23
Goldsmiths' trade	2	21
Bricklaying	3	23
Cabinetmaking	4	45
Upholstery	1	10
Saddlery	2	8
Coachbuilding	1	9
Shoemaking	2	9
Workshop needlework	2	47
Home dressmaking	2	31
Domestic work	2	24
Total number of pupils		528

OCCASIONAL COURSES IN 1920-1921

Subject	Number of classes	Number of pupils
Domestic work		
Housekeeping	1	12
Housework	1	10
Cookery	1	12
Infant and invalid cookery	1	9
Vegetable cookery	1	12
Food preserving	1	12
Needlework for housewives	5	100
Total number of pupils		167

SPECIAL COURSES FOR OLDER WORKERS IN THE APPRENTICESHIP SCHOOL
IN 1920-1921

Trade	Number of classes	Number of pupils
Engineering trades	6	145
Filing	7	117
Turning	4	78
Welding	1	24
Milling	1	17
Blacksmiths' trade	1	33
Plumbing	4	67
Tinsmiths' trade	1	25
Electrical fitting: high tension	2	42
" ": low tension	2	41
Goldsmiths' trade		
Chasing	1	13
Setting	1	9
Engraving	1	14
Building	3	59
Cabinet making		
Staining, etc.	1	15
Theory of design	1	21
Saddlery		
Leather coachfitting	1	18
Manufacture of leatherware	1	13
Home dressmaking		
Cutting out of women's and children's clothes	2	22
Total number of pupils		773

COURSES IN SPECIAL SUBJECTS IN THE TRADE SCHOOL IN 1920-1921

Trade	Number of courses	Number of pupils
Engineering trades	1	14
Electrical fitting: high tension	3	40
" ": low tension	1	11
Cabinetmaking	1	12
Workshop needlework (Bodice, sleeve and skirt hands)	2	25
Home dressmaking (Dress trimming and modelling)	2	22
Domestic work		
Cookery (small dishes)	1	12
Pudding and pastry making	1	12
Baking	1	13
Total number of pupils		161

During the year five heads of groups and 79 teachers were employed in the schools. In the school year 1921-1922 there were 17 workshop schools with 505 pupils, 15 trade sections in the apprenticeship school with 400 pupils, 43 special courses for older workers in the apprenticeship school with 690 pupils, 13 courses in the trade school with 150 pupils, and 10 occasional courses for older workers with 128 pupils, or 1,873 pupils in all.

It is proposed that three new workshop schools be opened in 1923, the first with a 3-year course for painters, the second with a 2-year course for bricklayers, and the third with a one-year

course for butchers and pork butchers, and that corresponding sections be opened in the apprenticeship school. The number of special courses for older workers in the apprenticeship school is to be 102 and in the trade school 40.

EXPENDITURE ON VOCATIONAL EDUCATION IN 1921

The expenditure on vocational education in Stockholm in 1921 was as follows :

	kronor
Teachers' salaries and fees	263,243
Opening of an apprenticeship school for domestic work and various occasional courses	36,174
Rent and other expenditure for premises	116,288
Educational supplies and books for the libraries	46,544
Heating and lighting	35,119
Office expenses	72,681
Printing and miscellaneous expenses	16,538
Total	586,587

State grants of 123,855 kronor have been made, of which 42,295 kronor were devoted to teachers' salaries in the workshop schools, 47,879 to salaries in the apprenticeship and trade schools, and 33,681 to material. Receipts from other sources such as fees, sales, etc. amounted to 4,791 kronor. The balance of expenditure was met by the municipality of Stockholm. In addition to this expenditure on the Stockholm vocational schools, the sum of 83,874 kronor has been paid in the form of municipal grants to private vocational schools in the town.

The estimates for 1923 include the sum of 404,305 kronor for salaries and 60,406 kronor for material. The expected state grant towards teachers' salaries amounts to 169,450 kronor. The fees in the trade school are estimated at 6,450 kronor and sales of goods made by the pupils at 20,000 kronor.

The main premises occupied by the schools include two engineering shops, a forge, a copper smithy, a workshop for blacksmiths, and one each for plumbers, shoemakers, saddlers, upholsterers, and goldsmiths ; three work rooms for home dress-makers, factory seamstresses, and milliners respectively, three cabinet-making shops, one coachbuilding shop, two workshops for electrical fitting and engineering, one watchmaking shop, and one instrument making shop are housed in other premises.

ATTITUDE OF WORKERS AND EMPLOYERS

Several statements as to the value of the schools and desirable reforms have been made during the ten years for which the apprenticeship and trade schools have been in existence. At first members of the trades were somewhat suspicious of the system of one-day instruction and were disinclined to allow their

apprentices free time (one day per week) to attend the apprenticeship schools. By degrees, as the schools became better known, their use was more fully appreciated, although employers were unable to allow all their apprentices to attend school. It is the unanimous opinion of the employers that the training given at the schools is excellent. In particular, they have realised that the workshop schools are of great value in laying the foundation for technical training and they have followed the work with great interest. The appointment of a committee for each school makes it possible both for employers and workers to follow in detail the work done, and they often make use of the opportunity thus afforded to introduce improvements in the work or in the regulation of the recruiting of labour. The workers are favourably disposed towards the schools, although a few express fears that the supply of apprentices for a given trade may become too large.

It is generally hoped that effective apprenticeship legislation, at present non-existent in Sweden, will soon be introduced, and in this event these schools will be in an excellent position to fulfil the expectations already aroused by their work.

