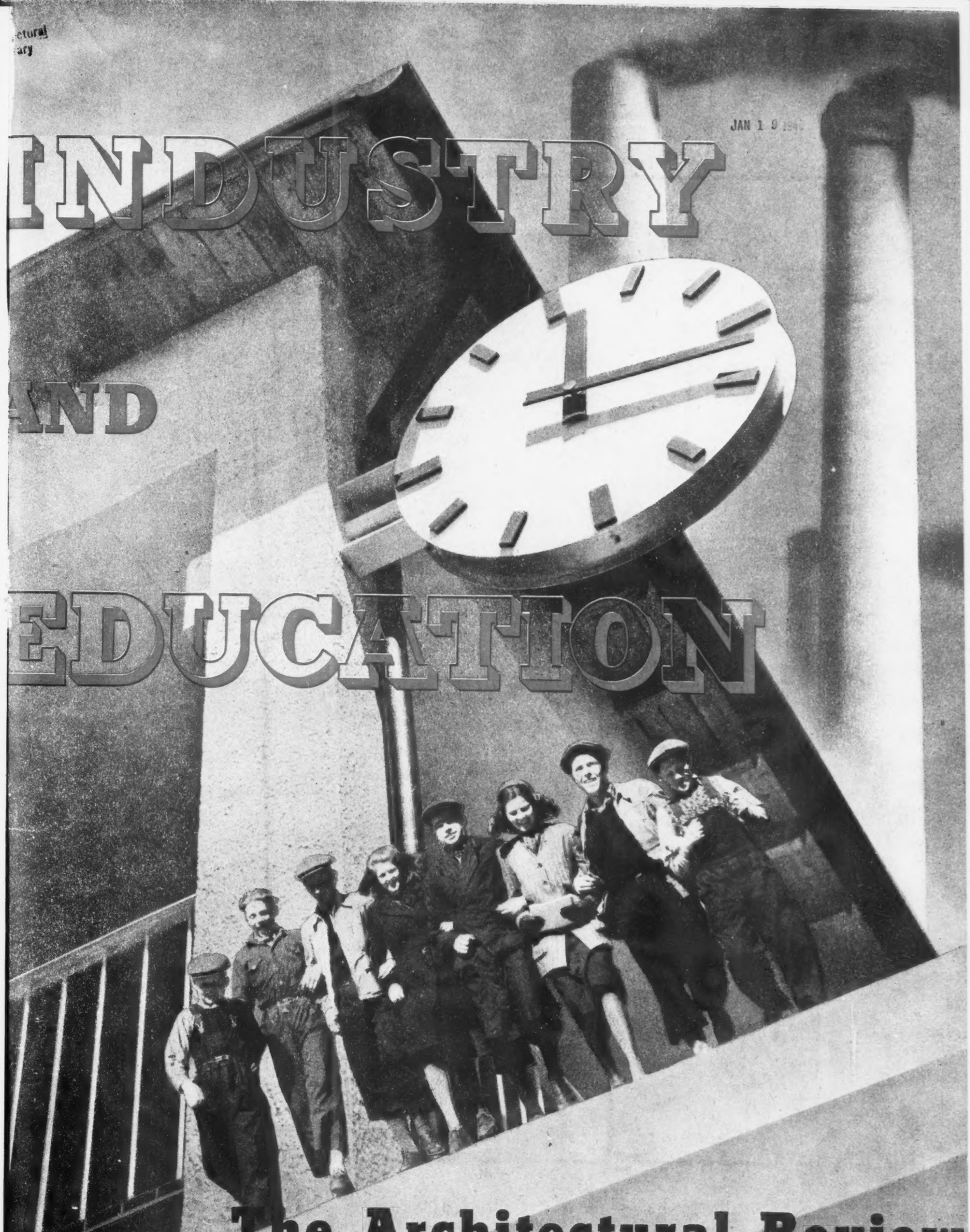
INDUSTRY AND EDUCATION



The Architectural Review

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INDUSTRY AND EDUCATION

The transition from School to Work must be smooth, natural, uninterrupted; an apprentice and his master at Enfield Cables.

CONTENTS FOR JANUARY 1946

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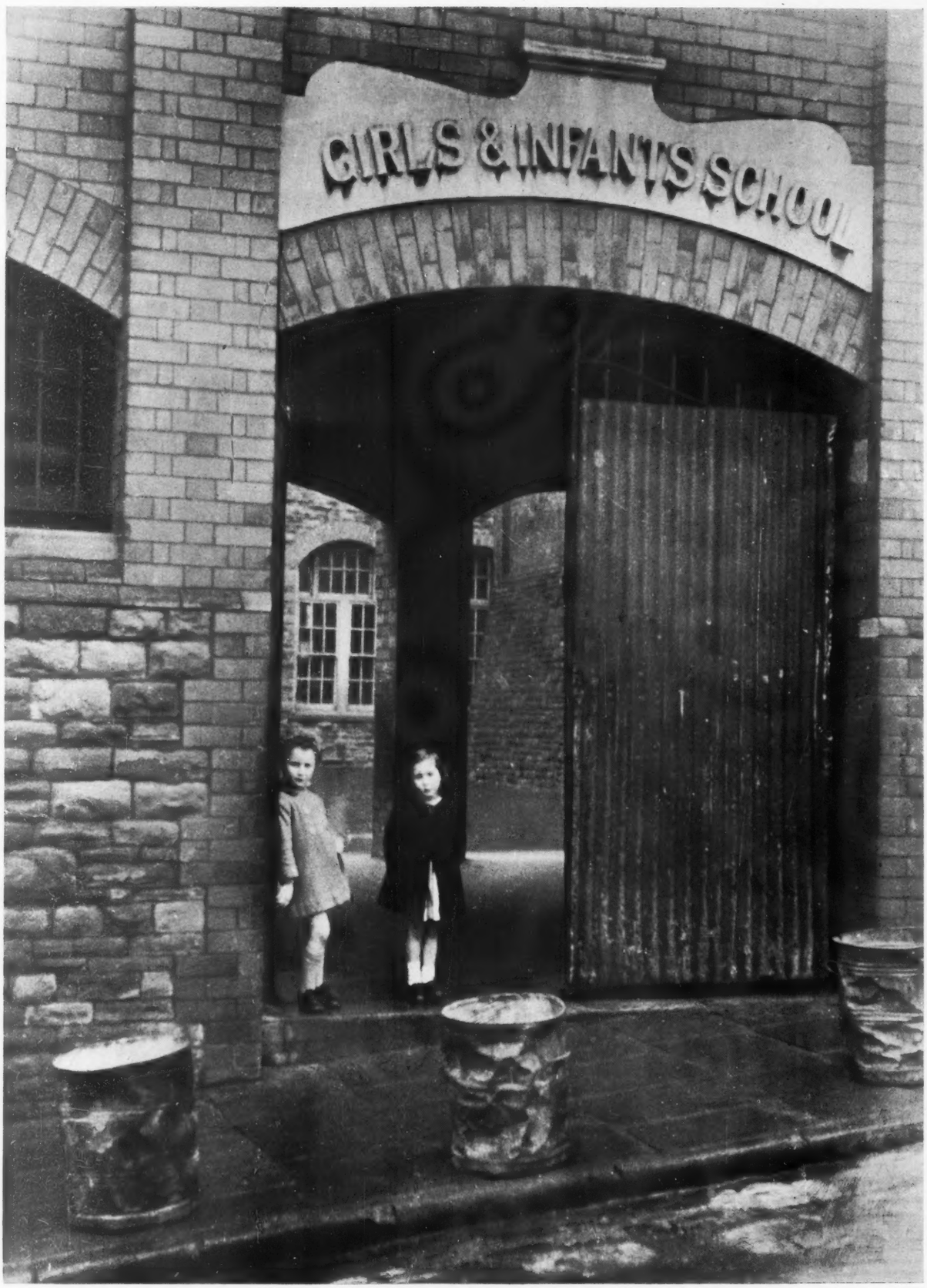
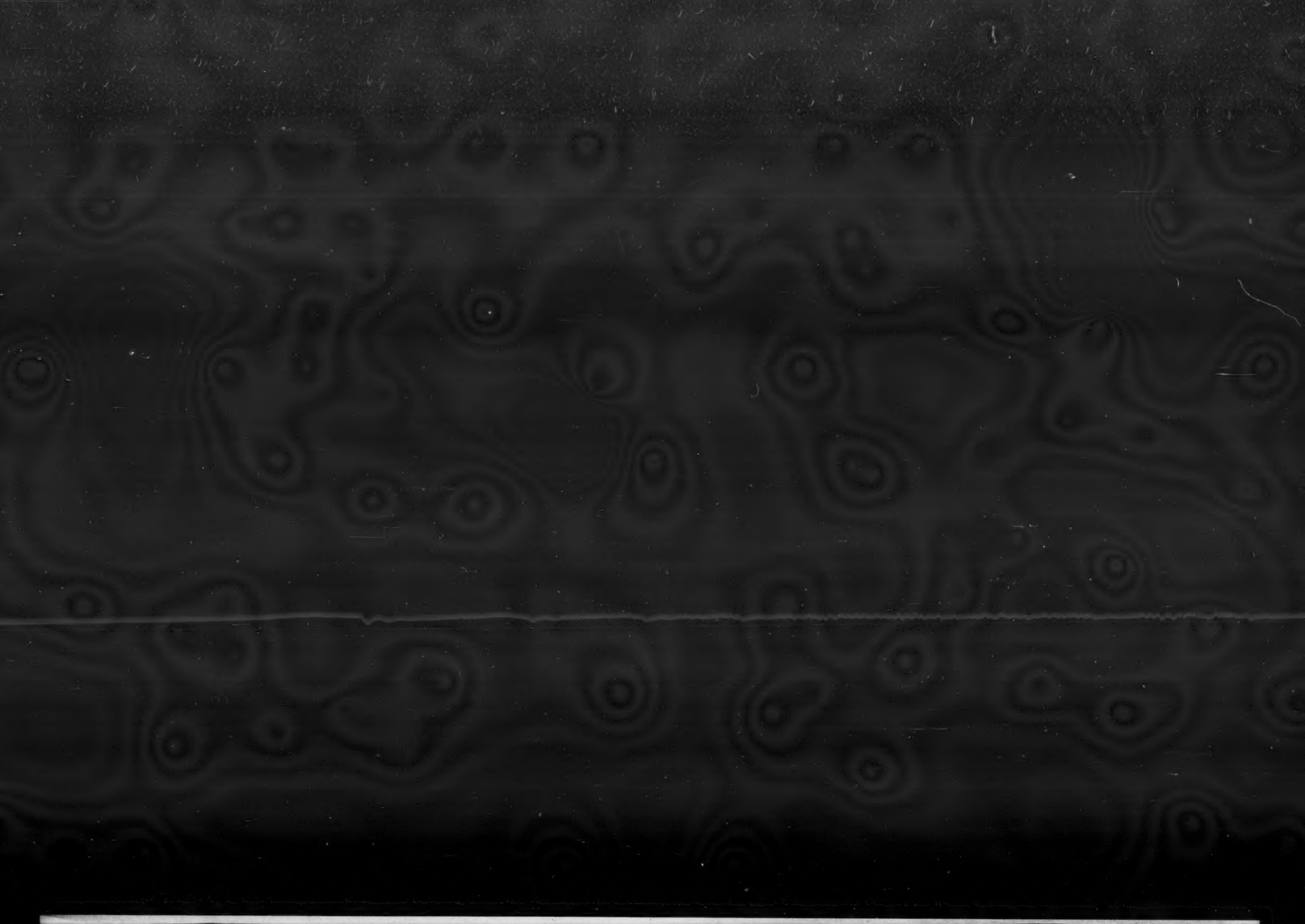
INDUSTRY AND EDUCATION, a special number prepared by the Association for Planning and Regional Reconstruction (A.P.R.R.) for THE ARCHITECTURAL REVIEW. A general word of thanks is expressed here to all the authors and to those who have provided illustrations. Special help has also been received from the Middlesex County Council Education Committee, the Enfield Technical College, the Enfield District Manufacturers' Association, the Swedish Tourist Traffic Association, Cadbury Brothers, M. S. Briggs, C. & J. Weir, Picture Post, Standard Telephones & Cables, Mather & Platt, L. Moholy-Nagy, the South-West Essex Technical College, General Electric Company. E. Hauri (Basel), F. W. Hutchinson (Enfield) and F. Henn (Berne), photographers. The architects responsible for the buildings are as follows: Paul Hedqvist (Trade School, Stockholm), W. Curtis and H. W. Burchett (The Enfield Technical College), Nils Ahrbom and Helge Zimdahl (The Eriksdal Schools), Walter Gropius and E. Maxwell Fry (Impington College), D. E. E. Gibson (Adult Education Centre, Coventry), J. Stuart (South-West Essex Technical College), Hans Brechbuhler (Technical School at Berne).



The task before us is threefold; human, architectural and engineering. The main entrance to a School in Monmouthshire, photographed in 1939, typifies our common failure to apply creative thought to the physical problems of Education.



1 Introduction

". . . for those who have not the kind of ability which makes them suitable either for the University or the Technical College there must be provided a scheme whereby their education is continued along lines suitable to their abilities. The difficulty is that we have little conception of what constitutes a suitable education in this case and therefore no suitable words in which to express it. To use words pregnant with meaning in the old system of education is to invite misunderstanding. The point is that up to the age of maturity any work carried out must be done under conditions which make the educative value of it the paramount consideration. . . ."

the late Dr. H. G. STEAD IN "THE EDUCATION OF A COMMUNITY," LONDON, 1942

" It is the purpose of the Technical School to supplement the teaching function of the master-craftsman, to bring to the student or the apprentice that vocational knowledge and skill which the craftsman is generally not in a position to impart."

Dr. G. FRAUENFELDER, Zurich, IN "METHODIK DES GEWERBLICHEN UNTERRICHTS," LUCERNE, 1934

A SUPREME opportunity lies ahead. Industry, for the first time, has become vaguely conscious of its social and educational responsibilities; Education is in the throes of reorganisation.

The new Education Act will bring into being reforms of deep significance to Industry—some of these are:

- Raising of the School Leaving Age.
- Attraction of the more able pupils towards careers in Industry.
- Compulsory part-time education during working-hours.
- County Colleges in place of Day Continuation Schools.
- Closer collaboration between Industry, Commerce and Technical Education.
- National and more ordered systems of training.
- Provision by Education Authorities of more adequate facilities for technical education.
- Responsibility of Counties and County Boroughs for major technical institutions.
- Reform of methods of recruitment of teachers.
- Broader basis for Scholarships to reward ability, regardless of means.

The present educational machine is not capable of sustaining the stresses that this programme will place upon it. Buildings are totally inadequate; staff is lacking. Education will, therefore, command the highest priority, excluding housing, in the years ahead. The opportunity is there and must be seized, or we lose all.

What A.B.C.A. has done for the Army; what in another sphere T.W.I. is trying to do for industry; and much more, must be done. In the Services it has been proven once again that the widest education and the most effective training are often given close to the job, without special buildings or equipment. A man can be trained, if the incentive is there, for almost any job; if the methods of vocational guidance are applied, the chances are that he will be trained without great waste for the right job. A man's approach to his work, however simple, must be intelligent. Dead-end employment must be banished for ever.

The future needs of education, at work and after work, provide one of the most brilliant opportunities that lies before the architectural profession to-day. The scope is new; the idiom is new; the variety of the demand is infinite. This number of THE ARCHITECTURAL REVIEW, therefore, appears at this moment with a purpose; that purpose is to show to architects and to the teaching profession how manifold is their task and how rich must be its fulfilment, where technical education is concerned. Some of the opinions expressed may differ or appear to contradict each other; that is inevitable. In no country has the job yet been fully done, although, perhaps, the smaller democracies have progressed furthest towards it. It is no accident of fate or incidence of good fortune that has put Swiss watches on the wrists of the world—the watch industry, like all the key industries of Switzerland and Scandinavia, has been built up on hard imaginative technical education. Britain, often first in the realm of ideas, must again find the imagination to produce them and the courage to carry them into practice.

An attempt is made here to show that the strongest link in the new set-up will be the link between factory and technical college. Each, for its several purposes, must achieve high standards of constructional design. The satanic mill and the glass-and-concrete college may both be immature interpretations of a functional need; the economics of recent production technique demand that the mill be re-designed almost as part of the machinery it contains; the garish college building is a mockery, a whited sepulchre, if it teaches hydraulics and electricity in an atmosphere rendered soporific by the misapplication of out-dated lighting and antiquated plumbing procedure. The building in itself must be of itself an inspiration and a practical demonstration of the methods of applied science and intelligent design.

Good buildings, without people to use them, and make them live, are an anachronism. The scope for an interpretation in architectural terms of the needs of many groups of people at a common focus, the technical college, is nowhere greater. Social functions, Foremen's Discussion Groups, Parents' Days, are all part of the link between the College and the industries it serves, and must be catered for in the design of its buildings.

The pages that follow try to imply an open-minded approach to the broader methods of education. Amongst these are the many varieties of part-time day release, the day-continuation school, the factory school—all of them laying a growing stress on education for citizenship and not only on training for technical mastership. There is the restless demand for adult education out of hours. There are the many efforts to build up within industry a sense of personal responsibility half-way between the older Guild system and the tutorial system of the Universities. There are the newer short-term schools, like Aberdovey, which lay stress on a vocational training removed far from the everyday work of the individual, a training that forms character and gives poise.

Industry, in short, must combine with the more formal educational authorities and the schools, to build that University without walls whose graduates will be the ordinary citizens of our industrial civilization. Many others beside the architect must grasp the opportunity that presents itself, but the architect's role could well be the one that in the end makes possible and influences their work. The quality of the job to be done must be paramount in its simplicity and its excellence; there must be open-minded experiment without early standardisation; it was Edmund Burke who said that " example is the school of mankind, and they will learn at no other."

2

TECHNICAL EDUCATION; PAST, PRESENT AND FUTURE

H. E. BROADBENT

historical development

THE lessons of history may often be difficult and obscure, but a systematic study of development over a long period gives a picture of the trend of successive phases of public opinion, with its influence on present-day conditions. Schools to provide education for the mass of the people are of recent origin, but secondary or higher schools have existed for a long time, to provide education for children —chiefly boys. Thus Public Schools and Grammar Schools have a long tradition, whilst primary schools are essentially modern schools.

The traditional curriculum gives some indication of the continuous struggle between rival philosophies of life, and of the many divergent theories of education modified in the light of human development. Controversy has always raged around the rival claims of a classical and a modern education; of the humanities and the sciences; of a general and a more specialised or technical education. General education in Western Europe in the Middle Ages was that of the seven liberal arts and sciences, and survived with little modification in this country until the eighteenth century. It was regarded as preparatory to the study of theology, law and medicine, and hence vocational in the widest sense of the term. As the Universities developed, the three philosophies —natural, mental and moral—were superimposed. Up to the middle of the eighteenth century, the typical school was the endowed Grammar School, sending its most gifted pupils to the Universities. In the seventeenth century there was a certain connection between these schools and the contemporary system of apprenticeship which corresponds to our modern system of technical education. This arose from the fact that a number of schools allocated funds for binding boys to a trade after several years at school.

At the end of the seventeenth and beginning of the eighteenth centuries there was a great development in sea-borne trade which created a demand for captains and officers for the mercantile marine with a knowledge of navigation. This led to the creation of Mathematical Schools. This period brought also great advances in various branches of science, and the traditional curriculum was clearly inadequate to meet the demand for a different type of knowledge. Thus Commercial Academies and private schools became the recognised means of education for the middle and lower middle classes of the population. Some of the Public Schools now broadened out the scope of the traditional type of training, and the examples of Eton, Rugby, Shrewsbury and Uppingham are too well known to warrant any comment here. A further development was the creation of Middle Class Schools, which were later engrafted on to the ancient Grammar School foundations. After 1850 the curriculum of most of the better schools was determined by external examinations such as the Civil Service, and Oxford and Cambridge Locals. The London University School Certificate examination came later in 1902.

In the second half of the nineteenth century, three great movements affected the traditional ideas about secondary education, namely :—

- A movement to provide higher education for girls and women.
- The establishment of a national system of elementary schools in 1870.
- The recognition of the importance of technical education.

The first arose out of the movement for the emancipation of women; the second had as its main motive the protection of children from premature employment in industry, and was meant to provide general popular education; the third was the result of the industrial revolution which had altered the organisation of industry, and the pressure of foreign competition which prompted State Aid for adequate facilities for technical education. The last one is of main interest to us in this historical review.

The first Mechanics' Institute was founded by Dr. Birkbeck in 1823, and by 1850 there were over 600 of them throughout England and Wales. They made an important contribution towards the development of a State system of technical education, which was initiated by the formation, in 1856, of the Department of Science and Art as a branch of the Education Department. A general system of examinations in Science for teachers and students was inaugurated in 1859 by this department, an example followed by the Royal Society of Arts for technological subjects in 1873. These were transferred to the City and Guilds of London Institute in 1879. The Royal Commission on Technical Instruction (1881-84) recommended that local authorities be empowered to establish and maintain technical (including agricultural) Schools and Colleges. The Local Government Act of 1888 set up County Councils for administrative purposes, and together with the Technical Instruction Act (1889) and the Local Taxation (Customs and Excise) Act (1890) made advance possible by creating a local authority for each county, and large county borough, with specific powers and funds for educational development.

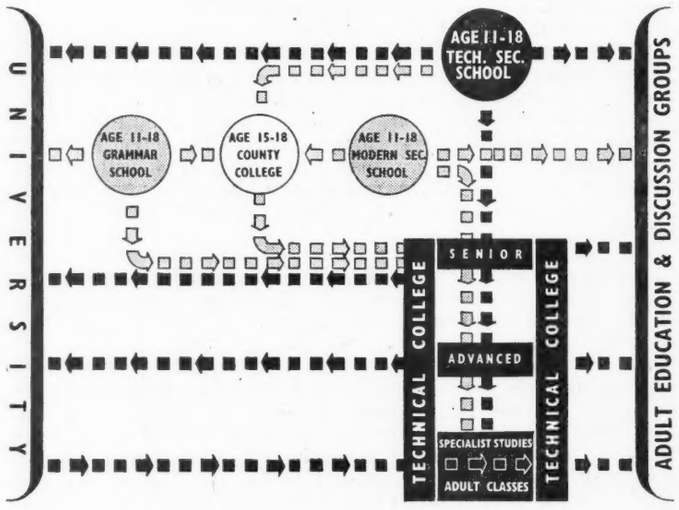
The relations of technical education to secondary education now became a matter of controversy, and the views of the Royal Commission on Secondary Education (1894-95) on the traditional curriculum make interesting reading. Consider these extracts which are expressed in the psychological terminology of that report :—

> " All education is development and discipline of faculty by the communication of knowledge, and whether the faculty be the eye and hand or the reason and imagination; and whether the knowledge be of nature or art, of science or literature, if the knowledge be so communicated as to evoke and exercise and discipline faculty, the process is rightly termed education."

And later on :—

> " Secondary education, therefore, as inclusive of technical, may be described as education conducted in view of the special life that has to be lived with the express purpose of forming a person fit to live it."

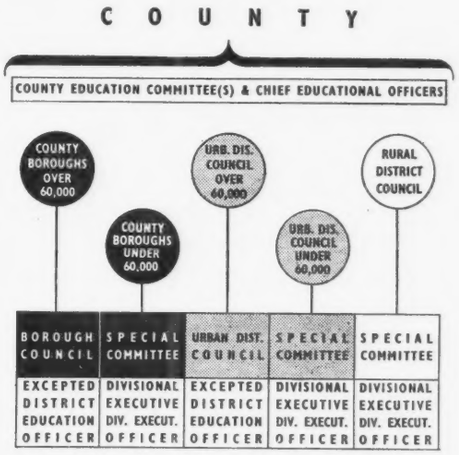
So, true to our national character, our educational system has been built up on compromise, resting upon the triple alliance of State, Local Authority and Voluntaryism. This system has stood the test of time, and has just been re-affirmed and re-invigorated by the Education Act of 1944. The direct intervention of the State with its Regulations for Secondary Schools (1904-5) took no account of the views expressed above, and it would appear that they introduced an unnecessary and unreal cleavage between Secondary and Technical education. The stress was laid on the provision of a School Certificate Course for boys and girls between the ages of 11 and 16, wherein any training of a vocational nature was discouraged.

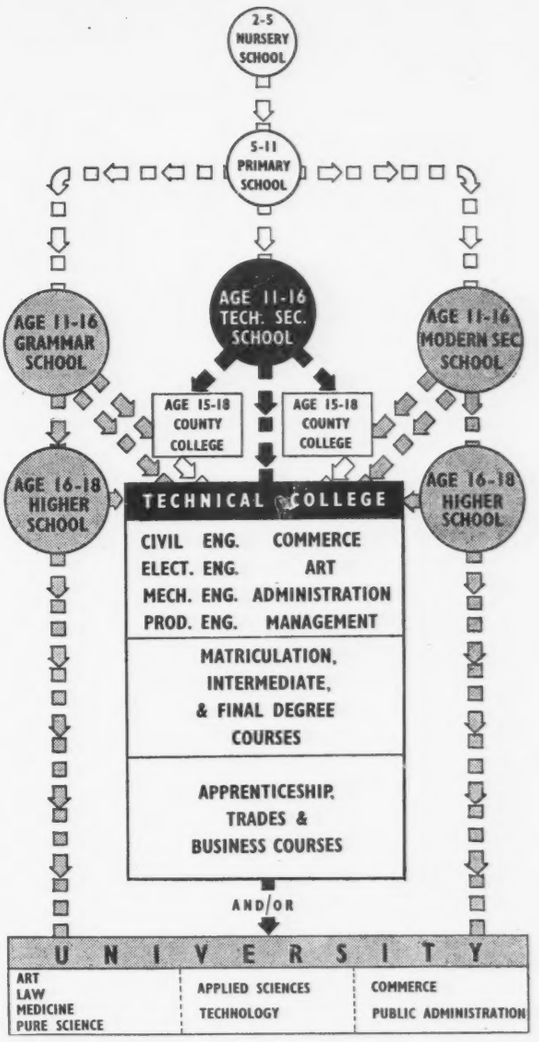


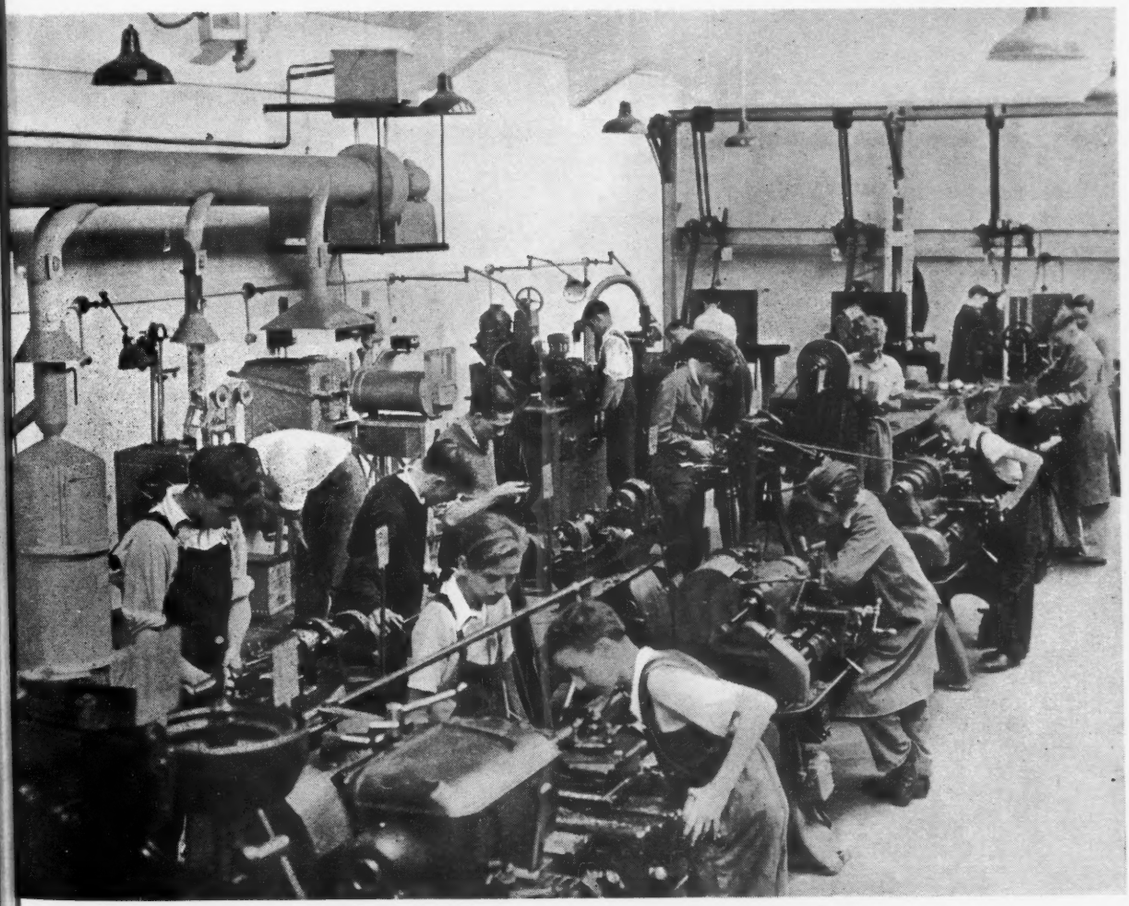
the present

By general opinion the work of Technical Colleges up to a few years before the war was confined mainly to tuition given in evening classes. A number of them operated full-time day courses for students above the age of 16 years, and conducted courses of study leading to the conferment of degrees, again mainly of the external type in conjunction with the University of London. A few more did specialise in various branches of industry, such as textiles and rubber. Industrialists, with few notable exceptions, have never taken the interest in the educational system that would appear to be of such vital importance to the welfare of the country as a whole. As they have to employ the product of the system from a comparatively early age, it seems clear that they should express an opinion regarding the knowledge and skill which would be required for success and should co-operate with the educationists in devising a type of education and subsequent training which will provide for their acquisition. The process should be a continuous one throughout the years of adolescence ; and in some cases far beyond this stage.

It has been said that " Man's thought will flourish in spite of you," and experiments with different types of schools for early training of a vocational character were bound to arise. A number of full-time day Trade Schools, mostly for boys, were established about the year 1900, and chiefly in the London area. They were designed to take







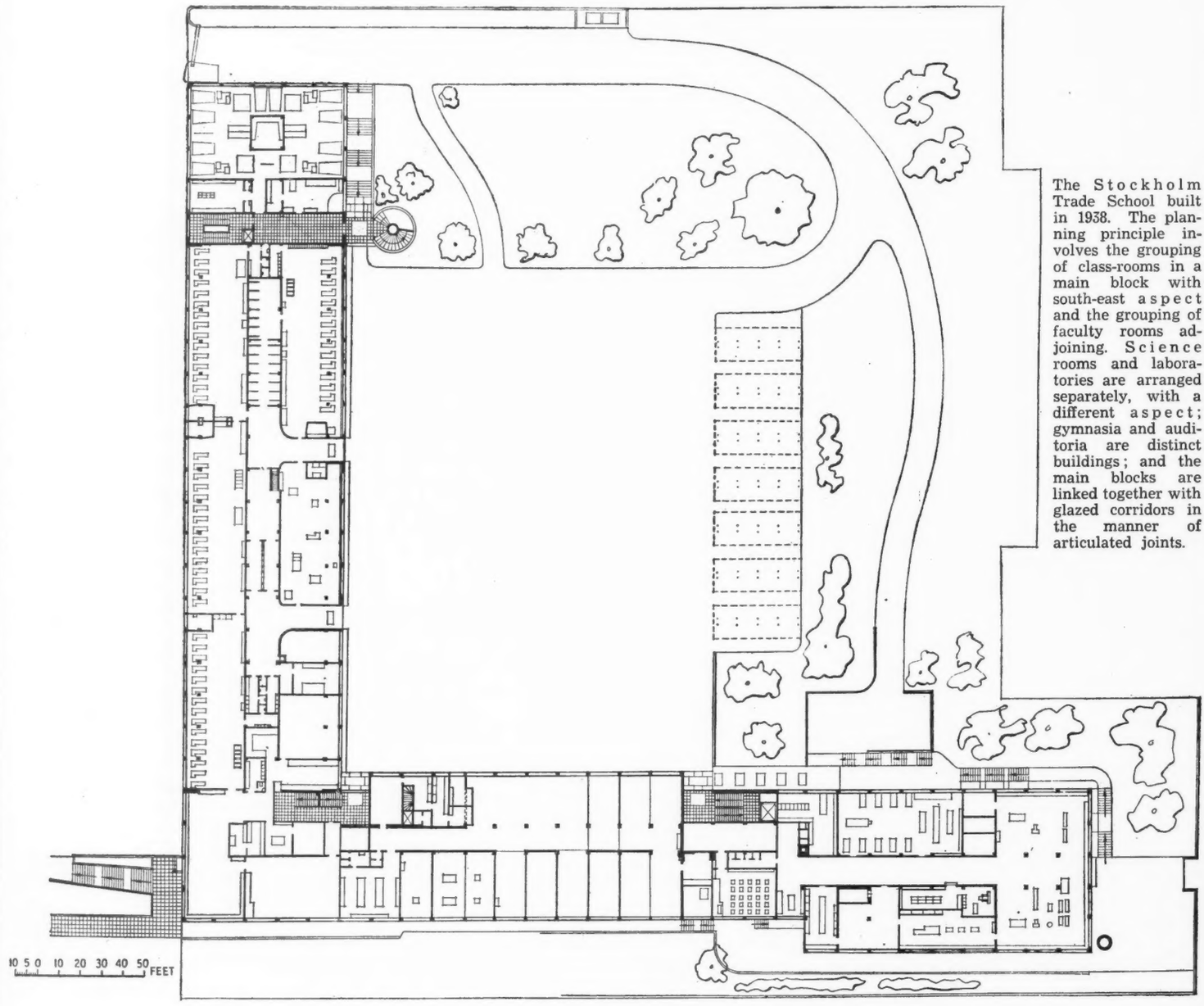
There must be practical instruction on full-scale plant and equipment in the Technical College as well as in Industry ; an engineering shop at Enfield Technical College.

boys on or near the completion of their elementary school career for a period of one, two or three years, and to give them a specialised training that would fit them to enter into workshop or factory life around the age of 16, with a definite prospect of becoming skilled workers. These Trade Schools received grants as Day Technical Classes under the Regulations for Evening Schools, Technical Institutions, etc., and were mainly organised as courses within a College. In spite of the cautious attitude adopted by the then Board of Education, there was a distinct demand for such day courses, which led to an increase in the number throughout the country, and caused the Board to issue separate Regulations for Junior Technical Schools in 1913. These Schools were not intended to offer preparation for the professions, Universities, or for higher full-time commercial or technical work, but were designed to prepare their pupils either for artisan industrial occupations or for domestic employment. The minimum age of admission was 13 plus, to take the pupils recruited mainly from the public elementary schools, and provide them with a vocational course of two or three years' duration. As the traditional secondary schools recruited their pupils at the age of 11 plus, whilst elementary schools and selective central schools took a further quota at 12 plus, the Junior Technical School was placed at a disadvantage in being unable to recruit selected pupils (as based on a verbal test) for a specific training for industry. In spite of this disadvantage the Junior Technical Schools have been successful in training boys and girls who have proved of value to industry and commerce, and who have risen to posts of responsibility within industry. The number of pupils attending these schools has always been small, the total for the country in 1937 being thirty thousand, as compared with four hundred thousand in secondary and one million, eight hundred thousand in elementary schools. These are close approximations, the estimated total child population in the age range being four millions.

Their general position in 1936 was reviewed in the Board's Educational Pamphlet No. 111, " A Review of Junior Technical Schools in England," which followed a systematic survey. There are four main classes :—

- Those preparing boys to enter specific industries without restriction to particular occupation within the industry, e.g. engineering or building.
- Those preparing boys and girls for specific occupations, e.g. printing, cabinet making, musical instrument making, and women's trades.
- Those preparing girls for home management.
- Those preparing boys and girls for commercial life and known as Junior Commercial Schools.

In many Technical Colleges, the Junior Technical School constitutes one of the main full-time day courses. Various types of professional, university and technological courses are also available. A limited number of engineering and building diploma courses fall into the last group, and provide a two years' or three years' course from the age of 16 for the Ordinary or Higher National Diploma. It would appear that there should be a limited demand for the continuation of such courses. Within recent years there has been an increasing number of engineering apprentices released during working hours in order to



The Stockholm Trade School built in 1938. The planning principle involves the grouping of class-rooms in a main block with south-east aspect and the grouping of faculty rooms adjoining. Science rooms and laboratories are arranged separately, with a different aspect; gymnasia and auditoria are distinct buildings; and the main blocks are linked together with glazed corridors in the manner of articulated joints.

attend the Technical College on one whole day or two half days per week without loss of pay. Up to the present, this practice has not been extended to other grades of workers (e.g. trade boys) on any large scale. The remainder of the work of the College is carried on in evening classes, in a wide range of professional, commercial, technological, and trade courses. During the last twenty years the National Certificate schemes in engineering, chemistry, building, etc., have proved a great success. Quite a lot has been done in the field of adult education, and a strong liaison has been built up among the many voluntary organisations working in this field.

With this background a summary can be given of the present position. Most children leave school at the age of 14 (the present compulsory age) from the elementary school. Of the small percentage of secondary school pupils leaving school at 16 plus, a relatively small number enter the manufacturing side of industry—craft is not popular. The number of young people trained in Colleges directly for industry is far too small. It seems clear from past experience that industry should not expect too much of the Universities, since in their case business and industry appear to be a side-line. Irrespective of the raising of the age for compulsory attendance at school, the number of young people available for employment in future will be less, and quality will be far more important. In the light of experience, what shall be done in the immediate future ?

the immediate future

As previously stated the 1944 Act has re-affirmed the principle of compromise in the control of education as between State, Local Authority and Voluntary effort. It is clear, however, that industry can no longer afford to be indifferent to the proper organisation of education and training for its young recruits. If it is true that industry is becoming more and more a social service, then its most important contribution to the National Welfare, and the wider problems of international relationships, will lie in its co-operation throughout the whole field of education, and education is a life-long process, and it cannot be divorced from the vocational aspect of " making a living."

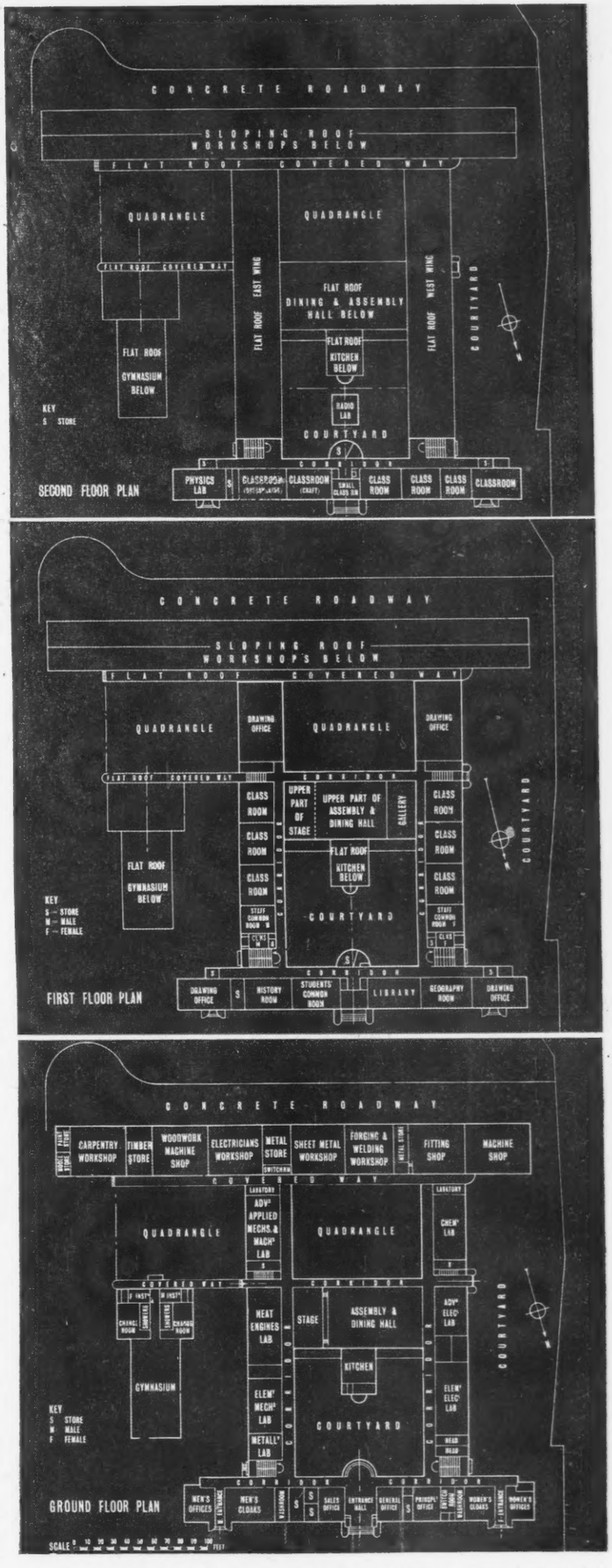
The provisions of the new Act are well known ; so only a brief summary will be given. Public education will be organised in three stages known as primary, secondary and further education. Beyond the age of 11, all education will be of the secondary type, and classification of all pupils is proposed on the basis of age, ability and aptitude, and not as the result of a competitive test. The three types of secondary schools will be Grammar, Technical and Modern. Further education will be re-organised in three sections :—

- Compulsory part-time day education.
- Technical, Commercial and Art Education, and
- Adult education.

The first legislates for the part-time attendance of all young persons between the statutory school leaving age and 18 at an appropriate centre for at least one day per week, unless they continue in full-time attendance at school. It is proposed to build County Colleges to meet this need. For the purposes of technical, commercial, art and adult education it is proposed greatly to increase the provision of adequate and properly co-ordinated facilities.

It seems that the conclusion reached years ago to the effect that " the best preparation for technical study is a good modern secondary school " has been accepted as true, and the new Technical High School of equal status with the Grammar School will be a future development. In any discussion on the corporate life of a Technical School, the problem will arise as to whether it should be a department of a regional Technical College, housed in the same building, or whether it should be an independent school with its own building and under separate control. There is much to be said on both sides, and the ultimate answer may be a compromise, so as to give the school at once the advantage of a separate building and existence, and at the same time retain the valuable link with the College. This will be a matter of planning buildings on larger sites—the latter not easily acquired in large centres of population—and will need consideration in relation to the provision to be made for County Colleges. If the new Technical Secondary School is completely isolated from the College, there is a distinct danger of its losing its identity in a common system of secondary education mostly on the old traditional lines. Whether this is a serious danger is, of course, open to argument, but industry should formulate and express its own views on this vital question.

Again, industry is vitally concerned with the development of the County Colleges supposed to be operative in 1948. In the manufacturing trades, apprentices and trade trainees could be accommodated in the colleges under part-time day release schemes similar to those now in existence. For the remainder of those within the age groups concerned, separate buildings will be required. As it has been laid down already that the larger proportion of the time shall be spent in general educational subjects, the question of additional time to be allowed for professional, technical and trade training will demand consideration.



The Enfield Technical College is the most recent of its kind to be constructed in Great Britain. The outline plans above show the artificial symmetry of the design and the failure to express the functional needs of such a College in the physical layout. For example, the size of the kitchen bears little relation to the size of the hall it serves and has no access for goods and services, except across the school corridors.

ENFIELD TECHNICAL COLLEGE

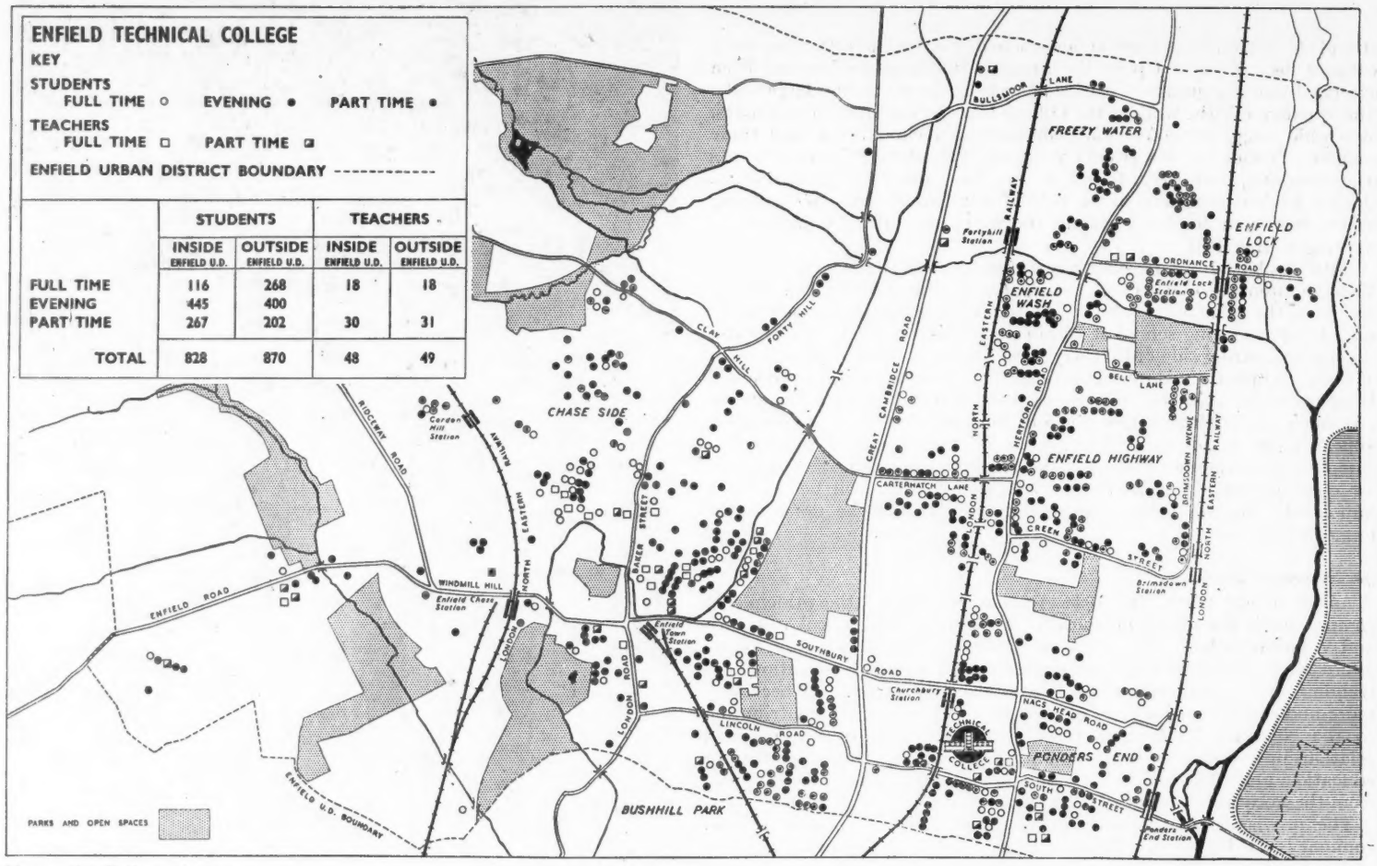
KEY

STUDENTS
FULL TIME ○ EVENING ● PART TIME ●

TEACHERS
FULL TIME □ PART TIME ◪

ENFIELD URBAN DISTRICT BOUNDARY ----------

	STUDENTS		TEACHERS	
	INSIDE ENFIELD U.D.	OUTSIDE ENFIELD U.D.	INSIDE ENFIELD U.D.	OUTSIDE ENFIELD U.D.
FULL TIME	116	268	18	18
EVENING	445	400		
PART TIME	267	202	30	31
TOTAL	828	870	48	49



Above, the College serves a compact but highly industrialised area; it has become a focal point for students of all kinds from further afield.

Below, the industries of the area. No Technical College should be designed and built without a careful survey of the industries to be served.

ENFIELD INDUSTRIES

KEY

METALLURGICAL, including Ferrous and non-Ferrous Foundries

GENERAL ENGINEERING including Sheet-metal Work and Production Speciality Machines and Aircraft (in wartime)

ELECTRICAL ENGINEERING and MANUFACTURE

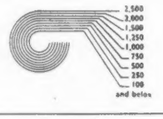
CHEMICALS, Paint, Plastics, and Rubber

BUILDING TRADES, including Building Materials and Furniture

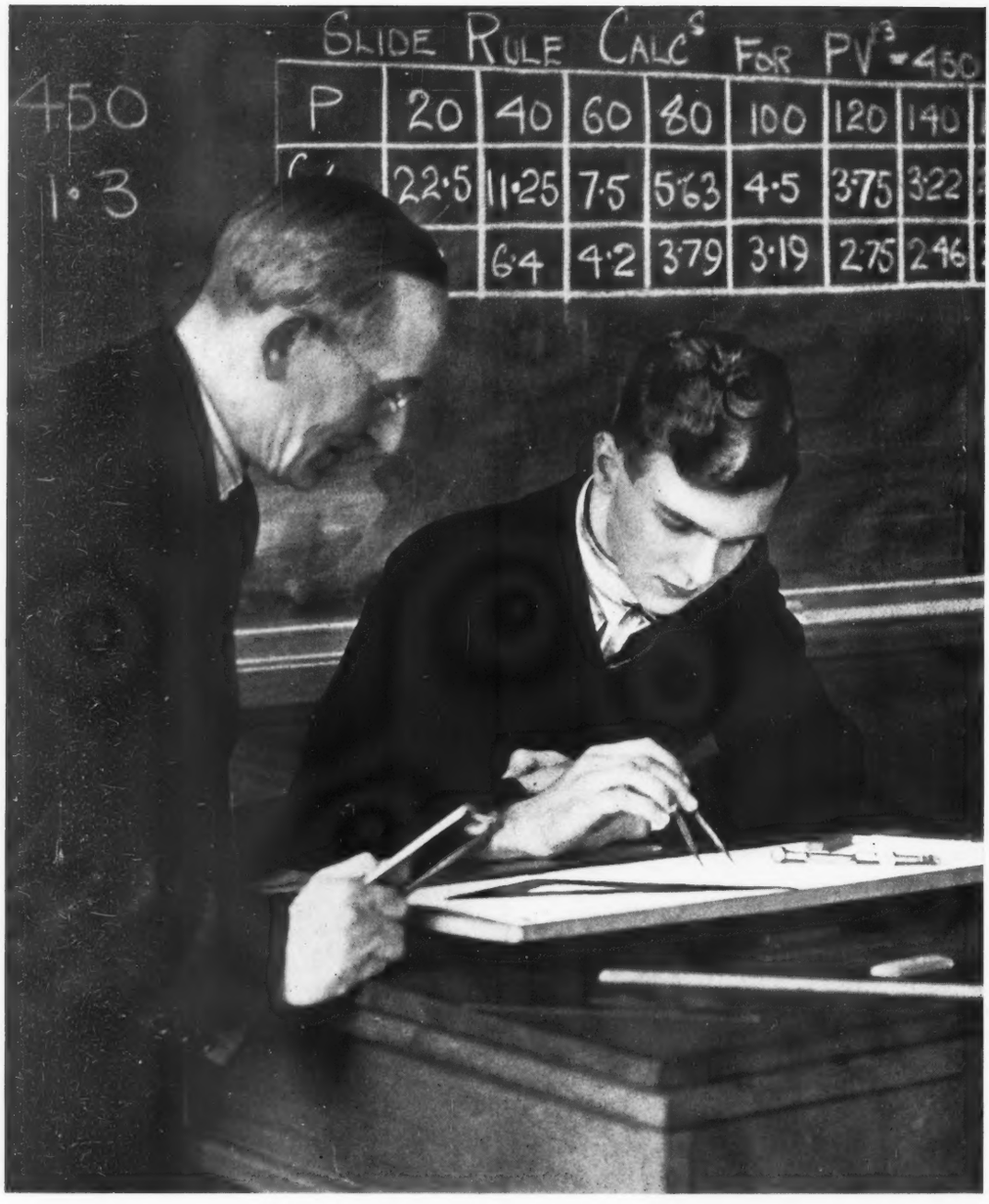
MISCELLANEOUS, including Printing, Laundry, Paper, Food, and Horticultural Supplies

This list is not complete, the classification has been complied to suit the needs of the area only; the substantial Lee Valley Glasshouse Industry (which is widely interspersed among factories) has not been shown

NUMBER OF WORKERS EMPLOYED



Above, at the Kiruna Trade School in the Swedish Iron Ore district practical instruction goes hand in hand with theory. Right, a Clydeside engineering firm of international repute operates its own Works School, designed both for specialised technical education and for training in citizenship.



Apprentices carry out their work according to a regular planned curriculum, part of the time being spent in School and part on practical work in the shops.

With the emphasis on cultural studies and leisure pursuits in the County Colleges it seems clear that such additional time will be required if the professional and vocational training is to be effective.

Technical, Commercial and Art education must undergo vast expansion. The need is for more and more flexibility in the provision of courses to meet the diverse needs of commerce and industry under the present conditions, in the light of a new world outlook. This country has shown a high productive capacity throughout the war years, and will only survive nationally by developing its high technical skill. In addition to the provision of a wide variety of craft courses specially directed to the needs of the area, the College must provide a wider choice of technological and science courses of the National Certificate type. This need has been foreseen already, since in addition to the usual provision for Mechanical, Electrical and Production Engineering, new courses are available in Physics and Metallurgy. The new Motor Traders' scheme is also worthy of note. Advanced courses up to the University level must also be developed, and it is to be hoped that the proposals to set up a Technological University of Great Britain will be successful, so that selected colleges may be part of its organisation. In this connection, too, it is important to make provision for the training of supervisors, managers and administrators, so that the present haphazard selection may be eliminated.

An attempt has been made already to deal in a limited way with adult education. In view of the excellent work done in the services during wartime there will be a much greater demand, and suitable provision must be made in all Colleges to meet this greater interest. This means the extension of facilities for discussion groups and special short courses of lectures in wide variety. In effect, the future college must be an important civic centre in the life of its community, with all the amenities that this entails. It must be mindful of the importance of local initiative, and must have freedom to experiment with ample room for individual effort.

Some years ago Professor Whitehead said : " The antithesis between a technical and liberal education is fallacious. There can be no adequate technical education which is not liberal, and no liberal education which is not technical."

This view appears to have gained general acceptance. The future development of adequate facilities for technical education depends upon whole-hearted collaboration with industry. Not all industries are organised for co-operation, and one method is to establish Regional Advisory Committees for each industry ; or to set up locally a liaison Committee between the College and the Local Manufacturers' Association throughout the area of its service. Knowledge of new processes and the achievements of research must reach the College lecture rooms and laboratories with a minimum of delay. Industry must provide lecturers in special subjects, and allow the use of its own facilities for training on an interchange basis. It must take a real interest in the planning and equipment of the College, so that the training is comprehensive in addition to being adequate. The financial implications are of a secondary nature, and in any case will be easily carried by the more efficient operation which must ensue. Here is our objective for future development of the services of technical education, and the goodwill of all concerned will ensure its translation into practice.

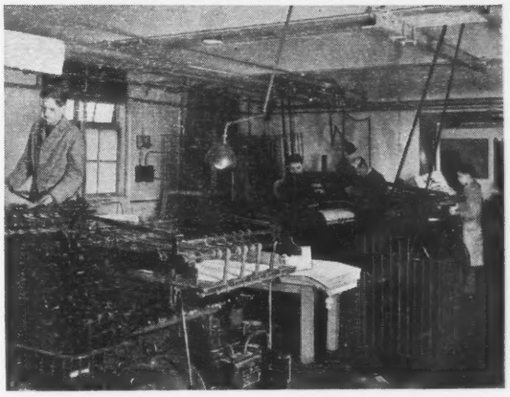
3

EDUCATION FOR ENGINEERS

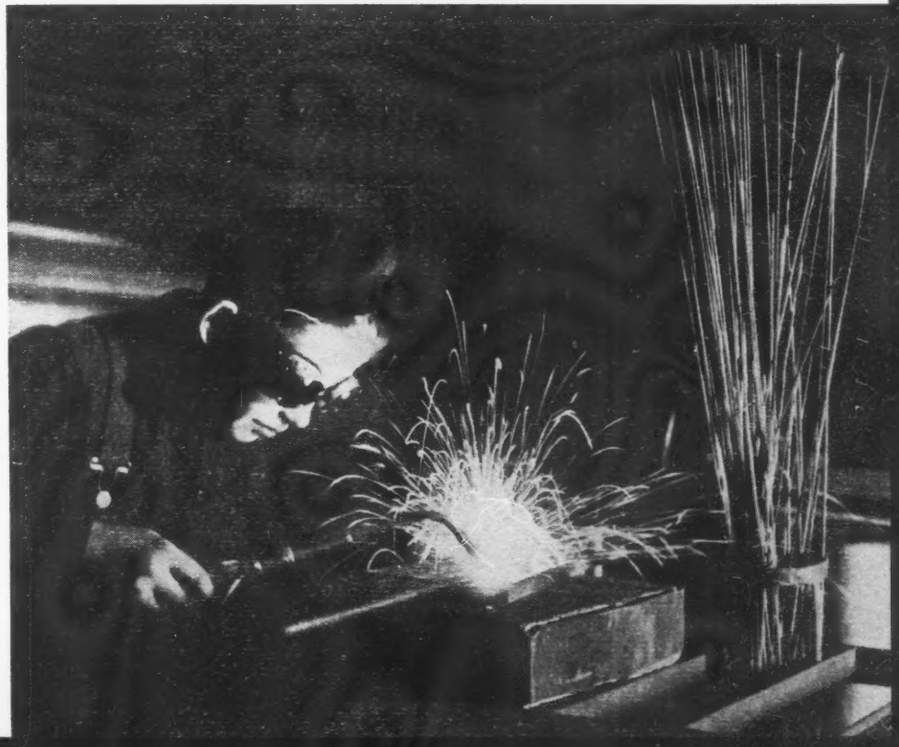
G. MAVOR

SINCE the last century the qualifications required from an engineer have changed completely. Sir William Fairburn has stated that "the millwright of the last century was an itinerant engineer and mechanic of high reputation. He could handle the axe, the hammer, and the plane with equal skill and precision; he could turn, bore or forge with the ease and despatch of one brought up to these trades. Generally, he was a fair arithmetician, knew something of geometry, levelling and mensuration, and in some cases possessed a very competent knowledge of practical mathematics. He could calculate the velocities, strength and power of machines; could draw in plan and section and could construct buildings, conduits or water courses in all the forms and under all the conditions required in his professional practice." The engineer acquired knowledge of his profession through pupilage during which he served in his chief's office and on his works. The craftsman learned his trade by apprenticeship. In those days there was no mass production in the factory sense, but in civil engineering work many labourers were employed. Pick and crowbar, shovel and barrow were their machines. Yet, though labour was the principal part of their lives, they could see and understand the job on which they worked, and they often became part of a team in which the human element was strong and pride in the job had a place.

The engineering profession now has divided itself into branches such as civil, mechanical, electrical or production, and within each branch smaller sections have been formed and continue to grow in number. Thus the system of education in operation must be sufficiently elastic continually to meet the needs of students. Some may cover more than one branch, while others specialise in a single branch according to their individual ability, inclinations and ambitions. The use of machinery, in manufacturing processes and for the conversion of energy, combined later with the development of highly specialised materials, has created a demand for a type of person who is neither a professional engineer nor yet a craftsman. Usually he is described as an engineering technician. His function is not to design nor to operate, but to supervise the operation of machinery, to use materials to the best advantage and maintain plant in an efficient condition. In view of the magnitude of responsibility and variety of apparatus involved, it is not easy to give a reliable definition of such a technician. In his training mathematical manipulation is less important, though it cannot be ignored, than the practical applications of methods by which manufacturing difficulties are overcome. The use of measuring and testing apparatus and the making of reliable observations are becoming more and more important. Hence it would be true to say that the engineering education of many technicians is of a kind which is limited to the minimum which will enable them to do their work successfully. It does not require that wide range of fundamental knowledge, nor the mathematical and scientific knowledge which enable an engineer of professional standing to address himself to many day to day problems which arise. Yet many technicians by their ability, study and experience reach the status of professional engineer. With the increasing complexity of modern engineering, the work of craftsmen has changed so that it has become less individual and, while much craftsmanship of a high standard continues, it cannot survive without a supplementary knowledge of technology. Thus it appears that there is no sharp line of demarcation between the craftsman and the technologist. In good craftsmanship there has been always a combination of skill of hand and mind, but by the development of machinery and subdivision of processes the balance has changed radically in recent years. It is important to emphasise this lack of a clear division between engineers, technologists and craftsmen in the engineering industry. Some craftsmen, by study and experience, become technologists, and many technologists become professional engineers. Such promotions are evidence of the reality of the opportunity which engineering offers in all its branches.



The new approach to technical education gives the Architect manifold opportunities for creative functional design. Top, technical instruction for crippled boys in Sweden. Centre, printing machine shop at the Cambridgeshire Technical College and School of Art. Left, Weir apprentices receive practical instruction in trigonometry, on the roof of their Works School.



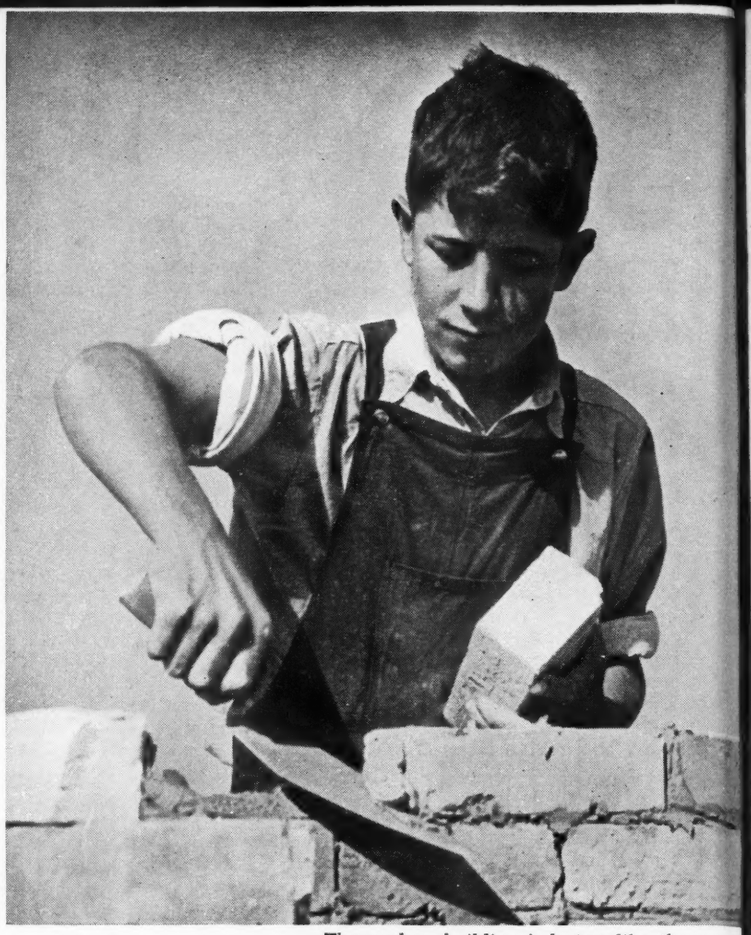
Right, instruction in gas-welding at Kiruna.

During the nineteenth and early twentieth centuries the many apprentices, who were later to become engineers of high standing, were indentured in works in which some branch of engineering was carried out. Although they gained experience and skill in a sufficient number of processes, there was rarely any organised provision within the works for their complete engineering education, which was not regarded as the employer's concern. If they wanted to learn the science of engineering or the technology of their special branch they attended a technical school, in their own time in the evenings, usually after a long hard day in the works. Those who had sufficient physical strength and mental ability acquired the status of professional engineer, whilst many, unable to complete the arduous course, remained competent technicians. By about 1920 the inability of a manufacturing works to provide a full and reasonable training was accepted, and the term apprentice had begun to lose its old meaning. To-day it often signifies no more than a youth who has been engaged in a specialised branch of the industry, although some firms still indenture apprentices. In the period between the last two wars a few employers with advanced ideas released selected apprentices so that at least part of their work at the technical college could be done in the daytime. This valuable concession was granted on a very small scale, and when the then Board of Education allocated a grant of £12,000,000 to the modernisation of technical colleges, the plans were still based on the assumption that post-entry industrial or commercial training would be given in evening classes. During the war, part-time day release has increased fourfold and when the County College, proposed in the Education Act of 1944, becomes a feature of our compulsory system of education (the appointed day is not yet fixed) evening study by young people will no longer be the recognised means of obtaining technical education. It should be pointed out, however, that after the age of 18 years the release of students in the day time will depend upon the generosity and prosperity of the employer.

Until very recently it was considered to be sufficient if the training of engineers comprised practical experience in or on works, and qualifications in such subjects as science, mathematics, and a branch of technology. A fully qualified engineer is now concerned with men, money and the law, as well as with materials, machines and man power; with art and commerce as well as science and manufacturing methods and an understanding of human nature. Engineering students should realise the wide field of training now necessary to achieve success. There can be no discussion here of the relative merits of a University or a Technical College education for the engineering student. The cloistered seclusion of the University offered ideal conditions for concentrated study away from the turmoil of industry, which, although giving many advantages, suffered from the lack of opportunity of linking theory with practice. In the Technical College courses are arranged to enable theoretical instruction to proceed along with the works training and, as the College is invariably situated in the midst of industry and is intimately associated with it, a balanced training is possible. Much thought is being given at the present time to the most satisfactory method of obtaining a balance between theoretical and practical training periods and no solution has yet been found which gives complete satisfaction to the industrialist and to the educationalist. Even with the increased hours which part-time day release provides for theoretical study, the wider conception of what is meant by education cannot be satisfied during the period of apprenticeship. Those who are ambitious, whether they have been educated at university or technical college, soon find that further knowledge in many directions is a necessity, and the development of post-graduate courses at the Technical College is a means of providing such knowledge.

At one time an apprentice regarded his academic career as closed when his apprenticeship ended. To-day he accepts the fact that if he is to be efficient in his job he must follow technical progress through the meetings of his professional institution, through reading the technical press, and through refresher courses and study groups at the Technical College. Modern industry now tends to regard the Technical College not only as the place where its apprentices receive technical education, but as a centre of learning where the industrial personnel, from operative to managing director, may study modern developments by means of formal or informal meetings. This new function of the Technical College is now being developed by the engineering industry, but in time it is hoped to make an appeal to a wider section of the community and to establish the College as the centre of adult education for the district.

In the past the accommodation provided in a College consisted of classrooms, laboratories, workshops and auxiliary rooms, and these in general met the requirements. With the acceptance of the College as the cultural as well as the technological centre of the area, the provision of mere working space for students is not enough. A first class canteen service, ample gymnasia, libraries, recreation and rest rooms, rooms for the meetings of local societies, a stage and cinema, are becoming necessities. In future the design of the College must provide for the wider range of activities and allow a flexibility in meeting new demands as they arise. Although it is a generally accepted principle that a Technical College should satisfy local demand by local provision, a level is reached in some activities at which demand is too small to make a local service effective. This limitation introduces an economic difficulty, since higher grade studies generally require equipment which is costly to install and maintain. Equipment and accommodation are a necessary part of the structure of a college, but its spirit and being come from its teachers and students, and there is a minimum of collective activity below which a vigorous and progressive organisation cannot be maintained. Thus at some predetermined level, in each subject, it is in the interests of the student to travel to or even to reside at a centre where effective provision can be made. When a student has attained the highest levels for which local provision can be made, it is the duty of his college to advise him where to go to continue his studies. Indeed, the local college will become a member of a regional group within which the provision of higher technical courses is mutually arranged.



The modern building industry, like the new manufacturing industries, demands a close link between practical work and theoretical instruction. A student at the Bournemouth Junior Building School.

In the early days it was left to the initiative of the apprentice to attend courses and to sacrifice some years of his life to study. But even this would have been of no benefit if enthusiastic teachers, who combined a sufficient academic knowledge with an active daily experience of practice, had not also sacrificed their leisure. The fact that together teachers and students have built a system of technical education to satisfy the needs of the day, although often working under far from ideal conditions, reminds us that student and teacher are the essential human elements of education, and that buildings and equipment alone are insufficient. A flourishing industry cannot be built up by teaching staffs which are isolated from it, and if reality is to continue in technical education, the teaching staff must be partly recruited from the industry itself, and the whole of such teaching staff kept in close contact with industrial requirements throughout their teaching career. It is hoped that periodically a teacher may return to industry to maintain contact with modern developments, and that industrialists will take a live interest in the Technical College. By this close association, born under the rigours of war, a system of education may be built up which will not only enable industry to attain an international supremacy but offer to industrial personnel a fuller life and wider interests than has been possible in the past.

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INDUSTRY; UNIVERSITY WITHOUT WALLS

J. FORRESTER

INDUSTRY to-day must face its wider social responsibilities; neglect of them can only add further strife and unrest to a long history of unhappy achievement. The early pioneers of industrial development in Britain devoted their major energies to the solution of mighty technical problems. The more famous of them, men like David Davies, the Robinsons of Chesterfield and the Cadburys of Birmingham, perceived long ago, sometimes only through a glass darkly, that the power they were amassing must be used rightly, that the place of work could not be divorced from the other activities that made up the life of towns and cities.

What lies ahead to-day, a hundred years later, must be tackled with all the freshness of mind and willingness to experiment that made Britain the home of the industrial revolution. What lies ahead is the new industrial revolution, when from every angle and in every place of work the relationship of the man to his work must be considered and respected. Whether we can achieve this depends on our intelligence rather than our ingenuity.

Work is as much a part of a man's full life as are his home and family, his food, his health, his recreation and his other main interests. Long years of unemployment have taught us, at last, that a man cannot be compensated for idleness by cash alone—by being paid for doing nothing; a man who feels that he is not wanted becomes a burden upon the fabric of Society and—because of the progressive atrophy of the mind—sooner or later an economic loss. A man whose mind is allowed to atrophy at work is in little better case than a man inhibited from working by economic circumstances, whose mind, therefore, atrophies.

The factory is not a box into which the employee disappears to work, 7, 8, 9 or 10 hours per day, 40, 45, 47, 48, 50 hours per week; it is a highly complex organisation within itself and it is abundantly linked by personal and other links with the environment in which it finds itself. An industry may offend against its environment by casting out its waste products—solid, liquid or gas—indiscriminately and haphazard. An industry may offend no less by undoing within itself the constructive work that educational and health services outside have tried to build up for the good of the individual and the community. It is a fearful fact that it should have needed the stimulus of Total War, with Full Employment, to bring home finally to industry the need for the intelligent handling of men and women, no less than of machines.

If a job of work, however skilled or however humble, is necessary to every citizen of working age, to give him or her a stake in a virile human society, then the attitude of industry must change basically. That this can be done, without economic loss to industry, is likely; that it must be done for the good of all, is certain.

At the present time some 500,000 adolescents pass annually from schools under Local Education Authorities into industry. Much money has been spent to educate them, up to a standard. Their educational background is made up thus:

from Senior Technical Schools	.59%
from Junior Technical Schools	2.34%
from Secondary Schools	9.36%
from Elementary Schools (Primary) ...	38.59%
from Senior and Central Schools (Modern)...	49.12%
	100.00%

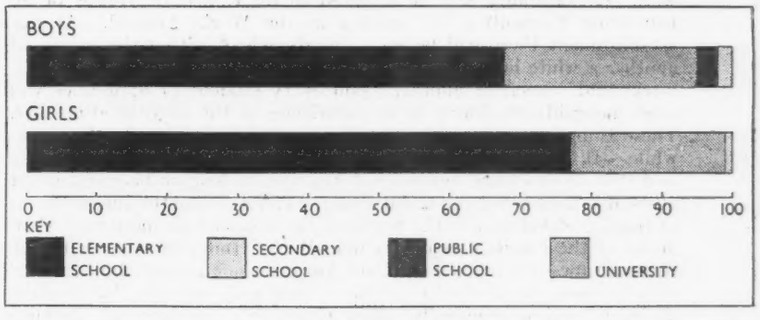
The burning problem that awaits solution is the problem of how these young people shall be absorbed, so that the process begun at school, at the expense of the community, shall not stop abruptly with the transition from the student life to the working life, a moment of great significance. Whatever be the age of leaving school, the place of work—be it Industry, Agriculture, Shipping, Mining or Commerce—must be ready to receive the growing mind (which is often also the creative mind). The age of leaving school is not so important as the urgent demand that education should not stop just at the crossing of the threshold. Education must continue at work and those responsible for the organisation of work must be aware of their responsibilities; all too often their actions are conditioned by the fact that they themselves in their time had little opportunity, therefore—they aver—they should not seek to provide opportunities for others, there must be a "struggle."

Industry must take the wider view. The process of education must not stop. The dead-end and the blind-alley must disappear—they are economically unjustifiable and socially corrosive. The adolescent and the adult, at all ages, must feel the urge to learn and must be fired with the enthusiasm that passes knowledge on—only so will the sparks begin to run to and fro amongst the stubble. Industry must be both a fertile field for experiment and a province for wider development arising therefrom. The great experiments of Mather & Platt in Manchester, G. & J. Weir in Glasgow, Cadburys in Birmingham, Sigmund Pumps on Tyneside, Avoncroft for Agriculture, Aberdovey for the Sea, "T.W.I."—these must be studied, learned from and developed. And how must it be done?

First, the management of factory or mine or shop or farm must be conscious of what is at stake—it is nothing less than the whole of our economic future. Management, conscious of the importance of these things, in large or small concern, must be firm but understanding, encouraging and yet detached; the exercise of good management itself can be an object-lesson of profound importance to both the young mind and the adult mind. Capital must be prepared to encourage part-time day release, and various schemes of training and education within and without industry as a duty and as a service; the new Act demands co-operation at every level within industry and within the educational field.

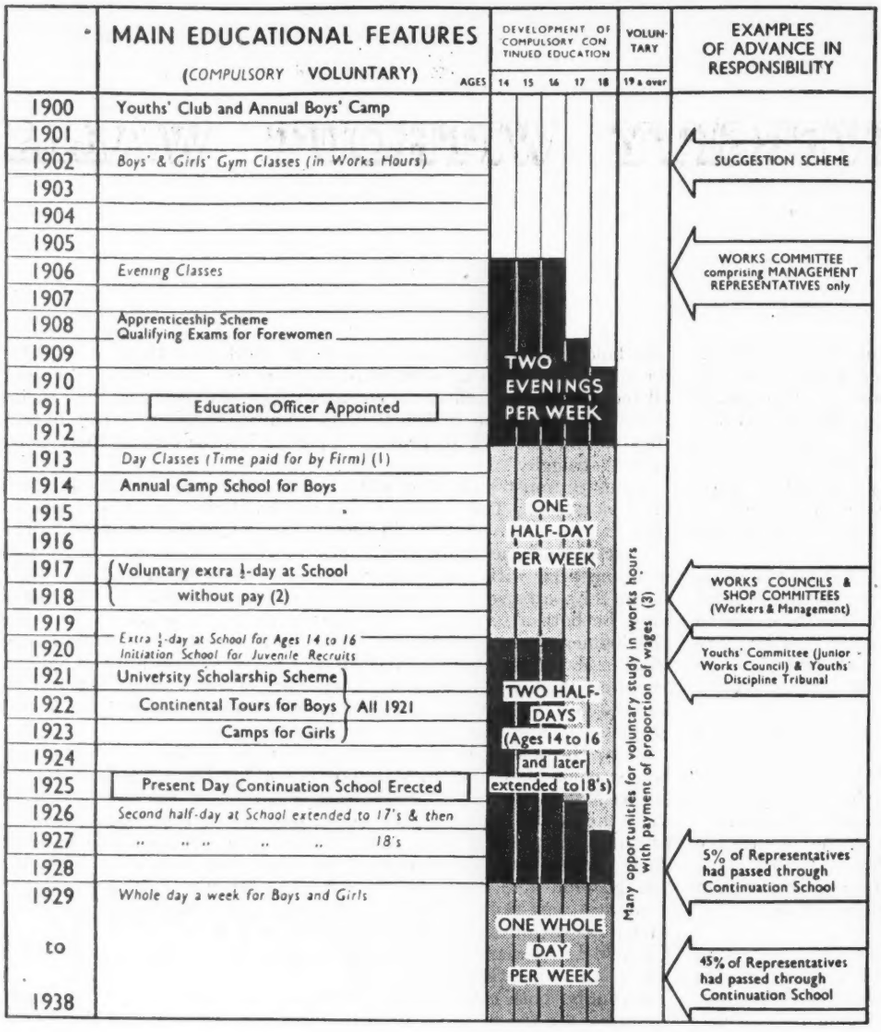
Secondly, both capital and labour must understand that even bold ventures into the field of education need not be costly and that every venture means hard individual effort, not mass pursuit of a common object. There can be no standardisation, no universal prescription

PROPORTIONS NOW RECRUITED FROM ELEMENTARY AND HIGHER SCHOOLS (Average 1928–1937)



At Bournville before 1914 almost all junior labour was recruited from local elementary schools. In the period between the wars an increasing proportion was selected from higher educational institutions. The proportion of girls so selected was smaller owing to the higher labour turnover caused by marriage.

EDUCATION PRECEDES RESPONSIBILITY



Progress in industrial relationships is generally made by trial and error. The remarkable pioneer work of one firm is recorded on this chart: there has been strong emphasis throughout on the educational responsibilities of modern industry.

for better industrial relationships or educational facilities. At one works responsibility will be invested in an Education Officer or an Education Committee, at another in the Works Council. At one establishment there will be an elaborate school within the works, at another a white line on the shop floor will be the only barrier between works and school, at another again every student or apprentice will work alongside an older man of experience, in the traditional manner. These things are not costly, but the results can be abundantly worthwhile. It costs little to assume that a man is an intelligent being and that he can learn anything at any age, so long as his mind is not allowed to become set and embittered; "T.W.I." like the various forms of training developed in the Services, has assumed no more than that. Many of the possibilities of Training Within Industry will be missed, if from now on employer and employee do not accept the fact that change from one trade to another is not only possible, but socially desirable and economically often necessary; furthermore, training within industry must become a part of the job, part of a new approach to Work.

Thirdly, the co-operation with the local Technical School or College must be of the closest. The Technical College alone cannot be the People's University, but the Technical College in its local setting, integrated with the needs and the resources of its local industries, can be of tremendous significance. Visits from one works to another, from school to works and vice versa, and between works and College, must become a part of education; production plant, be it machine or furnace or building, must be used for teaching purposes in the factory possessing it, if, as often happens, the College could not afford to mount the same process in the laboratory. The possibilities are infinite; many have been explored for the first time during the war, others can only open out under more settled conditions. Of overwhelming urgency is it that every Technical College should provide adequate facilities for part-time education for boys and girls; adequate facilities for adult evening instruction in foremanship and industrial administration; instruction in and opportunities for physical education; appreciation of the English language; a new social and cultural centre for the life of the area, for those who wish to use it, in which barriers of class or outlook or job do not matter. These things are more important to industry even than the teaching of engineering draughtsmanship or mechanics.

Fourthly, industry itself must set its own standards, of conduct and in things material, so high that the job in hand, however repetitive, becomes a lesson in itself to the active mind; the methods of joint consultation within the factory must become miniature lessons in the democratic system of work; the factory, its buildings and its products, their construction and their design, must become examples of the thing studied at school working out in practice, and vice versa. Of such is the approach to a knowledge of real things, of such is citizenship going to be built or by neglect of them it will perish.

At one London Company, where co-operation between Technical College and factory has been close, a general statement of the procedure and the objectives of an educational scheme has been published. All male employees, under 21 years of age, may take part in it; the opportunities before the individual student, the ordinary young person in the works (as opposed to the apprentice tied by a long-term agree-

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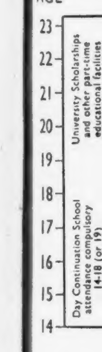
AGE
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University Scholarships and other part-time educational facilities
Day Continuation School attendance compulsory 14-18 (or 19)

ment), are here set out for reference; the collaboration with the Works Council and the introduction of the grown-up mentor or "Works Uncle" are worthy of especial note:

1. *AGE: The opportunity of studentship is offered to all male employees between the ages of 14 and 20 years inclusive. Students may, if they wish, apply for a transfer to the Works Apprenticeship Scheme, at a suitable age.*

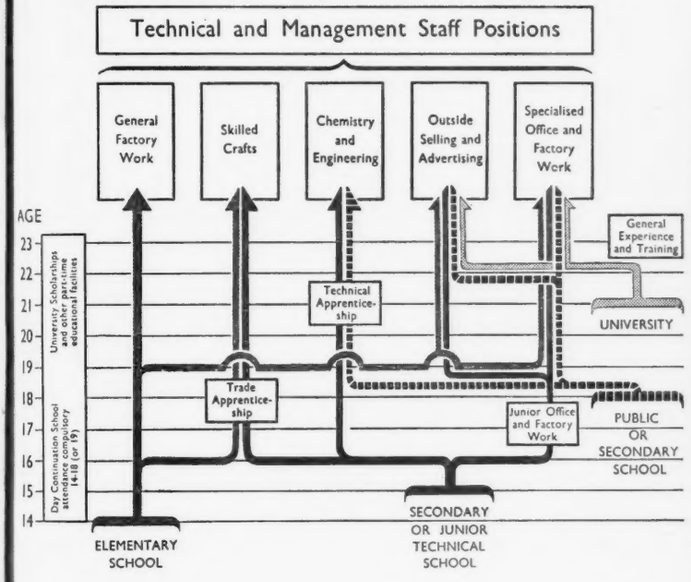
2. *SELECTION: Preliminary selection of students is carried out by the Works Education Officer. There is no written examination, but tests for aptitude and an interview are included; school reports are taken into consideration.*

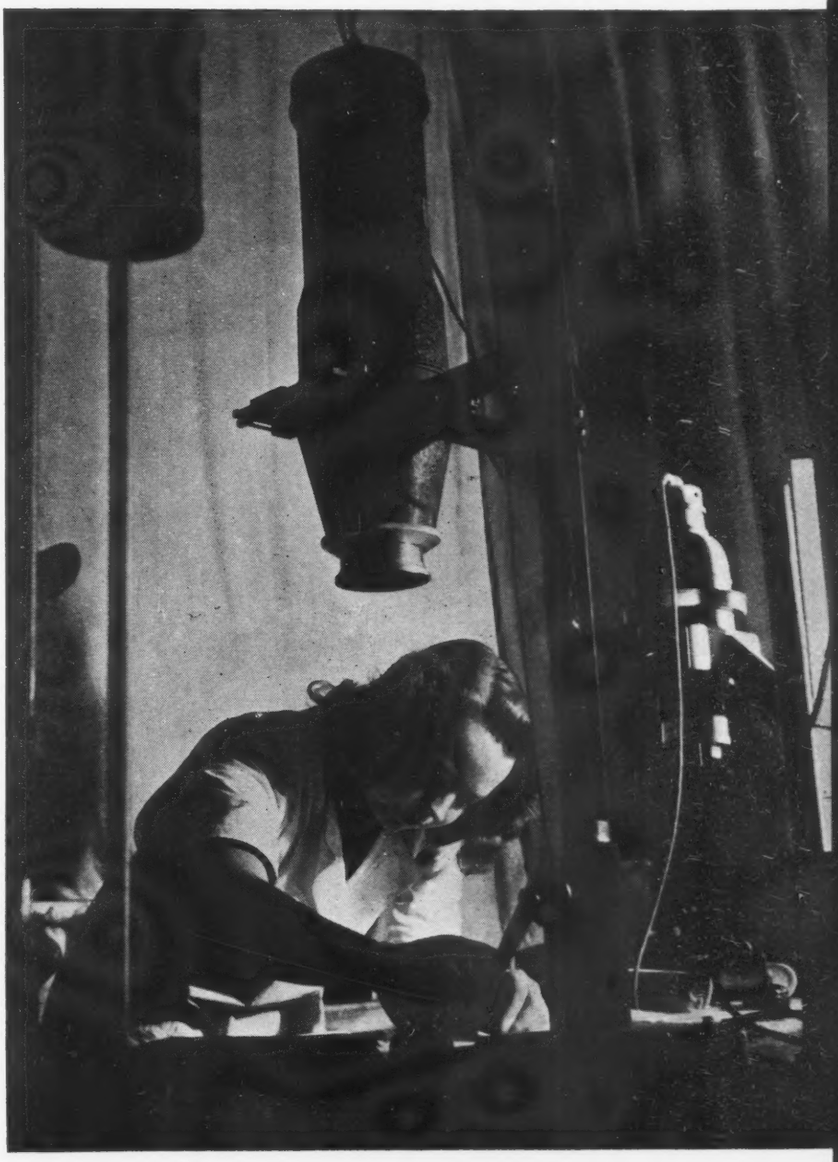
3. *PAY: Students are paid at the rates current for their jobs, according to age. Flat rate only is paid for time spent at the College.*

4. *RESPONSIBILITY: The Company appoints a part-time Education Officer, who is responsible for the working of the studentship scheme within the works and who, after consultation with the Principal of the College and representatives of the Works Council, decides whether an applicant may join the scheme or not and, periodically, whether he may continue with it; in the administration of the scheme within the Works the Education Officer is advised by the Works Council, on which management and employees of the Company are equally represented.*

5. *CURRICULUM: (a) College. Students spend not more than the equivalent of two half-days each week at the College, where they may take any of the courses of instruction available there, subject to the approval of the Principal of the College and of the Company's Education Officer. Physical recreation or gymnastics are included. The Company encourages suitable students to take higher courses at the University or elsewhere, in any subjects; the Principal of the College is free to give each student such instruction as may appear best suited to him.*
(b) Works. The remainder of the working week is spent at the factory, where each student continues with his normal employment; his progress at College and at the Works is carefully observed and, where possible, transfer into a more suitable trade or group is encouraged. On not more than one evening each week a one-hour talk or lecture is given at the factory, by different speakers, on a wide range of subjects, not necessarily directly connected with the main curriculum. As far as possible each of these talks is informal and self-contained; attendance is voluntary, and duplicated notes are provided after the lecture. Full and free discussion is encouraged.
(c) Visits. Periodical visits are arranged to undertakings of interest in the district, or to special sections of the Works, where the process or organisation is explained to the student by the man on the job and not by a professional teacher. Each visit becomes the subject of a business précis to be written by the student during his free time; such précis are deliberately limited in length, and should state facts and make suggestions; a concise style of self-expression is encouraged.

RECRUITMENT AND ADVANCEMENT





Above, a progressive firm must recruit the majority of its staff through its own ranks. Right, photographic instruction at the City of Stockholm Trade School.

6. *COUNSEL: For each student the Works Council selects from the Company's staff or workpeople a Counsellor, or "Works Uncle." To this Counsellor the student can turn at any time for help and advice on both general and practical matters. A student should have a talk with his "Works Uncle" each week; this talk must be arranged outside working hours, to suit the convenience of the persons concerned.*

7. *PARENTS: Throughout the scheme the closest possible contact is maintained with Parents, and at least once a year a Parents' Evening and Social is held, either at the Works or at the Technical College.*

8. *TRADE UNION CO-OPERATION: The scheme is organised with the full co-operation and approval of the Trade Unions concerned, who are kept in close touch with developments, through the Works Council.*

9. *WORKS COUNCIL: The Works Council is kept fully informed at its monthly meeting of the progress and development of the scheme, and assists in the following manner:—*

The student, after a preliminary interview by the Education Officer, is interviewed by a small panel, consisting of one member of the Management side of the Works Council and one member of the Works side, with the Education Officer in the chair. The panel makes recommendations, which are conveyed to the College by the Education Officer.

After hearing the opinion of the Technical College, the panel interviews the student again and explains the full working of the scheme, together with the recommendations of the College, and—in consultation with him—appoints his "Works Uncle."

Similarly, after each term, when reports of his progress at the College are available, the student, together with his "Works Uncle," is interviewed again by the panel, and further guidance or selection is decided upon.

In any one year there are eight separate panels organised in this way, each consisting of two members of the Works Council of sixteen.

In the event of dispute, the decision of the Works Council is final.

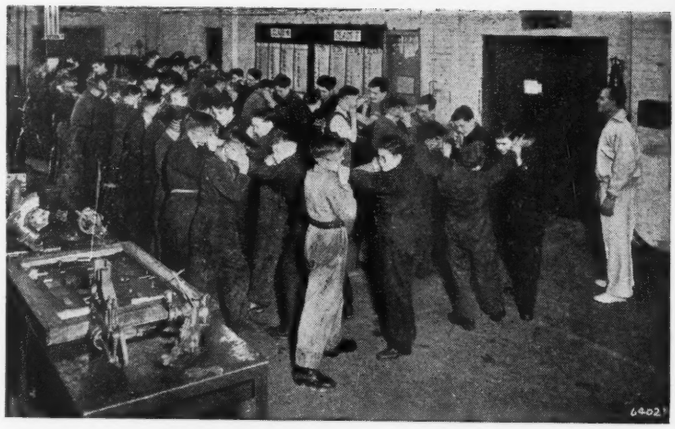
10. *FEES: The College fees are paid by the Company, so long as a high standard of endeavour is achieved.*

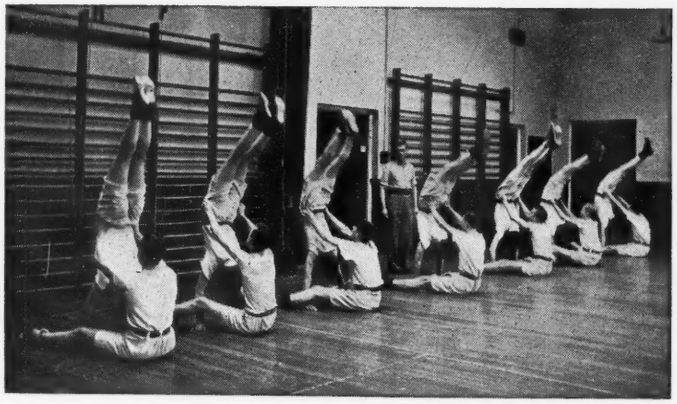
11. *REPORTS: It is important that the link between the Technical College and the Company and the Parents should be as close as possible, and a carefully devised system of reports is prepared in order to achieve this. At the same time, for the student, the most important contacts are personal, and a real interest in the life of a student is, therefore, one of the first duties of a counsellor or "Works Uncle."*

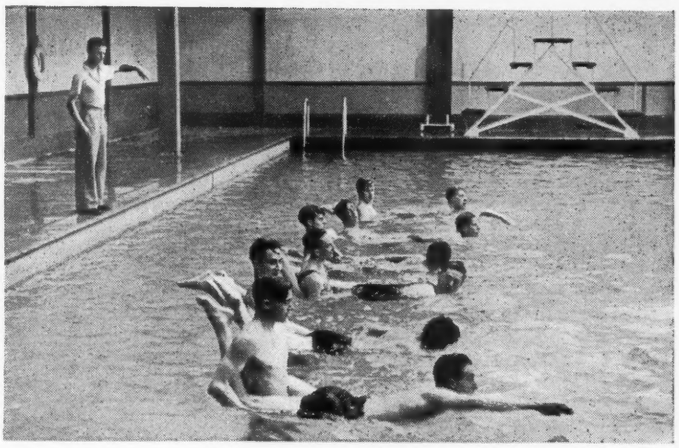
12. *BOARD OF STUDIES: All reports are subject to review by an informal Board of Studies or Consultative Group Council, on which serve the Principal of the College and the Director responsible on behalf of the Companies, or their deputies, two Counsellors and, if possible, two Parents and one student from each year's group. This Council meets not less than once each year, to consider the general progress of the scheme.*

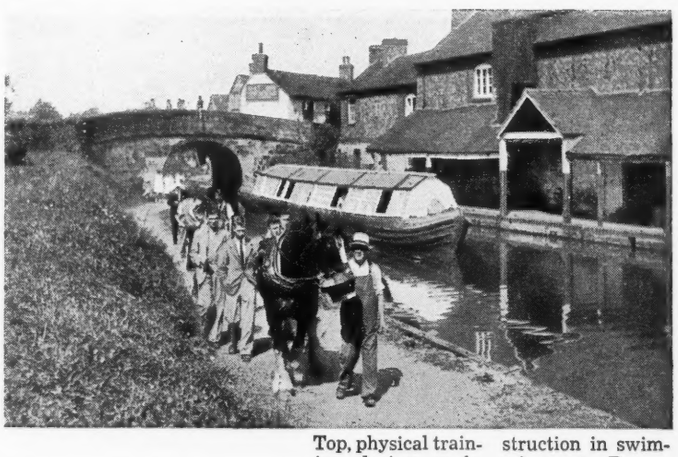
13. *HEALTH: Each student is encouraged to undergo a health examination every six months by the Works Medical Officer. He is expected to belong to the Works Welfare Fund, and to follow the recommendations of the Ophthalmologist and Dental Surgeon.*

Neither the factory nor the school is a box, in which certain processes are performed out of sight of the world outside. Both have hitherto been regarded almost wholly in that light, the factory because its processes were largely secret or to be kept from prying eyes, the school because within the school the ordinary child went through the ordinary mill before going forth into ordinary life, which began afresh at 14+. Both are changing and must change. Both are dealing fundamentally with healthy human beings; both must collaborate or else mutually contrive to continue to render each other's work partly void. The buildings of both factory and college present a challenge to the architect to express himself in the new idiom of our age; but buildings alone are not enough, the factory linked with the college and the school, the school and the college linked with the factory, must together become the University without Walls. And at the entrance to that University, and within it, there are no breaks or barriers; it is not a microcosm shut off within itself, because the twin processes of education for life and training for work should be one and unbroken.









Top, physical training during working hours at Sigmund Pumps, Gateshead-on-Tyne. Top centre, the works gymnasium at Bournville. Bottom centre, instruction in swimming at Bournville. Bottom, opportunities for group activities beyond the factory walls for young employees of Cadbury Brothers.




SECONDARY SCHOOLS

SECONDARY SCHOOLS RECOGNIZED BY THE BOARD OF EDUCATION

SCHOOLS MAINTAINED BY EDUCATION AUTHORITIES

SCHOOLS WITH 100–300 PUPILS •
SCHOOLS WITH 300–400 PUPILS ●
SCHOOLS WITH OVER 500 PUPILS ●

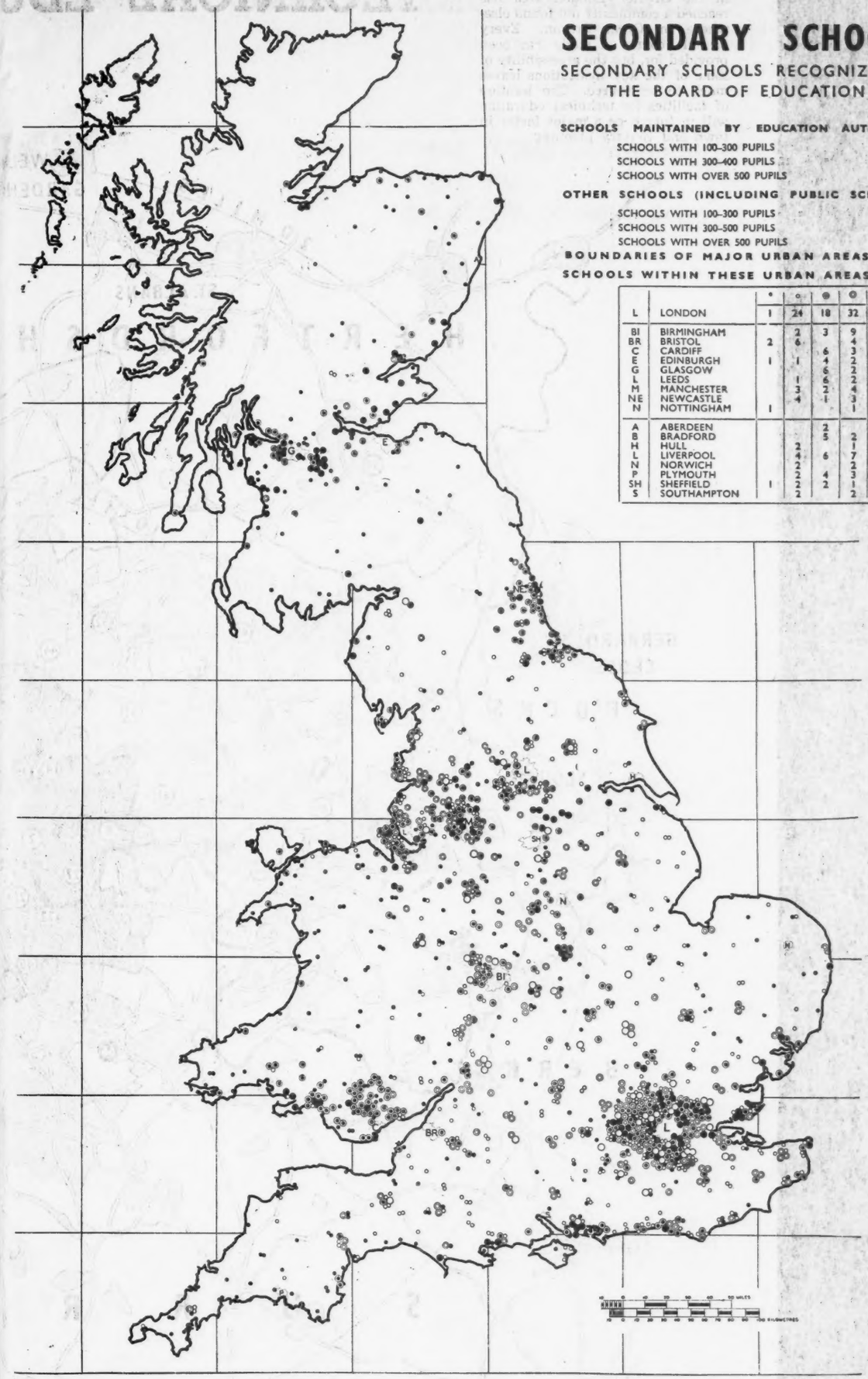
OTHER SCHOOLS (INCLUDING PUBLIC SCHOOLS)

SCHOOLS WITH 100–300 PUPILS ·
SCHOOLS WITH 300–500 PUPILS ○
SCHOOLS WITH OVER 500 PUPILS ○

BOUNDARIES OF MAJOR URBAN AREAS

SCHOOLS WITHIN THESE URBAN AREAS

		·	○	●	○	●	○
L	LONDON	1	24	18	32	8	22
BI	BIRMINGHAM		2	3	9	7	3
BR	BRISTOL	2	6		4	3	3
C	CARDIFF			6	3	2	
E	EDINBURGH	1	1	4	2	4	2
G	GLASGOW			6	2	17	1
L	LEEDS		1	6	2	4	2
M	MANCHESTER		3	2	4	6	2
NE	NEWCASTLE		4	1	3	3	1
N	NOTTINGHAM	1			1	4	1
A	ABERDEEN			2		1	1
B	BRADFORD			5	2	4	2
H	HULL		2		1	4	1
L	LIVERPOOL		4	6	7	5	1
N	NORWICH		2		2	2	
P	PLYMOUTH		2	4	3	1	
SH	SHEFFIELD	1	2	2	1	5	1
S	SOUTHAMPTON		2		2	3	



Many of the executives of industry are drawn from the public and secondary schools. The gap between secondary school education and the requirements of manufacturing industry tends to be a wide one, despite the pioneer work of schools like Oundle, where much emphasis has been laid on practical subjects, and those like Gordonstoun and Bryanston, who have anticipated the Fleming Report by founding bursaries for boys from industry, and others. The map shows the extraordinarily uneven distribution of the public and secondary schools of the country. A tendency to move away from the big cities is already apparent and is likely to continue, more especially amongst the boarding schools.

TECHNICAL EDUCATI

The provision of technical education in the Greater London area has reached a complexity not found elsewhere in Great Britain. Every possible course of study has been provided for, but the accessibility of some of the key institutions leaves much to be desired. The location of facilities for technical education will in future be a major factor in town and country planning.

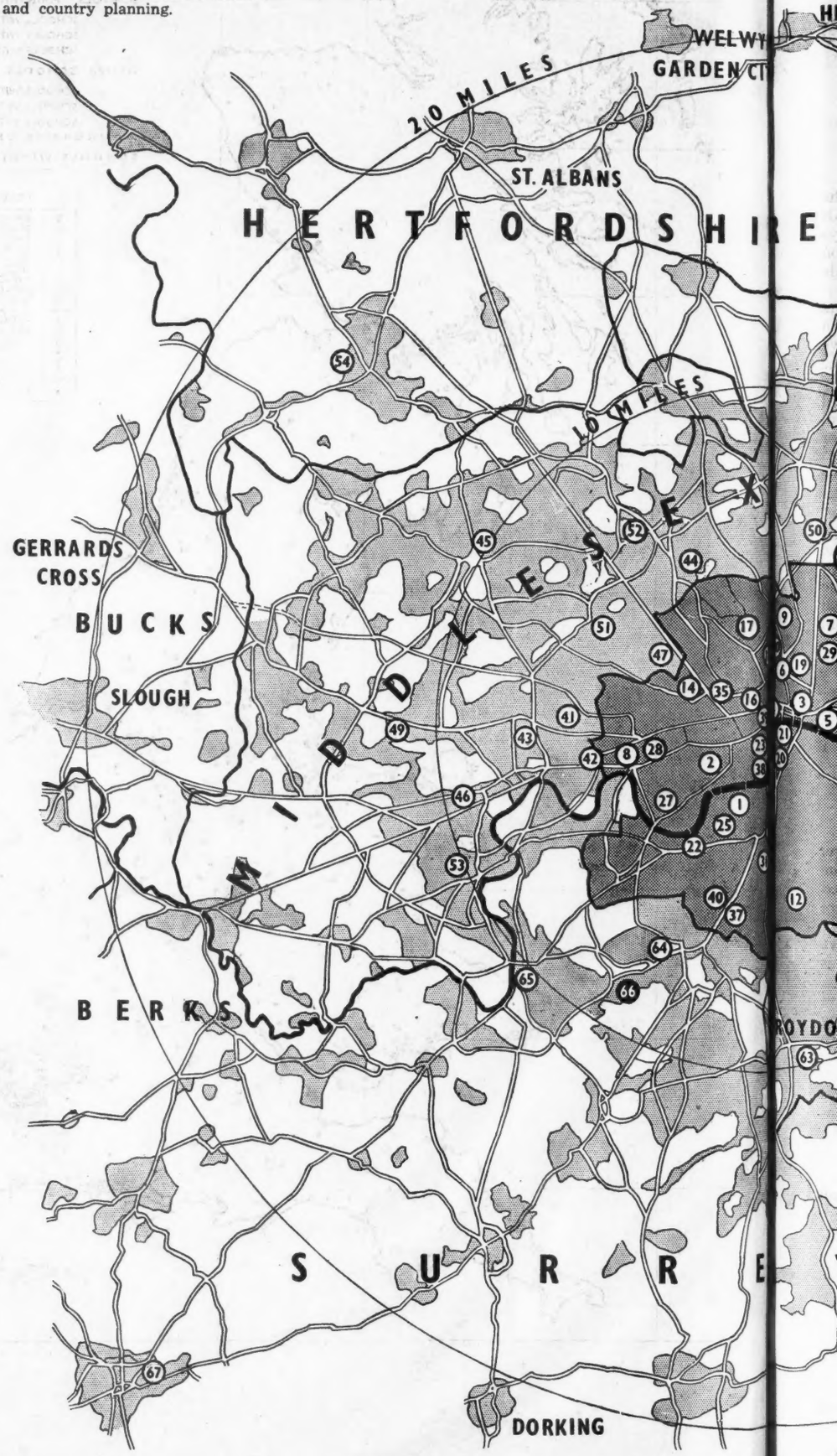
PRINCIPAL SCHOOLS

LONDON

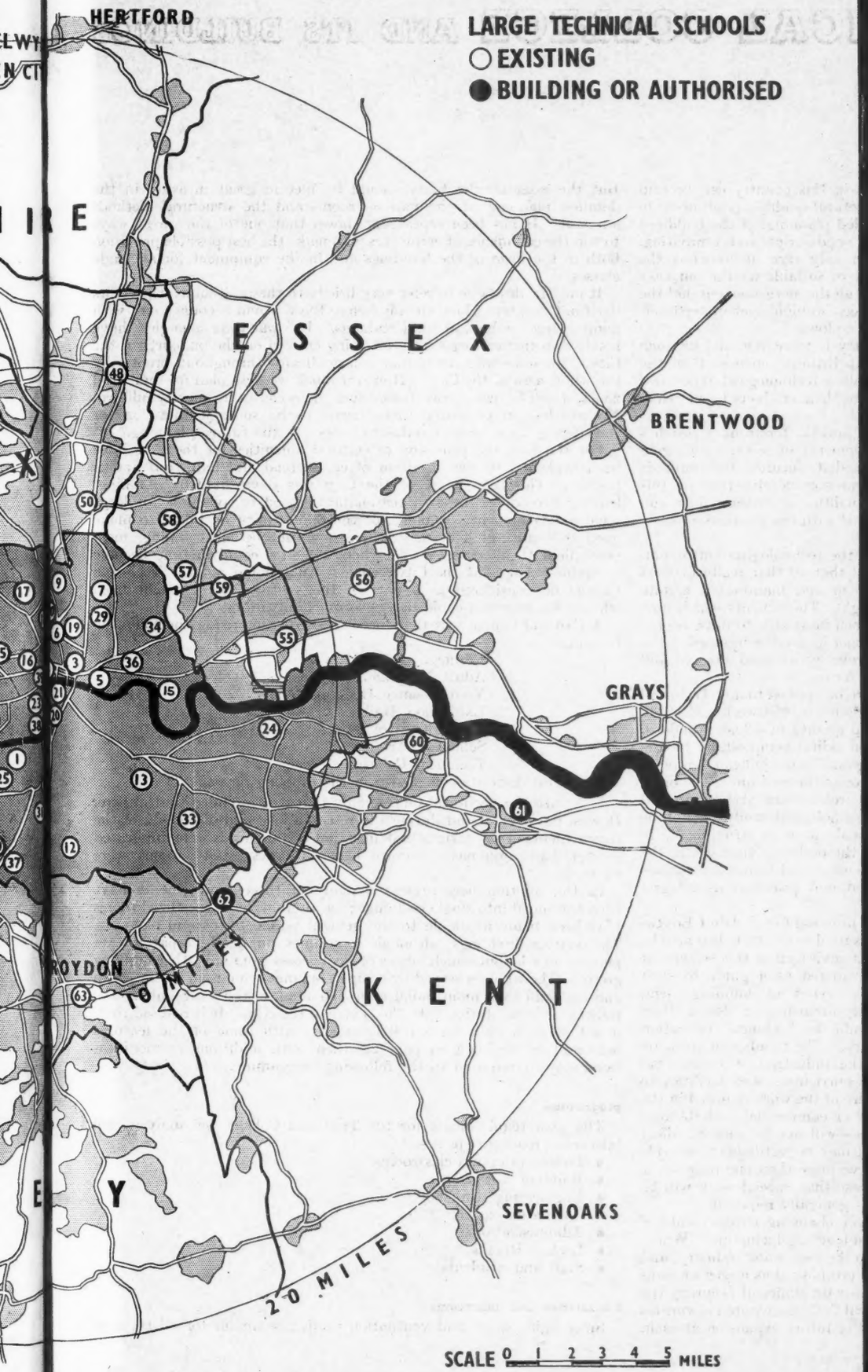
1	Battersea Polytechnic	
2	Chelsea Polytechnic	+
3	City of London College	★
4	School of Photo-Engraving	★
5	Sir John Cass Technical Institute	
6	Northampton Polytechnic	★
7	Hackney Technical Institute	★ +
8	Hammersmith School of Building	★ +
9	Northern Polytechnic	★
10	Brixton School of Building	★
11	Morley College	
12	Norwood Technical Institute	★
13	S.E. London Technical Institute	★
14	Paddington Technical Institute	★
15	Poplar School of Engineering	★
16	Regent Street Polytechnic	★ +
17	North-Western Polytechnic	★
18	Working Men's College	
19	Shoreditch Technical Institute	★
20	Borough Polytechnic	★
21	London School of Printing	
22	Wandsworth Technical Institute	★
23	Westminster Technical Institute	★ +
24	Woolwich Polytechnic	★ +
25	Clapham Commercial Institute	
26	H. Myddelton ,, ,,	
27	Fulham ,, ,,	
28	Hammersmith ,, ,,	
29	Dalston ,, ,,	
30	Highbury ,, ,,	
31	Brixton ,, ,,	
32	Kennington ,, ,,	
33	Catford ,, ,,	
34	Bow & Bromley ,, ,,	
35	Marylebone ,, ,,	
36	Stepney ,, ,,	
37	Balham & Tooting ,,	
38	Westminster ,, ,,	
39	City Literary Evening Institute	
40	Bec ,, ,, ,,	

★ Including a J.T.S. or J.C.S.

\+ With Art School attached



UCATION IN GREATER LONDON



PRINCIPAL SCHOOLS

MIDDLESEX

41	Acton Technical College	★	
42	Chiswick Polytechnic	★	
43	Ealing Technical College	★	+
44	Hampstead Garden Suburb Institute		+
45	Harrow Technical College		+
46	Spring Grove Polytechnic		+
47	Kilburn Polytechnic	★	
48	Enfield Technical College	★	
49	Southall Technical College	★	
50	Tottenham Polytechnic	★	+
51	Willesden Technical College	★	+
52	Hendon Technical College	★	
53	Twickenham Technical College	★	+

HERTS

54	Watford Technical College	★	+

EAST HAM C.B

55	East Ham Technical College		

ESSEX

56	S.E. Essex Technical College	★	+
57	Leyton Technical College	★	+
58	S.W. Essex Technical College	★	

WEST HAM C.B.

59	West Ham Municipal College	★	+

KENT

60	Erith Technical College		
61	Dartford New Technical College	★	
62	Bromley New Technical College	★	

CROYDON C.B.

63	Croydon Polytechnic		

SURREY

64	Wimbledon Technical College	★	+
65	Kingston Technical College	★	+
66	New College Replacing 64 & 65.		
67	Guildford Technical College	★	

5

THE TECHNICAL COLLEGE AND ITS BUILDINGS

D. E. E. GIBSON

VERY few of the Technical Colleges in this country can be said to be worthily housed. The architectural qualities (embracing in this term the landscaping and detailed planning) of the buildings which they occupy are too frequently nondescript and uninviting. At their worst they are deplorable. In only rare instances is the accommodation either sufficient, adequate or suitable for the purposes for which it has to be used. It is therefore all the more amazing that the technical qualities of their output have been so high—yet understandable that the æsthetic qualities have been so low.

If the international trade of this country is to revive, and on such revival the economic prosperity of Great Britain depends, then the men must be there with ability to maintain a technological expertness and an appreciation of the visual results of their products keener than those of our competitors.

The prosecution of the war has brought into the forefront of people's thoughts the many and ingenious achievements of science and technology, and one of the dangers of the immediate future is the emphasis which may continue to be placed for some considerable time on this aspect, to the grievous neglect of those qualities of outward form and design which we have for so long associated with the products of some Scandinavian and mid-European states.

By too many people, and not least by the technologists and manufacturers themselves, it has been assumed that all that really matters is that their actual products should reach and maintain a certain standard of efficiency and that it is enough. The benefits which may accrue to the craftsman and his trade, when he is able to draw on the services of the artist as well, have been either ignored or misused. The very environment of his training has probably numbed his eye and feeling for significant and pleasing visual form.

The first principle which should therefore be applied to any Technical College is that the buildings in which the student will work and study should themselves possess an architectural quality of a high standard. Dignity must be created by reliance upon skilful composition, by the right use of modern techniques of building and by the judicious employment of modern materials, rather than through the medium of elaborate and decorative forms associated with past architectural styles. Indeed the very requirements of present-day technological study cannot be adequately met by an approach traditional either in structure or in form. Yet, however satisfactory may be the buildings themselves, the full benefits will not be enjoyed if the amenities and facilities for intercourse and co-operation are not planned and provided as integral parts of the whole picture.

It was with such factors in mind that a proposal for an Adult Education Centre in Coventry was prepared ; it is used to illustrate this article. There is no suggestion that the provisions envisaged in this scheme or the proposals to meet them can be considered as a guide to such establishments elsewhere. Probably few types of buildings lend themselves less to standardisation of requirements or design than a Technical College. Local requirements in technical education differ considerably throughout the country. The number of students to be enrolled will vary according to the industrial or commercial character of the district or region ; the curriculum and facilities to be provided will be influenced by the nature of the work required in the locality. The presence of manufacturing or commercial undertakings on which art has a bearing—e.g., textiles—will not be without affect on the art training ; the extent to which it may be justifiable to provide single purpose rooms, or rooms which serve more than one purpose, is always debatable ; it will often be the case that special work will be called for at certain centres of a kind not generally required.

Flexibility is essential, to meet the ever changing requirements of industry and to provide for development in teaching technique. Where decisions have been arrived at in regard to the location of industry, and where optimum sizes for towns have been established as a part of planning policy, it may prove possible to assess with sufficient accuracy the number, capacity and character of Technical Colleges required in various centres with some indication of the trend of future expansion at each. But the essential flexibility should be met in great measure in the detailed planning of the various rooms and the structural methods adopted. It has been repeatedly shown that one of the surest ways to win the confidence of employers is to make the best possible provision both in the form of the buildings and in the equipment for all trade classes.

It may be desirable to refer very briefly to the position as it presents itself in Coventry, which already before the war had become a city with many large industrial undertakings. Its war-time energies have resulted in further large factories being erected on the outskirts of the City. Its industries are found spasmodically throughout practically the whole area of the City. However much we may plan for industrial zones, it will be many years before such plans can be ultimately fulfilled. Nevertheless in Coventry there seems to be some justification for considering three or four industrial zones in the future planning.

For too long the provision of cultural amenities for the City have been neglected to the provision of commercial and industrial undertakings. The very heart of the City was devastated by bombing, leaving a considerable area reasonably cleared or available for large scale redevelopment. Should not the opportunity be taken to make good this cultural deficiency where it would be most telling, most convenient to all citizens, and where the sites could in time become available—that is at the City Centre? And should not the Technical College be considered as a part of this cultural development from whence its activities could derive so much advantage ?

A Cultural Centre was therefore proposed, comprising the following buildings :—

Library.
Adult Education Centre.
Youth Centre Headquarters.
Exhibition Hall.
Youth Theatre.
School of Art.
Technical College.

The general disposition is shown in the drawing on page 23.

It is with the Technical College only that it is intended to deal here. It was, however, found during the research into and discussion of the requirements of the various buildings that certain needs were duplicated —large halls, gymnasia, lecture halls, libraries, study rooms were examples.

In the solution here presented many of those requirements have been combined into single buildings ; or alternatively specialized rooms have been made available to the general public by careful planning. The various buildings, although sometimes physically separate, are planned in a layout which allows of easy access from any other building group. The whole is served by a suggested inner ring road on the south and east and by a main radial approach road on the west linking the railway and bus station with the centre of the city. It is realised that, if a College is built on a restricted site, with some of the features indicated in the plan on page 23, then some additions or modifications may be required to the following programme.

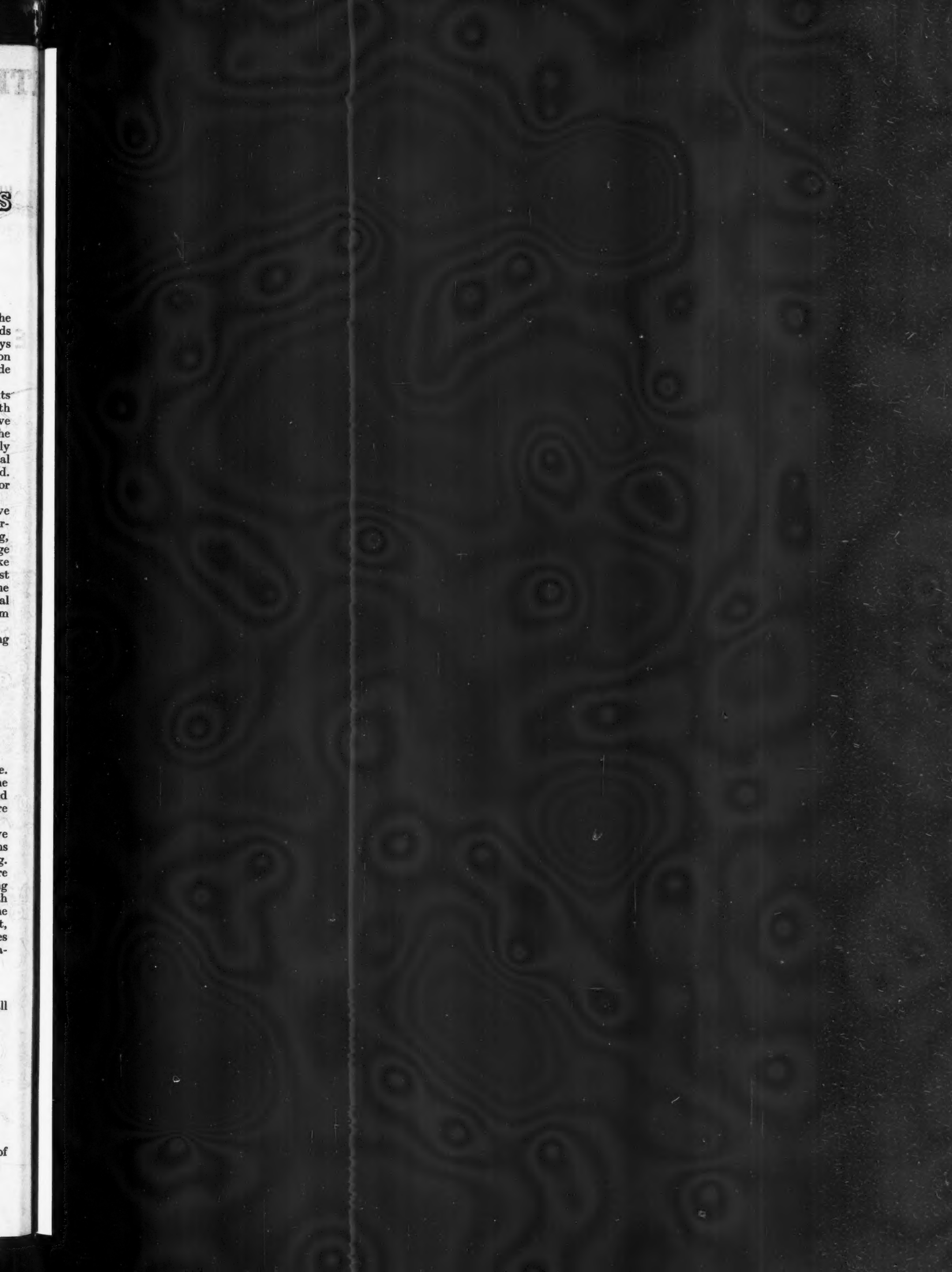
programme

The plan requirements for the Technical College, on analysis, fall into seven main groups :—

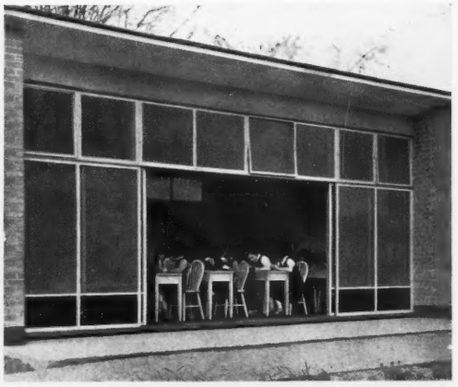
- Laboratories and classrooms.
- Building workshop.
- Engineering workshop.
- Circulation space.
- Administration.
- Lecture Rooms.
- Staff and Students.

laboratories and classrooms

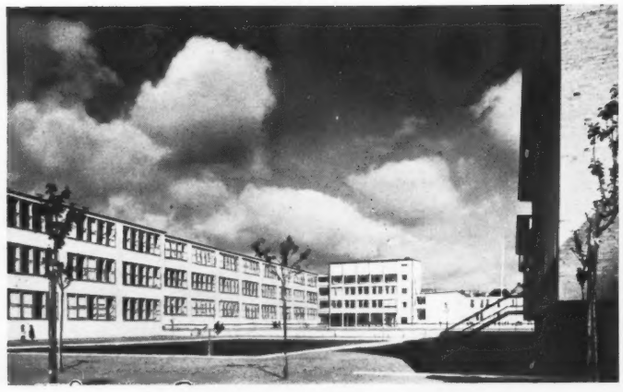
Since light, space and ventilation needs are similar for all types of

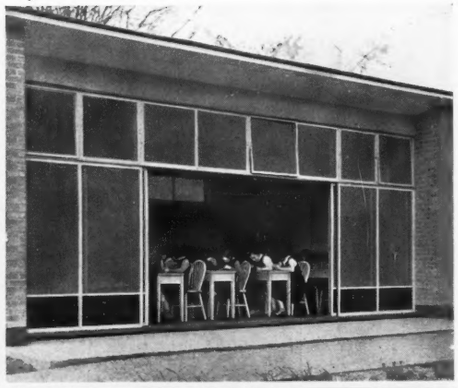


Outside the City of Stockholm Trade School. In the erection of such buildings the triple demands of human requirements, architectural design and engineering excellence must all be fulfilled.

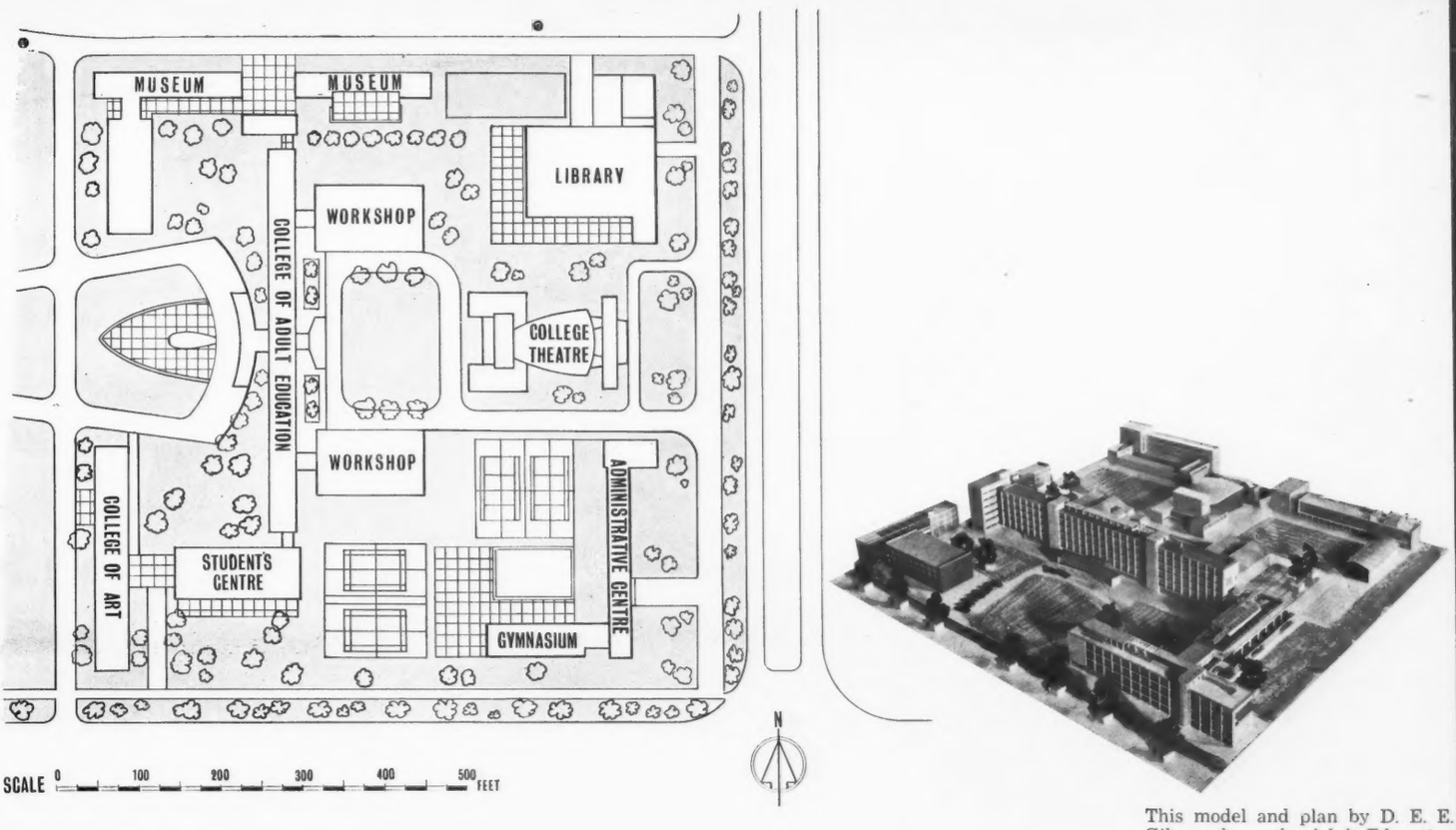


Top left, the Eriksdal Elementary Schools at Stockholm. Top right, modern classroom at Impington Village College, Cambridgeshire. Centre, gymnasium in the School an der Batterie, Basel, Switzerland. Below, on the roof of the Technical School at Berne. Left, clock at the entrance to the School an der Batterie.





Top left, the Eriksdal Elementary Schools at Stockholm. Top right, modern classroom at Impington Village College, Cambridgeshire. Centre, gymnasium in the School an der Batterie, Basel, Switzerland. Below, on the roof of the Technical School at Berne. Left, clock at the entrance to the School an der Batterie.



This model and plan by D. E. E. Gibson shows the Adult Education Centre in the proposed New City Centre for Coventry.

laboratories a standard was adopted of a width of 24 ft. with 8 ft. corridor.

The number of classrooms required governed the height of the building. Three storeys were necessary. The biology and physics laboratories were sited on the fourth floor and placed to allow of easy access on to the roof garden and conservatory of a lower building. The fifth floor is devoted to the chemistry laboratories.

All classrooms in the main block not requiring special lighting facilities are orientated to face west.

workshops

Workshops require :—

- Room for expansion.
- Top North or East lighting.
- Easy access for lorries.
- Structurally separate units to reduce noise and vibration.
- Storage facilities.
- Separate washing facilities.

In the positions chosen these requirements are fulfilled.

circulation space

The corridor on the east links staircases, lifts, lecture rooms and students' rooms.

administration

This block forms a structurally separate unit linked by a balcony over the Entrance Hall to the main corridor.

lecture rooms

These form a separate block, each floor having its own specialised lecture hall. The lower two are intended also for public lectures.

staff and students

This block is intended for use by all from the various building blocks.

structure and materials

Structurally the building consists of three principal elements :—

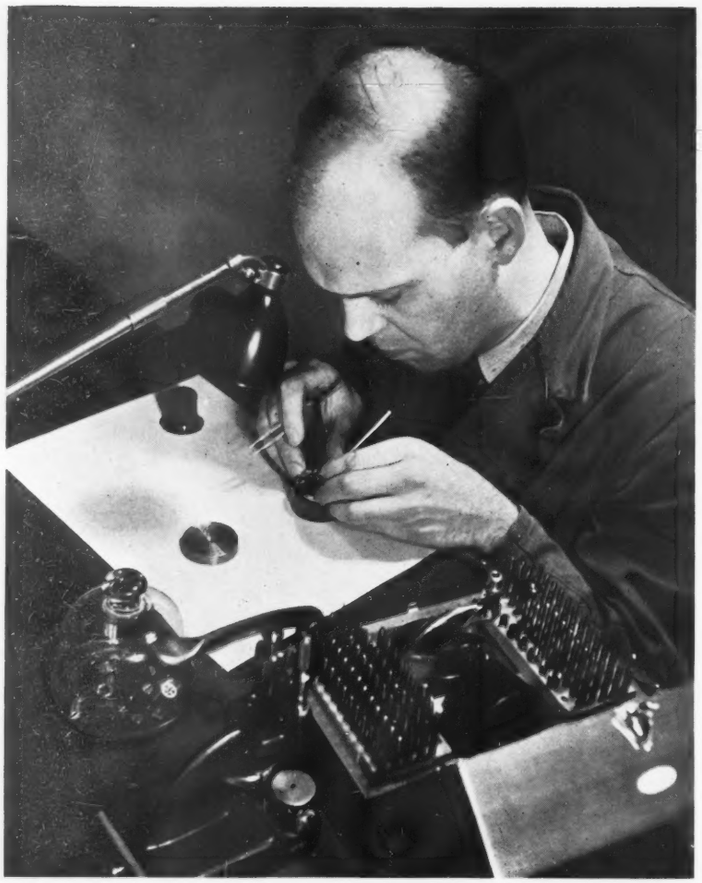
- Main spinal block—this is essentially a cellular structure of unit classrooms in which some standardisation could be most easily adopted.
- Workshops—various methods could be utilised to give uninterrupted floor space subject to the structural requirements for lifting and moving fairly heavy loads.
- Other rooms—these units each serve specific purposes and would receive the individual treatment most suited to each one. They are smaller units and their size and siting could give the interest and relief required to contrast with the rhythm which will be inevitable with the classroom block.

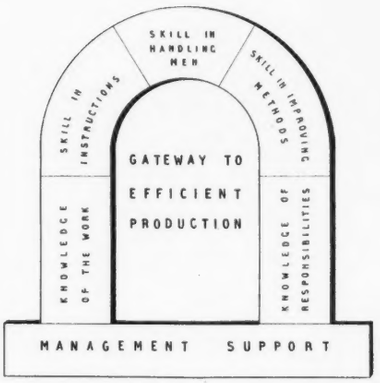
It is obvious that some considerable time may elapse before a scheme of the dimensions and scope of that suggested here could fully materialise. It seems therefore unwise to attempt at this stage to finalise the type of structure which could be adopted eventually, though it would appear that a framed building of either ferro-concrete, steel or other metal will be most readily advisable. Nor is it appropriate to attempt to predetermine the materials or the method of fixing for either the external or internal skins. It may be hoped that as a policy it will be possible to consider certain sections of the scheme as experimental and to alter or amend the cladding from time to time accordingly.

As a general principle it is desirable to envisage the basic material throughout the redevelopment to be brick or, if stone, of a local brown or Hollington. In this it should be remembered that the Cathedral and the large Parish Church of Holy Trinity are both sited on the highest ground of the City centre and are major features in the replanning proposals. Further, Coventry is itself situated within a region producing some extremely beautiful bricks. It should be unnecessary to state that the use of traditional materials does not imply a continuation of traditional structural methods of building but rather that their intrinsic value should be given due emphasis by a sympathetic application to form, texture and relief.

The proposals outlined above, though based on extensive research and co-operation with the technicians concerned, will no doubt require amendments in detail if not in fundamentals, when the time is opportune for them to be realized. As set out here, they may serve as a guide to others with similar problems to solve.

6 TRAINING V





Left, technological advance in industry has brought about an increasing demand for the *Feinmechaniker* or precision mechanic, the instrument maker. He needs, potentially and in fact, background knowledge as well as manual skill.

Below, T.W.I. Job Instruction Course ; a discussion group in session. In every factory there must be a room provided for meetings, discussions and lecture courses.

NG V

WITHIN INDUSTRY FOR SUPERVISORS

F. H. PERKINS

the origin

MUCH has been said and written from time to time regarding the training of supervisory staff in industry and commerce generally. Progress has been made during recent years, under the stress of wartime conditions, in the development of the lecture course and discussion groups. A general need and demand for training of this character has been disclosed and available staff competent to conduct such courses and discussions has been at a premium.

In September, 1944, the Ministry of Labour and National Service began to develop a new form of training called "Training within Industry for Supervisors,"* which merits the special attention of all concerned with this problem. It is similar to a scheme that has been outstandingly successful in the U.S.A., where approximately one and a half million supervisors have benefited from this form of training during a period of intense industrial activity.

The Ministry made a close study of the American scheme, and then introduced it, with appropriate modifications, into industry and commerce in this country. During the last twelve months rapid progress has been made; nearly twenty thousand supervisors in British industry have passed through the initial stages of the training and the verdict has been uniformly favourable.

It may be said that the outstanding feature of the scheme is its clear, logical and practical approach to the real issues involved in good supervision. It is an approach that throws up in relief factors which may have previously received but scant attention, and it provides a medium for a more balanced assessment of the real needs of good supervision in any set of given conditions. It embodies, too, a departure from the lecture method and an acceptance of the principle of group discussion along set and well-defined lines, as the best means of assisting the practical man on the job with a scientific approach towards the solution of his problems.

It is based on the idea that, once general principles have been clearly defined and accepted, the skill in good supervision can only be acquired by practice and that initially in the group-discussions supervisors can do a great deal to help each other in acquiring this practical experience more rapidly. It accepts the fact that many supervisors to-day have acquired their ability in the hard school of long experience, but it asserts that much can be done by the T.W.I. method to accelerate the process and so eliminate the need for costly "learning errors."

However, it is an approach that is of little value unless it has the full understanding and whole-hearted co-operation of "top management." It is true to say that almost everything depends on this and that, therefore the approach becomes a real challenge to management. Success is only obtainable if there is a thorough integration of the training into the whole organisation and a continuous day to day application on the job by all levels of supervision. Much evidence is now forthcoming that where the training has been well done and the vital condition of management support exists, the results are significant and far-reaching.

It has been said that no written article or oral exposition can adequately convey the full implication of T.W.I., and the experience gained so far in the development of this work has proved this to be true. It is, therefore, only possible within the scope of this article to give a very brief account of the analysis of the essential needs of good supervision upon which the whole T.W.I. approach is based.

basic needs: knowledge of the work

Firstly, the supervisor, who is defined as anyone in the organisation who has the responsibility of directing the work of others, needs to some degree a knowledge of the work. In a factory job this may imply a knowledge of the materials, machines and processes involved. The extent of the knowledge required in order to perform his supervisory duties satisfactorily will vary from industry to industry and from job to job.

basic needs: knowledge of responsibilities

Secondly, a supervisor requires a knowledge of his responsibilities as a supervisor, and this implies an understanding of the limits of his own authority and a knowledge of the company's policy on matters on which he himself can take action or can recommend what action should be taken.

The extent of the knowledge required in both the above cases must be determined by individual managements themselves and the initiative for making good the deficiencies rests on their shoulders. But these "knowledges" represent the pillars of the structure, they are basic and fundamental in the make-up of a good supervisor. Clearly then, although a man must have this knowledge of the work and of his responsibilities, it is the manner of its application that represents the real "skill" in supervision.

basic needs: skill in instructing

A supervisor must possess an ability to impart knowledge to others, to give an instruction in a manner that will induce the best results and, in the case of those close to the worker, an ability to instruct in the way in which the job should be done. The need for the development of this skill forms the basis of the T.W.I. Job Instruction programme.

A series of five two-hour sessions are held within the factory or office during working hours for a group of ten supervisors at a time. The meetings are held on consecutive days under the guidance of a trained group-leader. In small firms the leader may be one of the Ministry of Labour's own staff, while in larger firms there are very good reasons why he should be one of the firm's own men trained by the Ministry of Labour to do this work. During these sessions a simple illustration is presented by the leader to the group to enable the underlying principles of sound instruction to be firmly established in the minds of the members of the group. An opportunity is then given during the group meetings to each member of the group to apply the principles to the best of his ability on a typical sample job with which he is familiar, using one of his colleagues as a learner. The group discussion that follows each demonstration is both educative and enlightening to all members of the group alike. Members leave the group feeling that much has been learnt and that a start has been made towards a better quality of instructional method; it is clear that a high degree of skill will only be acquired by constant application on the job and a properly organised follow-up scheme.

basic needs: skill in improving a method

The life of an industrial undertaking rests in the long run on its ability to progress and improve. The whole field of supervision has a valuable contribution to make towards this end.

A supervisor must develop an ability to apply sound principles of work simplification to any and every job with which he is associated. It may well be that others are employed, for instance, to lay down the "operation layout" in considerable detail, but nobody is in a better position to assess actual difficulties, or possibilities for improvement, than the supervisor who is in day to day contact with the job. By the aid of the T.W.I. Job Methods programme he can be enabled to develop an attitude of mind and a method of improvement that, if applied only to the smaller items of the job, may make collectively a major contribution towards improvement in production as a whole. In the group session arrangements this programme is conducted along similar lines to the Job Instruction programme.

basic needs: skill in handling men

Finally, as representing the keystone of the arch superimposed upon the two pillars of knowledge of work and knowledge of responsibilities, comes the skill in handling men. T.W.I. approaches this problem in its Job Relations programme as one of paramount importance in industrial relations to-day, and suggests that much can be done through the medium of this programme to bring up the qualities of leadership into line with the changing trends of the present time.

Along similar lines to the other two programmes, it develops by group discussion the "Foundations for good relations," and suggests that, however conscientiously as supervisors we apply these foundations, human problems will always arise and that sound training is needed in the handling of these problems. An underlying method for use in the handling of all human problems is discussed by the group and its application is practised and demonstrated on individual problems brought in by each member of the group. But here again a high degree of skill in leadership can only be acquired by constant and unflagging application of the "Foundations" and the "Method" in day to day contacts on the job.

T.W.I. has accepted this analysis and directed its whole effort towards the development of the skills as represented in the arch itself. The stability of the whole structure of T.W.I., however, can only be measured in terms of the strength of its foundation, and this is Management Support. The T.W.I. programmes are not exercises in paternalism or philanthropy; judging by the spirit with which they are being received, it can be claimed that they represent a practical approach to the real problems of supervision to-day and may be significant pointers for the future.

* For information regarding the scheme application can be made to the Secretary, Ministry of Labour and National Service, Training Department, T.W.I. for Supervisors, Ebury Bridge House, Ebury Bridge Road, London, S.W.1.

7 MATHER & PLATT; A CASE STUDY

H. W. DAVIES

SEVENTY-ONE years before the Education Act of 1944 established the principle that the continued education of young people in industry must be a prime condition of their employment, a small class for engineering apprentices was opened at the Salford Iron Works of Mather and Platt. The originator of the experiment was Mr. William Mather, an engineer whose great services to his country in securing the progressive betterment of working conditions and in the pioneering of technical education, brought him many honours, including a seat in Parliament and a knighthood. It brought him too the warm respect and absolute confidence of all sorts and conditions of working men.

It is on record* that " for many years previous to the opening of the Queen Street Institute, Sir William rented a room in Bury Street, Salford, and conducted what was called a Ragged School for the poor children in the neighbourhood of the works. This school was open three nights a week, and Sir William was very regular in his attendance."

The School at Salford Iron Works closed in 1902, when the opening of technical evening schools rendered it redundant, but before its close it had greatly extended its scope and activities. Old copies of Speech Day programmes recall the triumphs of many poor Salford boys who owed their first step upwards in life to the fact that chance had led them into the employ of an industrialist who mixed philanthropy and sound business to a marked degree.

History now records how Sir William Mather raised the fiery cross of technical education both inside Parliament and out, and how he took the lead in shortening working hours so that, for those who had the wit to profit by it, the hours for self-improvement might be lengthened. But time passed on; the nation became aware of its backwardness in technical education; new technical schools were opened; Sir William himself grew old and retired; and for a while the Works School enterprise seemed to lapse. Meanwhile the name of Mather and Platt, Mechanical and Electrical Engineers, had become known far and wide, and the firm had moved to new premises at Park Works, Newton Heath, Manchester.

In 1916, Mr. Loris E. Mather, the present Chairman of Mather and Platt, planned a new Works School at Park Works on lines which anticipated the provisions of the Fisher Act of 1918, by two years, and which have since lent themselves to the many fruitful developments of recent times. In 1918, the Manchester Education Committee was invited to take the School under its wing. Since then the system of joint control has borne evidence of the happy relations that can be established between education and industry. Many of the enactments of the 1944 Act—daytime release of young workers for further education without loss of pay; advanced courses for eligible students at the Technical Colleges (fees paid by the employer where conduct and progress were reported as satisfactory); free medical attention and dental treatment; " keep-fit " classes; sports clubs and outdoor activities of all kinds—have been available to young apprentices of Mather and Platt all through the past twenty-five years. Attendance at the Works School was originally made, and still remains, a condition of employment, but the present-day scramble for places, which are scarcely sufficient to meet the demand, suggests that this rule might well be abolished as an anachronism. The school has been running long enough to establish a sound tradition and to be accepted by all, officials and apprentices alike, as a necessary and valuable part of the works organisation.

The school is divided into three sections—lower school, middle school and upper school. Into the lower section come the 14 year olds from the council schools, a motley crowd as diverse in habits and outlook as they are in attainment. Some have but a flimsy knowledge of vulgar fractions or decimals, many have never heard of algebra or the metric system, and most are sorry exponents of the use of their mother tongue. These boys are taken in hand and guided through a General Preparatory Course by a teacher of long experience who is adept at spotting deficiencies and making the rough places plain. Thence the boys pass into the middle school, where they are prepared for the Pre-Senior Courses devised by the Union of Lancashire and Cheshire Institutes. By the time 60 per cent. of the original 14 year olds have reached the Second Year stage of the Preparatory Senior Technical Course, they have exhausted the three years allowed them in the Works School, so they continue their studies at evening classes, either in the Park Works School or in schools nearer home. The remaining 40 per cent. brighter students of the 14 year old group, reinforced by an influx of Junior Technical School recruits, complete the First Year stage of the Senior Mechanical Engineering Course before leaving school at 17; meanwhile a picked group of especially promising pupils are allowed to stay on an extra year and complete the Second Year of their Senior Mechanical Engineering Course (Ordinary National Certificate) before taking up Day Courses at the local College of Technology. Apprentices in the Iron Foundry are allowed to diverge at the P.S.T.2 stage and take a special foundry day course at a neighbouring Technical School, which has the requisite equipment for practical foundry work.

From the curriculum which includes Mathematics, Engineering Science, Engineering Drawing, English, and Physical Training, the apprentice gains a solid core of instruction appropriate to his job and is helped to maintain the fitness necessary to carry out that job. English affords a means whereby the apprentice is taught the value of clear concise reports, whether oral or written; he is encouraged to quicken his faculties in debate, and is afforded opportunities to practise the art of speaking; he widens his knowledge of, and refines his taste for, good literature; he is brought to exercise his critical faculty and to strive to reach balanced judgments. The use of a sound film projector and an epidiascope make possible the most up-to-date aids during classes, whilst visits to the cinema (*Henry V* for example), Shakespeare in the Parks, the Hallé Concerts, the International Club, the Reference Library—to mention but a few recent activities—give him most useful contacts with cultural circles in the outside world. In short, as far as it is possible in the time available (two mornings of 4½ hours each per week) the apprentice trains for the " fuller life " as well as for his career as a workman.

The Park Works School some years ago devised a series of Dexterity Exercises, based on the suggestions of Colonel R. B. Campbell, of the Department of Physical Education, University of Edinburgh, which aimed at instilling into young workers a more thoughtful attitude to the problems they are likely to meet in their daily work and equipping them with a safe technique for solving those problems. The exercises serve to focus the attention of engineering apprentices on the need for Accident Prevention measures.

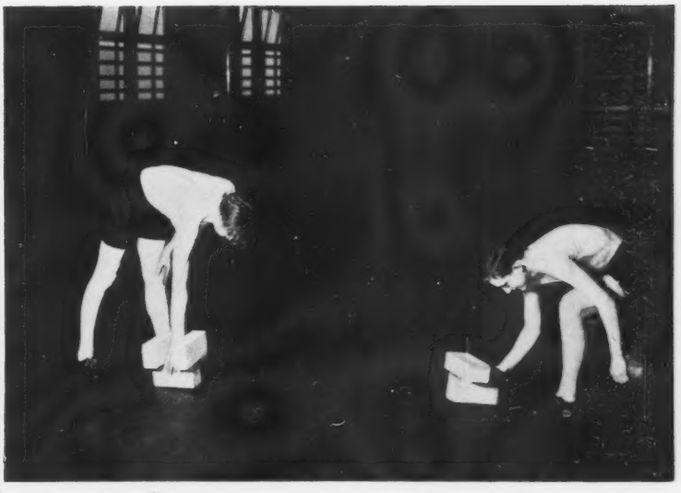
This was followed, in 1941, by an experiment undertaken at the request of the Board of Education to test the effect of daily periods of physical training during working hours on the continued physical well-being and productive capacity of boys in the workshop. Forty-eight boys were divided into two groups of 24 each, and each group was arranged to represent a fair cross-section of the type and age of worker under consideration. One group was given forty-five minutes of physical training per day on six days per week for three months. The other group had no physical training and remained at work. The two groups were compared by means of tests—psychological, medical and productive—applied at the beginning and the end of the three months period. After consideration of the final results, the firm felt justified in recommending a policy of granting two one-hour periods of physical training per week for all young workers, being satisfied that loss of working time would be more than neutralised by improved health and productivity.

From the point of view of the teacher, a post in a Works School has this advantage, that he can measure the effect of his work as reflected in the careers of boys when they leave school. From the employer's viewpoint such a school provides an easy means of recognising conspicuous ability early. For the boy it breaks up the monotony of the working week; it keeps him subject to a wholesome influence at an impressionable stage of his working career, and it enables him to measure his powers and his progress against that of his fellows. It affords, too, an excellent medium whereby experts and specialists in the works can come along and demonstrate to the boys vivid and up-to-date applications of the general principles learnt in school.

The Park Works Day Continuation School, as already stated, is under the joint control of the Manchester Education Committee and the firm. To-day the next stage is under review and the firm is studying the possibilities for incorporating girls into the educational scheme, a step which will be necessary when the Butler Act is enforced. The training to be provided for girls will differ from that so well proven for boys, but the experiment goes on. The light lit by Sir William Mather still burns; the example set by his firm has led others and has influenced and will influence new policies and new legislation.

**Sir William Mather.* By R. Cobden-Saunders.

Dexterity exercises, designed to give training in the safe handling of irregular objects in the works gymnasium of Mather & Platt, of Manchester. Above, raising a barrel, below left, raising and lifting box, and below right, raising two bricks.



The Outward Bound Sea School at Aberdovey takes boys of 16-18 from all walks of life for short term courses in seamanship, lasting one month each. Started by the Blue Funnel Line, it is probably the most remarkable experiment in vocational education in the country at the present time. Boys are given opportunities and trained *through* the sea, not only *for* the sea. Above, ratlines. Below, swinging the lead.

8

SHORT TERM SCHOOLS

T. G. BEDWELL

DURING recent years there have been many discussions concerning the merits of Boarding Schools and Day Schools, about the value of education within industry, and of the proper balance between academic and vocational learning. Prominence has been given in these discussions to the methods of teaching, the importance of home influence, the need for recreational and physical training, and the part which these and other features play in the early life of young people.

Whatever the rights and wrongs may be, few will deny that the real purpose of education is to acquire knowledge, experience and balance, to equip the individual with qualities which will enable him to make the most of himself, and to play as full a part in life as he can, as a happy and useful member of society, and as a " whole " man.

A boy requires preparation for life and to serve his apprenticeship for citizenship just as much as for any profession, vocation or trade. Work, as such, though an important part, is only a part of his life. The extent to which he can enjoy it and understand its purpose depends largely on his early background at home and at school, and his outside activities and interests during his leisure time. Unless he can see far beyond the pay packet, his job will not mean very much to him.

Interest, adventure, and sometimes thrill—these are the necessary ingredients in the making of character and the spirit of enterprise and initiative. To be effective they must be harnessed to faith, confidence, loyalty and courage. Without them the training of any young person is incomplete and he will remain unconscious of his real self and capacity.

It is with the object of filling some of the gaps in normal educational experience that Short Term Schools are being given serious thought. Broadly, they are designed to give any boy an opportunity to measure his own capacity and character, his physique, his knowledge and his moral and physical courage with others of his own age and in entirely new surroundings, for a period long enough to confirm his measurement in his own mind and long enough to give him one of life's unforgettable memories. No entrance examination, interview or preselection is needed. Boys are drawn without distinction from all classes of society or occupation.

What was destined to become the first Short Term School was established at Aberdovey in Mid-Wales in October, 1941. The Outward Bound Sea School was founded by Lawrence Holt for a dual purpose; to give boys about to serve at sea some practical training in the management of small boats with a taste of the sea in a sailing ship, and to give others the opportunity of training *through* the sea as a means of discovering for themselves their own capacity and ability to face the test of wind and weather and the " hazards " of searching occasions.

Nearly 3,000 boys have now passed through the School. A course lasts for 26 days and a maximum of 120 boys are in residence. All boys must be, at least, 15½ years of age and not over 18½. Each course is complete in itself and there is no carry over from one course to the next. There are eleven courses each year. Each course costs £15.

The boys are divided into " Watches " of twelve, each having a Leader and Vice-Leader. They spend approximately half their time in boats under oars, sail and power, and in a cruise of three to five days in a sailing vessel, each complete Watch forming the crew; for the remainder of the time they undergo land and athletic training in walking, running, jumping and throwing, with a little class-room work each day.

The high-light of the sea training is the cruise at sea. On land it is the long land expedition of from 30 to 35 miles—including the ascent of Cader Idris—which they undertake at the end of the third week. Over 80 per cent. of the trainees accomplish this. The others have a rather shorter test as dictated by the Medical Officer.

Both the sea and land training is co-ordinated to build up the mental and physical alertness and stamina which is needed to meet " the challenge " which the course inspires. This challenge is quiet and unobtrusive, but is a clear and definite invitation to set out to attain a clear objective. It is an objective in four main parts:—

- To live in a community and play a full part in a team and for the whole.
- To achieve a defined standard of knowledge in a vocational subject.
- To develop physically without overstrain.
- To prove capacity as a citizen and in endurance and courage.

Boys are called upon to comply with simple rules of discipline and self-control—for example, smoking and drinking are not permitted. The whole course is designed to encourage a boy to give nothing less than his very best and to demand his best in every way. Forty-two courses at Aberdovey have proved how very few boys fail to respond.

Some are given the special urge to jump, run or walk—some to enjoy the scenery and country—some to sing, to speak, or sketch—some to learn or read. All acquire new interests and a better understanding of their own ability, their virtues, shortcomings, and their potential worth. Many who come there have left home for the first time and they have paid tribute to the benefit they received from this " boarding school " experience as a preparation for their life in the Services, or when working away from home.

On each course all are " new " boys " together. They come from farm, factory, school or office, and their equality is signified by a simple uniform—a blue jersey and blue trousers. The Watch Leaders are in the first place selected by the staff after interview, but each Watch can itself confirm or reject the selection after a few days' experience. Only the essential minimum of ceremony is enforced to ensure good order and a true feeling of belonging to something worth while—something greater than themselves.

The numbers have grown consistently on the recommendation of the boys themselves. There is a permanent staff of five reinforced by others who come for three to six months and who, at Aberdovey, are drawn from the Merchant Navy. They, too, learn much from the experience, and the ships to which they return are the better for their newly acquired knowledge of young people and their needs.

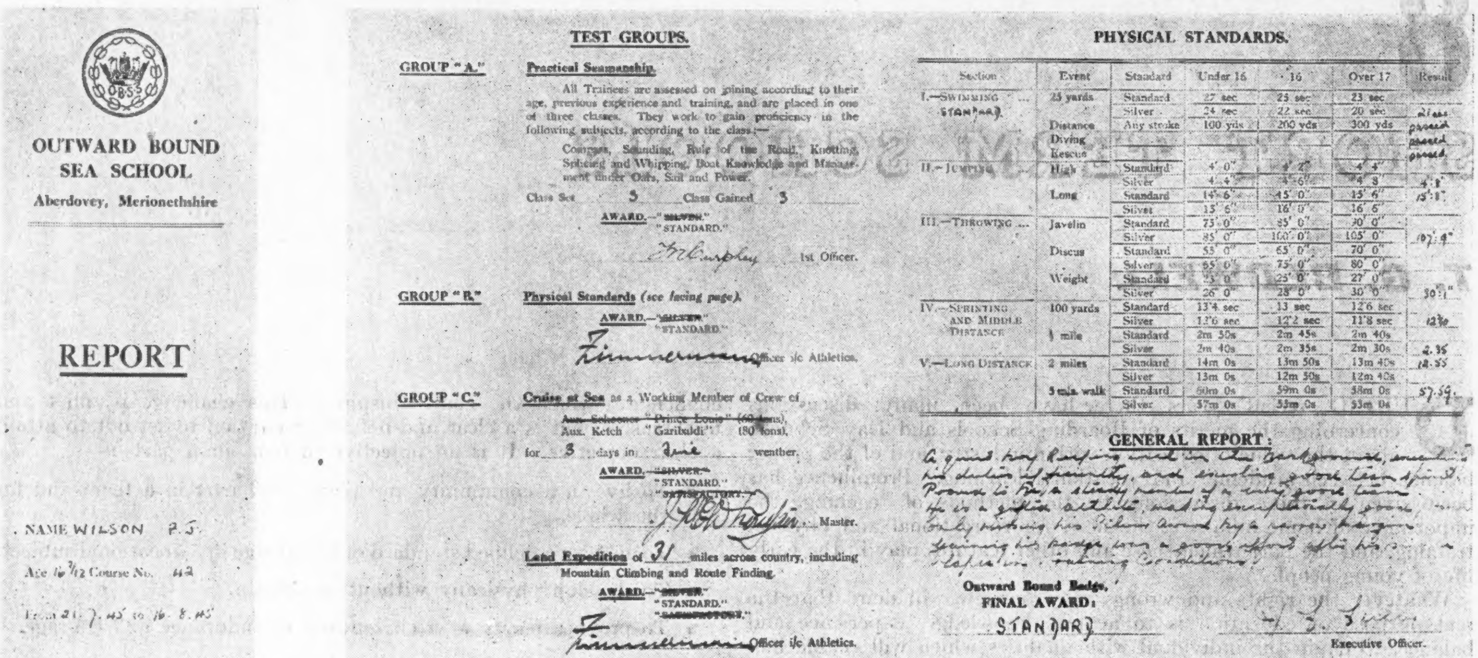
In common with mountains the sea possesses unique qualities. An individual must at sea or on mountains face the conditions which arise—from which there is no escape. Thus often does a boy discover himself and the measure of his true character.

How can these opportunities be developed and how can they help those employed in industry? At the Outward Bound Sea School the sea is used as the vocational and purposeful interest. At other Short Term Schools (some of which are now being planned for early operation), mountains, forests, horses, the air, railways or mining might form the special interest. Additional subjects can be introduced into any of them.

No subject can be taught in a month but, just as a boy can be inspired to want to walk, jump, run, sail a boat and do things, so is he inspired to learn or to study a new subject either to help him in his work or as a hobby for his leisure time.

The new Education Bill will raise the school leaving age to 16. The great majority will then leave school with a School Certificate standard in education. Will they then be as ready or as satisfied to sweep the floor, oil the wheels, hold the tools, or lick the stamps? The status of these essential tasks must be brought into better focus in order that their purpose can be better appreciated, but even then they will not provide a very convincing or enjoyable outlet for the prowess of those who have just left school. That outlet must come largely during their leisure time and requires preparatory training and experience.

It is surprising how many boys are reluctant to accept challenging enterprise or activity when at home, at school, or at work in surroundings



OUTWARD BOUND
SEA SCHOOL
Aberdovey, Merionethshire

REPORT

NAME WILSON P.S.
Age 16 4/12 Course No. 42
From 21. 7. 45 to 16. 8. 45

TEST GROUPS.

GROUP "A." **Practical Seamanship.**

All Trainees are assessed on joining according to their age, previous experience and training, and are placed in one of three classes. They work to gain proficiency in the following subjects, according to the class:—

Compass, Sounding, Rule of the Road, Knotting, Splicing and Whipping, Boat Knowledge and Management under Oars, Sail and Power.

Class Set 3 Class Gained 3

AWARD.—"~~SILVER~~." "STANDARD."

[illegible signature] 1st Officer.

GROUP "B." **Physical Standards** *(see facing page).*

AWARD.—"~~SILVER~~." "STANDARD."

Zimmermann Officer i/c Athletics.

GROUP "C." **Cruise at Sea** as a Working Member of Crew of

~~Aux. Schooner "Prince Louis" (60 tons),~~
Aux. Ketch "Garibaldi" (80 tons),

for 3 days in fine weather.

AWARD.—"~~SILVER~~." "STANDARD." "~~SATISFACTORY~~."

[illegible signature] Master.

Land Expedition of 31 miles across country, including Mountain Climbing and Route Finding.

AWARD.—"~~SILVER~~." "STANDARD." "~~SATISFACTORY~~."

Zimmermann Officer i/c Athletics.

PHYSICAL STANDARDS.

Section	Event	Standard	Under 16	16	Over 17	Result
I.—Swimming ... Standard.	25 yards	Standard	27 sec	25 sec	23 sec	
		Silver	24 sec	22 sec	20 sec	21 sec
	Distance	Any stroke	100 yds	200 yds	300 yds	passed
	Diving					passed
	Rescue					passed
II.—Jumping ...	High	Standard	4' 0"	4' 2"	4' 4"	
		Silver	4' 4"	4' 6"	4' 8"	4' 8"
	Long	Standard	14' 6"	15' 0"	15' 6"	15' 8"
		Silver	15' 6"	16' 0"	16' 6"	
III.—Throwing ...	Javelin	Standard	75' 0"	85' 0"	90' 0"	
		Silver	85' 0"	100' 0"	105' 0"	107' 4"
	Discus	Standard	55' 0"	65' 0"	70' 0"	
		Silver	65' 0"	75' 0"	80' 0"	
	Weight	Standard	23' 0"	25' 0"	27' 0"	
		Silver	26' 0"	28' 0"	30' 0"	30' 1"
IV.—Sprinting and Middle Distance	100 yards	Standard	13·4 sec	13 sec	12·6 sec	
		Silver	12·6 sec	12·2 sec	11·8 sec	12 3/10
	½ mile	Standard	2m 50s	2m 45s	2m 40s	
		Silver	2m 40s	2m 35s	2m 30s	2.35
V.—Long Distance	2 miles	Standard	14m 0s	13m 50s	13m 40s	13.55
		Silver	13m 0s	12m 50s	12m 40s	
	5 mls. walk	Standard	60m 0s	59m 0s	58m 0s	57.59
		Silver	57m 0s	55m 0s	53m 0s	

GENERAL REPORT:

[illegible handwriting]

Outward Bound Badge,
FINAL AWARD:
STANDARD

[illegible signature]
Executive Officer.

Above, a typical report after a one month's short term course at Aberdovey. Facing page, right, the possibilities of short term release from industry in place of part-time release are many, only a few have been tried. Facing page, below, team competition. A Youth Service Volunteers camp in being. Boys from school and boys from industry at a short term forestry camp organised by Youth Service Volunteers.

to which they are accustomed. Nearly all will accept it in a new environment, with new contemporaries, and under new influence and leadership free from past prejudices and the natural fear of looking foolish in front of their friends.

Much valuable preparation is given at home, at school, and at work, or in clubs and organisations, but a short-term course is still required to clinch matters and to provide the challenge of searching occasions. Character is all-important. It cannot be taught on a blackboard. Young men in their thousands have faced and mastered the challenge of searching occasions during the war—how much easier it could have been for them (as so many have affirmed) had they been given a preparatory apprenticeship. A gale at sea, a mist on the mountain, an excitable horse, a treacherous coalface, these are the things that can find us out and prepare us for life's emergencies. They are the self-measurement form for self-confidence, courage, character, power of leadership, quality of knowledge or initiative.

These outlets and these adventures must be provided. The lessons they teach can only be learned by personal and actual experience. A boy's limitations come to be accepted by himself and others in his normal life. Many of his qualities remain undetected until new experiences bring them to light; until then he remains an incomplete person, and all too often he remains both physically and mentally ill-equipped to face new experiences in safety.

There was a boy at Aberdovey who wrote home giving descriptions of his activities, his walks, the scenery and his accomplishments. He had only written for money before—he never noticed scenery. Another who went there from school, a confirmed "book-worm," hating the idea of going, thanked his Headmaster for insisting on his proving for himself that he could do active things. Smoking 30 cigarettes a day when he went, another boy who stopped smoking for the 26 days has never smoked more than 10 cigarettes a day since.

One more example was a boy from a factory who wrote: "We learn ocean highways up here from men who have travelled them. This is the way to learn geography. I know why I learned geometry now since I took bearings going out in the boat, so as to know how to get back. I know the places now where a lot of our products go." Won't that boy take more interest in his job when he gets back? No longer will he be only making, say, bolts. He will be making bolts for Cape Town, for Sydney, or for West Africa.

More than ever will industry require boys of character, determination and initiative. More than ever must boys learn the purpose of work and the knowledge required to do a good job and enjoy it. Courses like these at Aberdovey can bring the results if industry will allow the 26 days in which to complete them. Perhaps it might take the place of some of the "days a week" which the new Bill demands for continued education after leaving school.

All who have been associated with the Aberdovey experiment believe profoundly that the results prove the need and the value, and that Short Term Schools can play a vital part in the educational system and in the building of character for the preparation of whole men. The same thing can and should be done for girls and one of the proposed new schools will, it is hoped, cater for both sexes. There have already been two very successful short courses for Rangers at Aberdovey.

Everybody needs a period in which to be alone—and to like it. Everyone needs periods of idleness and to know how to be idle and how to enjoy it. Do any of us really know ourselves until we have achieved that? Fear of solitude and fear of idleness have much to do with the present tendencies to be doing *something* all the time at all costs and always to do it with others.

The lone hand on deck at night doing anchor watch in a ship at anchor—alone on a hill or mountain—the lone firewatcher of the forest—the lone watcher on the coast—the lone walker or fisherman, they come to know themselves, how to be alone and the benefit it can give. The war is over. The world must now build peace. The campaigning spirit of war must be directed to constructive work. Many young men and women have found themselves in their war experiences. They have found new qualities which had been hidden. They have been tested and they know where they triumphed and where they failed. They have found the joy of service without reward—of loyalty and devotion to something greater than themselves. They are more complete and—whether they recognise it or not—more Christian. Can we not see to it that the oncoming generation can learn these things without war? They are all Outward Bound to new work, to new enterprise, to life.

9

DESIGN EDUCATION

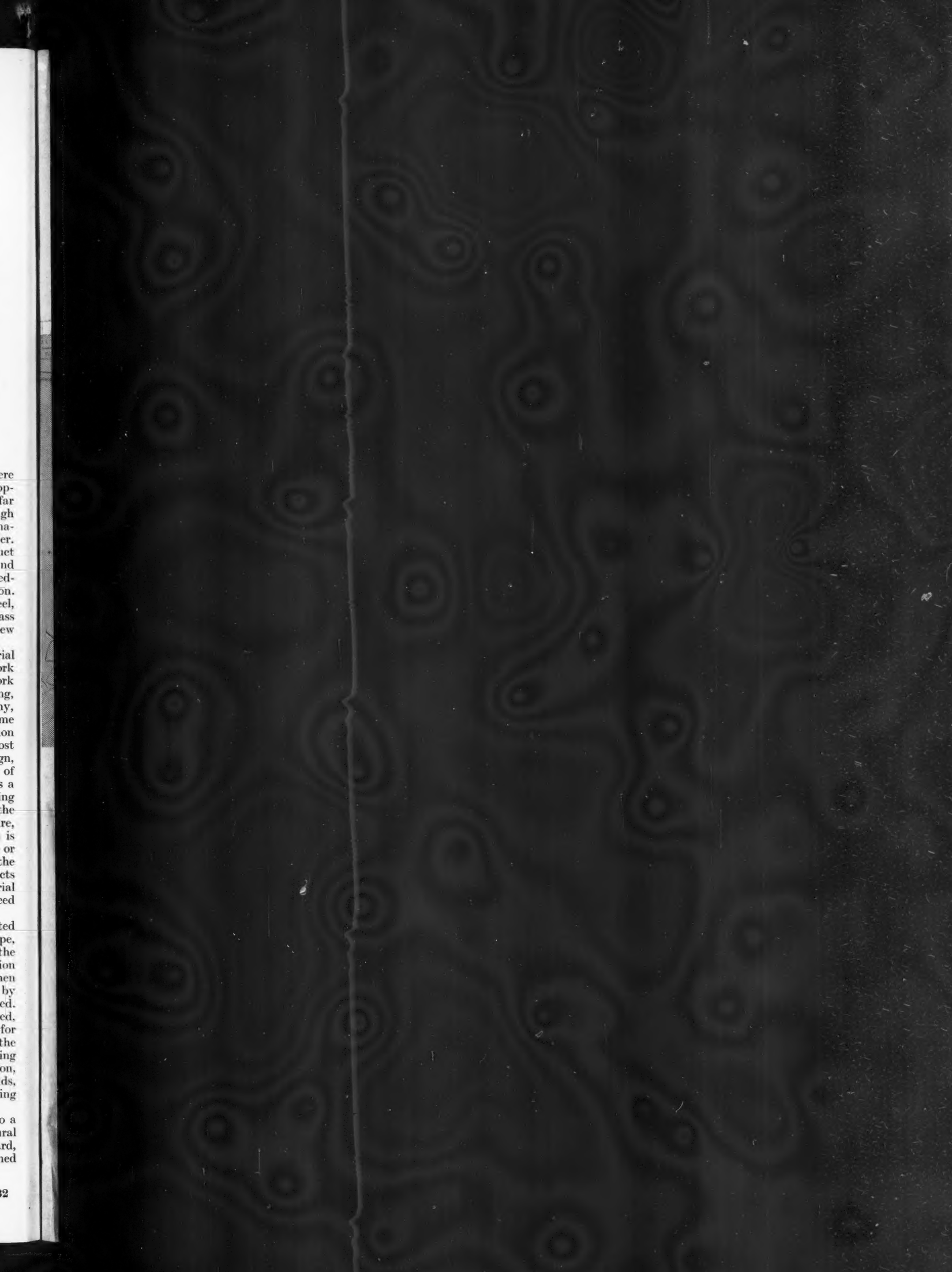
L. MOHOLY-NAGY

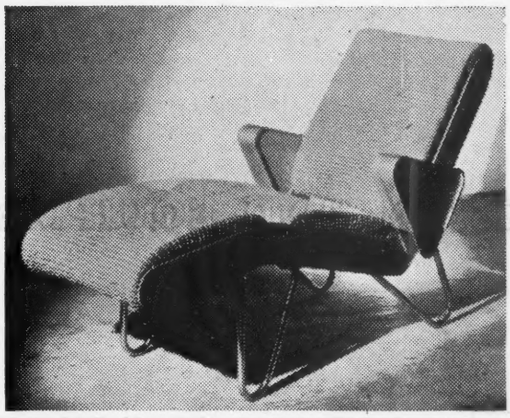
ARCHITECTURAL education is in a state of flux. Though there is a notion that the social, scientific and technological developments of the industrial age must be incorporated into it, so far the fixations of the " beaux arts " education have not allowed a thorough application of the new requirements. The main impetus for rejuvenation seems to come from the new education of the artist and the designer. This has been brought about mainly by the consideration of product development suitable for mass production, including its economic and social ramifications. Under its influence there exists a certain preparedness to apply new methods of approach to architectural education. People have begun to appreciate new industrial materials, steel, aluminium, plate glass, cement, the idea of " prefabrication for mass production," and under the pressure of the contemporary arts the new space conception derivative of the new industrial age.

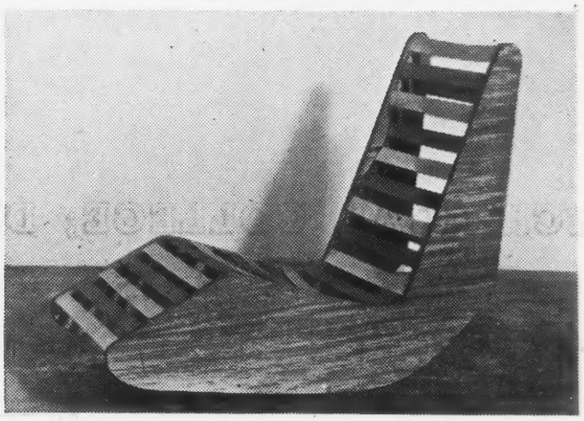
In order to work most efficiently and intelligently, artists, industrial designers and architects have to master the fundamentals of work with plane, volume, space and motion (space-time), since the work of each is interrelated with the other. The fundamentals of drawing, colour, modelling, life drawing, mechanical drafting, photography, mathematics, physics, chemistry and the humanities are the same in both architecture and product development. Thus, a co-ordination of the education of the artist, designer, and architect is one of the most important aspects of the training given at the Institute of Design, Chicago. After two terms of general studies in the fundamentals of expressions, scientific and technological subjects, the student selects a specialized workshop as a designer for product development, advertising arts, painting, modelling or weaving, and simultaneously learns the elements of architecture. Knowing the essentials of architecture, the product designer will be able to cope with its demands. This is important because most of the products he designs will in one way or another be incorporated into architecture. On the other hand, the architect will select with a greater assurance of judgment the objects and products needed in his work. Also his knowledge of the industrial processes will be a good guide to him for a timely, industrially produced housing on a large scale.

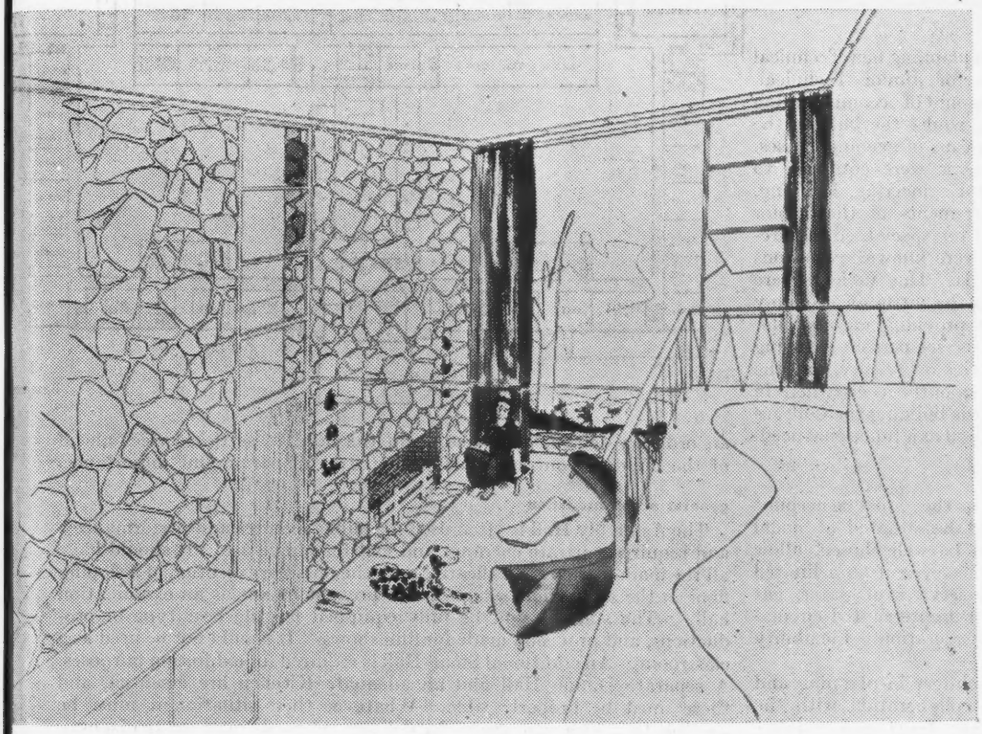
It is obvious that generally any task or product must be evaluated from many different points of view, such as function, material, shape, adaptability for certain production techniques, finishes—that is, the relation of the finish to wear and tear, as well as to the sense of vision and touch. But if complex tasks are understood as complex and then broken down into their fundamental components and solved one by one, a quicker and better handling of the elements can be acquired. After these elements and their fundamental qualities are mastered, they can easily be brought into related play. The student is asked, for example, to make a hand sculpture and tactile chart where only the materials are explored, especially their different properties concerning the qualities of the touch sensation, such as temperature, vibration, pricking and pain. These qualities can later be used in other fields, in co-ordination with other qualities and functions, such as in making a steering wheel, door handle, weaving or other products.

Another basic exercise is the changing of a flat sheet or slab into a three-dimensional structure. By manipulating a flat sheet its structural properties can be changed, whether the sheet is of paper, cardboard, metal, wire mesh, plywood, or plastics. They all can be transformed

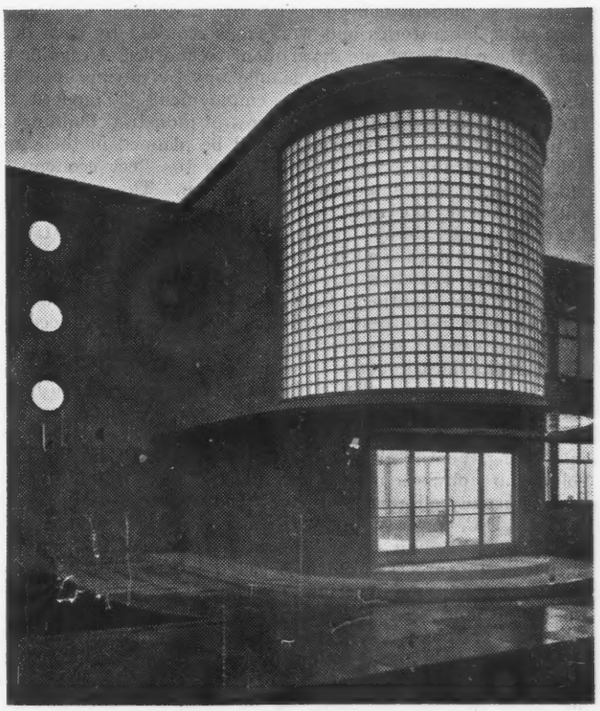








Facing page, left top and bottom, flexible chairs of plywood with tubular structures, right, a demountable plywood chair. This page, top left, a lounge chair with plywood drums and airfome cover. Top right, a rocker chair designed for convalescents. Left, the design for a studio room. Below, the entrance to the Berlei factory at Slough. Designed by Sir John Brown and A. E. Henson and W. David Hartley.



into a stable, carrying structure. These exercises also serve as useful analogies for many practical structures. Another phase of these exercises leads to the study of volume relationships which can be more thoroughly explored in modelling and sculpture.

Such studies have, then, their practical equivalent in the understanding of castings, dies for products in plastics, the difference between negative and positive volume, the mold and the plunger. Very often penetration of shapes with compound curvature, such as a fender with the reflector, can better be imagined and rendered after such a training. This helps to create a kind of " volume fantasy " much needed in present day streamlined industrial production.

Another exercise is the " invention " of joints in any one material or in a combination of materials. Joints are basic. Working with them abstractly and in isolation will lead to the understanding of all possible assemblage problems. Simultaneously, motion pictures and visits to factories supplement the microcosm of personal experiences on a less intensive, but larger scale.

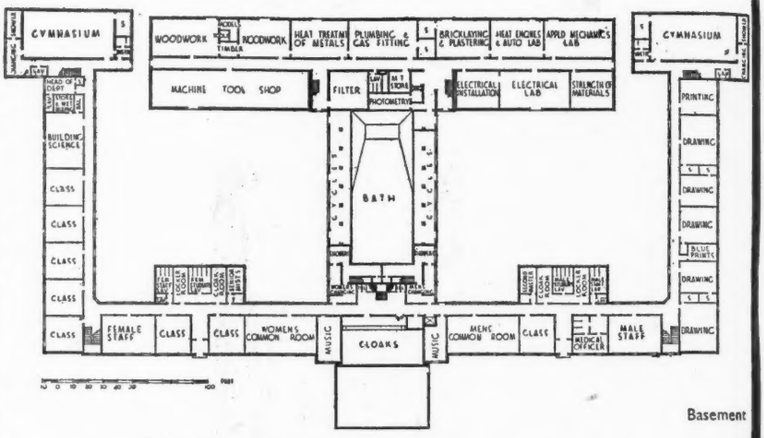
This method of approach can be applied to every subject and, in fact, every teacher in the Institute works with the same principle trying to stimulate the exploratory attitude of his students.

10

THE TECHNICAL COLLEGE; DESIGN AND EQUIPMENT

H. E. BROADBENT

IN pre-war days, the general policy adopted in planning new Technical Colleges was to provide accommodation for Junior Technical, Commercial and Art schools with a limited amount of accommodation for senior full-time and part-time day courses, whilst the bulk of the instruction to young employees was given by means of evening classes. In the first instance laboratories and workshops were equipped to provide instruction for the evening courses in Engineering, Building, Commerce or Art bearing in mind the requirements of the Junior Schools. After the College was established and the specialised requirements of the industries served by the College were known, extensions and equipment were provided to meet these needs. Thus Colleges were extended to meet definite demands, which had the virtue of economy in expenditure, but has resulted in difficulty in providing accommodation for the training courses for industrial and service personnel arising out of the needs of total war. In the light of this experience, and the wider demands to be met under the New Act, as outlined elsewhere in this issue, a new look must be directed towards building the Colleges of the future so that they fulfil a community as well as a functional need.



Basement

architectural features

Having in mind Colleges which serve a region, as they must on account of the capital cost of equipment, they should be situated at nodal points with regard to transport. Sites should be well chosen, allow for extension, and provide facilities for recreation even if on a limited scale, with wider facilities elsewhere. Ample services of water, gas and electricity should be available and free and uninterrupted circulation areas and roadways should be a main consideration. Flexibility should be always the keyword in design.

College buildings give ample scope to the architect in planning and layout, although this must be done in close collaboration with the Principal or Education Department since the functional requirements of a modern college necessitate a detailed knowledge of the classrooms, laboratories and workshops required by each department and of the relation of one department to another. A dignified external effect should be obtained in a simple way by relying upon the skilful composition, and the judicious employment of modern materials. They should include the best features of industrial buildings modified to suit function. The layout should be planned in the same simple fashion, preferably on a "Unit" basis to effect economy in cost; and to allow for subsequent modification. The number of storeys will depend on site utilisation, and it is of advantage to provide detached single storey buildings for the workshops. If rooms are placed on both sides of a long corridor, careful selection will be necessary as to their use so as to safeguard efficiency in ventilation, quiet working conditions and lighting. Grouping of departments, storage space, freedom from noise and the disposition of sanitary accommodation all require careful consideration.

One of the most important factors, often overlooked, is the provision of adequate services. These should be planned *with* the building and not as an afterthought. It is not often realised that a variety of such services must be provided for modern needs. The main services such as Heating, Ventilation, Lighting, and Hot and Cold Water in ample volume are obvious needs, but demand more specific consideration than is usually afforded to them. The electrical service must include A.C. and D.C. power supply, with reduced voltages and outlets in certain situations. Vacuum systems might be provided for general cleaning purposes, and are essential in selected laboratories. Gas and steam supplies are required in certain locations. Compressed air is essential in workshops and science laboratories. The provision of an internal telephone system and synchronised clocks is important. Certain rooms demand special consideration in ventilation and drainage. These features of flexibility and control of services must be stressed, since they inevitably influence the design of the whole structure. A College is not an ordinary school, and once again the need to settle services ahead of the building contract must be noted as of paramount importance.

general accommodation

The Assembly Hall is often used for public lectures and performances, and requires separate entrance and exit for public use. It should have all the main features of a theatre, with the possible exception of a sloping floor in the auditorium which would prevent its use as an examination hall. The stage should be fully equipped for the best type of productions, and provision made for film shows. It should not be used as a classroom. An additional Small Hall is required for exhibition purposes. A separate Dining Hall and an adequate Kitchen are essential, and these must be properly sited. Whatever their situation it must be possible to ensure easy access for delivery of goods, and waste disposal. In view of the increased numbers of part-time day and full-time students now attending Colleges two Gymnasia should be provided, only one of which need have the full range of equipment; the other being for light exercises and remedial work. Along with adequate dressing rooms, showers, etc., these could be detached from the main building in a compact unit design.

departmental accommodation

Modern Technical Colleges provide courses in a limited number of the twenty or more Departments necessary to cover the requirements of Art, Commerce and Technology. It is therefore only possible to deal with general principles in discussing accommodation. Drawing Offices, Laboratories, Workshops and Craft Rooms are common to many departments and some aspects of their design can be considered in detail. The main problem of the Drawing Office is lighting, which demands an intensity of 25 f.c., with freedom from glare—an extremely difficult one for the illuminating engineer. A solution is shown in the photographs on page 36. With laboratories the provision of services and their arrangement, the design and location of furniture and fittings, drainage and ventilation are all important. Science departments require vacuum, compressed air, gas, steam, water and electrical supplies in variety. There is a demand here for a unit bench with all services laid on, so that these benches may be grouped or isolated as required. Drainage from sinks demands careful consideration, and should be by open channel in every case, finished in material impervious to corrosion and rapid deterioration. Workshops again require flexibility in services and arrangement, with adequate provision for handling heavy machinery and bulk stores. The Heat Treatment Room calls for arrangements whereby Metallurgical investigation can be carried out on the spot, even if a full Metallurgical section is provided elsewhere. Similarly a Hydraulics department should have a small flume, and arrangements made for pumping to a tower on top of the

IASIUM

INTING

RAWING

RAWING

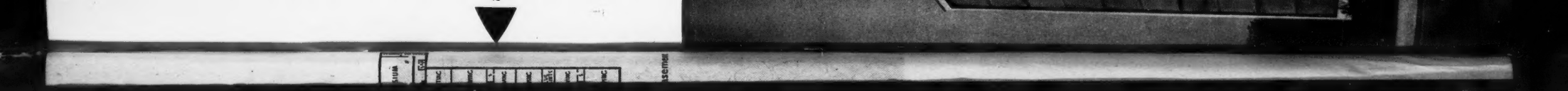
RAWING

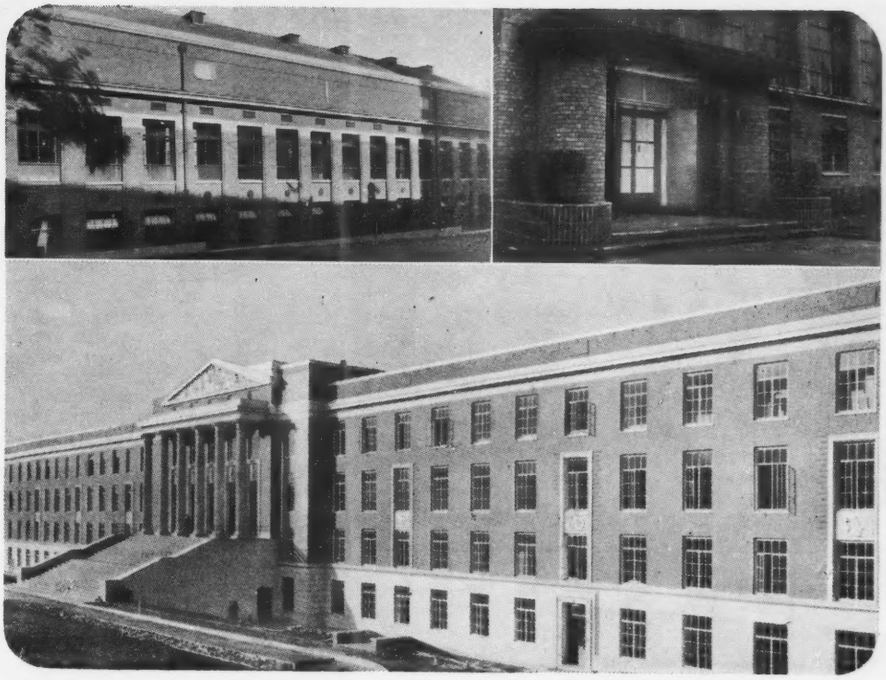
BLUE PRINTS

RAWING

RAWING

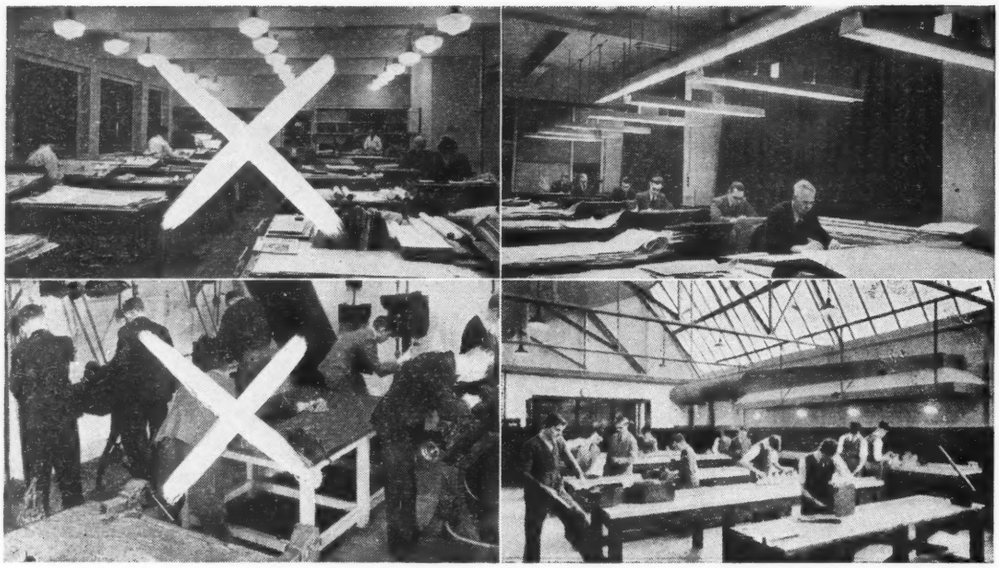
Basement





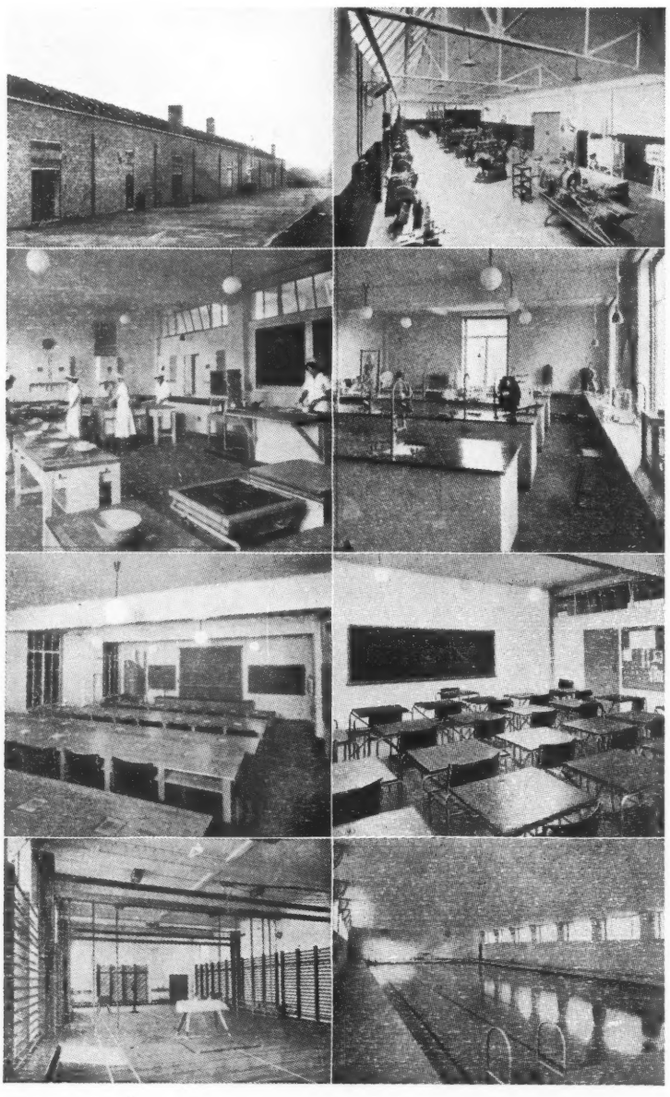
the plan

Top left, Doncaster Technical College. Top right, Enfield Technical College; and below, the South West Essex Technical College with its plan on the facing page. Each of these shows subservience of design to a preconceived symmetry which banishes the essential working purpose of the building to the back regions and destroys any possibilities of achieving efficient circulation. In contrast the Berne Technical School, below, interprets in its facade the logical arrangements of the plan.



Top left, drawing office; tungsten lamps with industrial type fittings. The light sources are too bright and cause distraction. Top right, drawing office; an alternative solution, combination of tungsten lamp with fluorescent tube. Lower left, an over-crowded and ill-lit workshop. Lower right, an airy and well-lit workshop.

Below, reading left to right down, back of workshop block, note easy access from roadway with direct unloading of goods into shop; well-laid-out machine and tool-making shop; cookery room; biology laboratory; lecture theatre; class-room; gymnasium; swimming bath.



building, storage tanks and down feed. The pipe-runs could be housed in panels on the exterior surface of one elevation of the building, these being embodied in the architectural design of the facade. Craft Rooms have not yet had the attention they deserve, and rooms for Domestic Science, Dressmaking, and Art Studies give wonderful scope to the designer.

equipment

The regional College must have the best and latest design of equipment, since it should be a pattern for industry. Its function is to provide the background training and knowledge of industrial processes and applied techniques of all kinds. In other words it serves the purpose of an investigation department without interference with production lines, and ordinary routines. In highly specialised industry, a local federation of firms should equip a department and keep it up to date. Again, it is clear that the Architect should have a clear specification of the proposed equipment when he is laying out the details of the building. This avoids endless confusion, and gives a real economy in cost. Thus the services can be built in, bearing in mind flexibility of operation and easy extension. All this affects the provision of panelled walls, floor ducts, electrical outlets for floor or wall mounting, and the location of service units. Drainage always requires careful consideration. Some examples with regard to siting of equipment may be given. The compressed air supply to workshops requires a pressure tank which may have considerable weight. This can be mounted on a low roof but must be readily accessible for inspection. The location of electrical transformers and motor driven generators should receive early consideration, along with the distribution boards. Some items of apparatus must be mounted so as to damp out any vibrations from the buildings, which necessitates foundations independent of wall support. Foundations for items of heavy equipment also require consideration in the early stages, otherwise the layout becomes unsightly due to large masses of cement projecting above floor level.

Other features depending on location and type of equipment are important. Woodworking machinery and abrasive wheels in the workshop require trunks to remove dust particles to a central chamber. In many sections local lighting is essential in awkward places. The new methods of lighting, such as by fluorescent tube, must be considered and incorporated. Floor boxes as electrical outlets should be in more general use.

conclusion

No single article on this subject could be exhaustive, or indeed cover a fraction of the field, but sufficient indication has been given to show the importance and complexity of the architectural problems involved in providing education to meet the needs of Art, Commerce and Technology. The widest interpretation should be given to these needs so as to make possible the accumulation of social experience in a community life right up to adult level. Careful planning and imaginative vision are required to make future development really effective. The co-operation of all interested parties is essential, and a great responsibility rests upon our Architects for clear expression of ideas and the provision in future of buildings which will enable us to maintain our tradition for high technical ability and skill.

ANTHOLOGY

One well-ordered Commonwealth

The colleges of Oxford, for curious workmanship and private commodities, are much more stately, magnificent, and commodious than those of Cambridge : and thereunto the streets of the town for the most part are more large and comely. But for uniformity of building, orderly compaction, and politic regiment, the town of Cambridge, as the newer workmanship, exceeds that of Oxford (which otherwise is, and hath been, the greater of the two) by many a fold (as I guess), although I know divers that are of the contrary opinion. This also is certain, that whatsoever the difference be in building of the town streets, the townsmen of both are glad when they may match and annoy the students, by encroaching upon their liberties, and keep them bare by extreme sale of their wares, whereby many of them become rich for a time, but afterward fall again into poverty, because that goods evil gotten do seldom long endure.

In each of these universities also is likewise a church dedicated to the Virgin Mary, wherein once in the year—to wit, in July—the scholars are holden, and in which such as have been called to any degree in the year precedent do there receive the accomplishment of the same, in solemn and sumptuous manner. In Oxford this solemnity is called an Act, but in Cambridge they use the French word *Commencement* ; and such resort is made yearly unto the same from all parts of the land by the friends of those who do proceed that all the town is hardly able to receive and lodge those guests. . . .

The common schools of Cambridge also are far more beautiful than those of Oxford, only the Divinity School at Oxford excepted, which for fine and excellent workmanship cometh next the mould of the King's Chapel in Cambridge, than the which two, with the Chapel that King Henry the Seventh did build at Westminster, there are not (in my opinion) made of lime and stone three more notable piles within the compass of Europe.

In all other things there is so great equality between these two universities as no man can imagine how to set down any greater, so that they seem to be the body of one well-ordered commonwealth, only divided by distance of place and not in friendly consent and orders. In speaking therefore of the one I cannot but describe the other ; and in commendation of the first I cannot but extol the latter ; and, so much the rather, for that they are both so dear unto me as that I cannot readily tell unto whether of them I owe the most goodwill. . . .

In most of our colleges there are also great numbers of students, of which many are found by the revenues of the houses and other by the purveyances and help of their rich friends, whereby in some one college you shall have two hundred scholars, in others an hundred and fifty, in divers a hundred and forty, and in the rest less numbers, as the capacity of the said houses is able to receive : so that at this present, of one sort and other, there are about three thousand students nourished in them both (as by a late survey it manifestly appeared). They were erected by their founders at the first only for poor men's sons, whose parents were not able to bring them up unto learning ; but now they have the least benefit of them, by reason the rich do so encroach upon them. And so far has this inconvenience spread itself that it is in my time a hard matter for a poor man's child to come by a fellowship (though he be never so good a scholar and worthy of that room). . . .

In some grammar schools likewise which send scholars to these universities, it is lamentable to see what bribery is used ; for, ere the scholar can be preferred, such bribage is made that poor men's children are commonly shut out, and the richer sort received (who in time past thought it dishonour to live as it were upon alms), and yet, being placed, most of them study little other than histories, tables, dice, and trifles, as men that make not the living by their study the end of their purposes, which is a lamentable hearing. Beside this, being for the most part either gentlemen or rich men's sons, they often bring the universities into much slander. For, standing upon their reputation and liberty, they ruffle and roist it out, exceeding in apparel, and banting riotous company (which draweth them from their books unto another trade), and for excuse, when they are charged with breach of all good order, think it sufficient to say that they be gentlemen, which grieveth many not a little. But to proceed with the rest.

Every one of these colleges have in like manner their professors or readers of the tongues and several sciences, as they call them, which daily trade up the youth there abiding privately in their halls, to the end they may be able afterward (when their turn cometh about, which is after twelve terms) to shew themselves abroad, by going from thence into the common schools and public disputations (as it were " *In aream* ") there to try their skill, and declare how they have profited since their coming thither.

Moreover, in the public schools of both the universities, there are found at the prince's charge (and that very largely) fine professors and readers, that is to say, of divinity, of the civil law, physic, the Hebrew and the Greek tongues. And for the other lectures, as of philosophy, logic, rhetoric, and the quadrivials (although the latter, I mean arithmetic, music, geometry, and astronomy, and with them all skill in the perspectives, are now smally regarded in either of them), the universities themselves do allow competent stipends to such as read the same, whereby they are sufficiently provided for, touching the maintenance of their estates, and no less encouraged to be diligent in their functions.

WILLIAM HARRISON (*Description of England*, 1593).

MARGINALIA

This Month's Anthology

William Harrison, a passage from whose *Description of England* is printed in *Anthology*, was a topographer, chronologer and historian. Although he calls the book "this foule frizzled treatise of mine," it has, in fact, made him one of the most frequently quoted and trusted authorities on the condition of England in Elizabeth's and Shakespeare's days. The work of which it is part was originally planned as "an universall Cosmographie of the whole world . . . with particular histories of every known nation," by Queen Elizabeth's printer, Reginald Wolfe. However, after the death of Wolfe, it was finally narrowed down to descriptions and histories of England, Scotland and Ireland.

Aesthetics in Industry

The correspondence columns of *The Times* have given hospitality recently to two spirited controversies, one on industrial design, and the other on tricky questions of precedence in the L.C.C. Housing Command. The first was opened in a long and very interesting letter from America's well-known industrial designer, Raymond Loewy. In America, he explains,

" The industrial designer has developed a design technique that has been successfully tested in the field during the past 15 years, and American products most generally carry with them the advantage of collaboration between the professional consulting designer and the industrialist. This partnership with industry and our philosophy of design are based on securing greater sales appeal—increased trade. I have heard much here in England about the æsthetics of design. This to me is strange. We seem to find that the æsthetics of an industrial product will take care of themselves automatically after we have provided a balance between function, simplicity and utility. In the average manufacturer's mind the word æsthetics has connotations of philanthropy and culture after office hours. Industrial design did not become standard practice in America because of æsthetics. There were far too many other good reasons for using it—increased sales appeal of products and increased trade. And the final result is no less beautiful for having been designed on sound, unemotional, business lines.

" Industrial design, as I know it," Mr. Loewy concludes, " delivers the goods. It is a serious profession which combines good taste, technical knowledge, and common sense. In the case of my own organization, it is taken seriously by over 75 corporations who are planning to build during 1946 over £200,000,000 worth of products designed with our assistance. Their conception of æsthetics consists of a beautiful sales curve, shooting upward. This realistic approach is certainly successful. May I suggest it for the consideration of the industrial designers of Britain, who must share in the tremendous responsibility of British industry in to-day's great problem ? "

One of America's most famous cartoon characters is Little Orphan Annie ; although left to take care of herself, she does not fare too badly. The position of æsthetics in American industrial design appears to be similar. Before the metaphor drops dead from exhaustion, it can serve well to illustrate the British position. From succeeding letters which appeared on the subject (e.g. from Mr. S. C. Leslie, Director of the Council of Industrial Design) it seems clear that, along with artists in other fields everywhere, it is the almost unanimous desire of British industrial designers to claim parentage of the child and, what is more, to give her a square deal. The resultant effect on sales curves will be interesting to watch.

Mr. Silkin on Landscaping

It was illuminating and encouraging to hear Mr. Silkin, the Minister of Town and Country Planning, put the case of the English landscaping tradition and

its topical function at the recent Annual Conference of the Institute of Landscape Architects. He told his audience of the heyday of landscaping in the late eighteenth century, of how the movement gave England "the most designed of all countrysides" and how then, in the Victorian age, "the landscape enthusiasm went into hiding in the suburban garden." He spoke of the fascination of urban landscape and warned against unimaginative and regimented planting, and he conjured up a vision of a future countryside landscaped in harmony with our century's carefully sited high blocks of flats, trunk roads and holiday camps.

Architects in the L.C.C.

In a reply to a letter which appeared in *The Times* from Mr. Percy Thomas objecting to the L.C.C.'s proposal to transfer their architects to a Housing and Valuation Department headed by a valuer, Lord Latham stated that—

"What is proposed is to concentrate, for an experimental period of three years, for the sake of greater speed of production, in one department (the Valuer's, to be renamed the Housing and Valuation Department) work which is at present divided between three departments, the Engineer's, the Architect's, and the Valuer's. This will involve the secondment of the qualified architectural and engineering staff, who are at present engaged on the same work in their separate departments, to the Housing and Valuation Department, at the head of which will be the Director of Housing and Valuer. Under him there will be a housing architect in charge of the architectural work whose duty it will be, among other things, to prepare the layout and arrange for the grouping of dwellings, the typical plans of which will have been prepared, as at present, by the Architect to the Council.

"The question is one of creating an organization calculated to secure the production of the largest number of good quality dwellings properly sited and laid out in the shortest possible time. There is, as I have stated, no proposal to take architects out of housing and there is nothing in what is suggested which contravenes the sound principles of town and country planning or affects the full consideration of planning aspects by the planning division of the Architect's Department."

At the end of his letter Lord Latham expressed his opinion that the speedy provision of housing accommodation is of greater human importance than unreal questions of professional prestige. There are few architects who would question the truth of that. One of the objections which is not concerned with professional prestige was expressed in a letter from Sir Patrick Abercrombie. His experience, he said, has shown that

"The old plan of snapping up cheap sites wherever obtainable by the Valuer and laying them out as separate units has produced no communities fit for human beings and has blocked road and other improvements. The same policy will continue if the London County Council adopt this proposal. Finance which should be the servant of the community will have precedence over human needs. Lord Latham's thin veneer of Housing Director will not deceive anyone who knows the tough rough core of the Valuer's department. . . . This is no mere question of professional prestige but of a fundamental attitude to social reform."

A New Headmaster

Bainbridge Copnall, M.B.E., has been appointed, on the retirement of Mr. Milner Gray, to the Headmastership of the Sir John Cass School of Arts and Crafts, Jewry Street, E.C.3.

Mr. Bainbridge Copnall has been demobilized from the army with the rank of Major, R.E., having served overseas in the M.E.F. and C.M.F. with the Eighth Army. While waiting to be demobilized he painted numerous portraits of Senior Army Officers in a studio at the British School of Art in Rome.

Electricity and the Highlands

The struggle which the *Electricity Number* of last April tried to analyse and decide is still on. Letter after letter appears in *The Times*, asking the same questions and receiving the same replies. A highlight of the controversy was the passage of arms between D. S. MacColl, the distinguished art critic, and A. E. MacColl, the Deputy Chairman of the North of Scotland Hydro-Electric Board. The weakness of the Board's case, as the *Electricity Number* has proved, is that it has never yet disclosed its programme for Scotland in full, that it has not been able to establish the industrial value of its projects for the actual districts immediately affected by them, and that it has not found a satisfactory reply to the figures brought forward in comparison of Canadian and maximally possible Scottish electricity output.

A.P.R.R. Information Service

The Association for Planning and Regional Reconstruction (34, Gordon Square, W.C.1) has sent out a four-page leaflet summing up its work and services—a remarkable achievement for a small, privately financed organisation. The *Maps for the National Plan* are now being followed by a new series of publications, *Survey before Plan*, of which the first volume will shortly be reviewed in these columns. Then there are the broadsheets and mimeographed reports—all sound, intelligent, useful stuff. May this war development not be cut short or curtailed by the return of peace.

War Damage in Germany

As more eye-witness reports come in, it gradually becomes possible to form a clearer picture at least about the condition of monuments in the British and American zones. No news has yet been received at all regarding the French and Russian zones.

Pending the publication of the official War Office reports and the continuation of Mr. Bourke's and other contributors' detailed accounts, here are a few more general notes.

ASCHAFFENBURG.—The Castle is badly bombarded, the church gutted.

BRÜHL.—The Palace is damaged, but the centre part with Neumann's staircase is intact.

COLOGNE.—A number of the Romanesque churches is repairable, and labour and materials are urgently needed. Of the decagon of St. Gereon's two bays are missing. The church could well be repaired.

DINKELSBÜHL.—Intact.

GÖTTINGEN.—Intact.

LÜBECK.—First aid to St. Mary's is progressing.

LÜNEBURG.—Intact.

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MARBURG.—Intact.
MÜNSTER.—In a very bad state.
PADERBORN.—In a very bad state.
RATZEBURG.—Intact.
ROTHENBURG.—Not undamaged.
SOEST.—In a bad state.

Culzean for the Nation

Culzean Castle in Ayrshire, Robert Adam's rare effort in the castellated Baronial, has been given to the National Trust for Scotland.

Douglas Cockerell

Douglas Cockerell, the bookbinder, has died at the age of seventy-five. He was the last survivor of the group of craftsmen immediately inspired by William Morris. He made his name (after a few years in the Wild West of Canada, as a bank manager in a small and highly insecure place) while in charge of the Doves Bindery under Cobden-Sanderson and Emery Walker.

Enter the A.D.A.

An Aluminium Development Association has recently been formed with The Hon. Geoffrey Cunliffe as President, and Air Commodore W. Helmore as Director General. The aim of the Association, which includes a central body of design and development technicians, is to give the user a better and cheaper article in aluminium and its alloys than could be obtained in any other material.

In an inauguration address Air Commodore Helmore gave some interesting facts about the relative weights of vehicles and their loads. A lorry can carry more than twice its own weight of goods, a two-decker bus more than half its weight in passengers, but a railway coach only one-eighth of its weight in useful load. In other words, if a bus carried only seven people it would be as efficient for its weight as a railway train. The moral should be clear.

Liverpool R.C. Cathedral

The architect appointed to succeed Sir Edwin Lutyens is Adrian Gilbert Scott, Sir Giles's brother, and the sixth member of the dynasty to appear before the public eye connected with building of front-rank prominence.

The Use of Fibreglass

The standard of presentation of a newly published booklet discussing the properties and advantages of Fibreglass is surprisingly high—good printing, excellent photographs, and an intelligent presentation of a good case. There can be no doubt of the commercial soundness of this kind of informative and pleasing publicity.

CORRESPONDENCE

The Murphy Cabinets

The Editor,
THE ARCHITECTURAL REVIEW

SIR,—Having just seen the November issue of your Review, I am concerned at some inaccuracies of caption to the pictures illustrating the *Design Review* on radio sets. To anyone reading captions 106 to 110 they would have a very clear impression that Mr. E. Minns was solely responsible for the design of the sets featured. This, however, is very far from being the case. Mr. R. D. Russell was, right up to the beginning of the war until he joined the Navy, responsible for the design of the Company's cabinets. It is true he had the co-operation of Mr. E. Minns in this, but Mr. Russell himself was the person primarily held responsible by us for their design. He should really, therefore, have been included in the acknowledgments given. In fact, some of the Murphy cabinets were entirely Mr. Russell's work, some were under his general control and some (for instance the cabinets numbered 107, 108 and 110) were the work of both designers.

I have no doubt that you will be hearing from Mr. Russell himself in the matter, but I should be obliged, from my Company's viewpoint, if you would find room in your next issue to correct any misapprehension that may have been caused.

I am, etc.,
JACK MARTIN,
Advertising Manager,
Murphy Radio Ltd.
Welwyn Garden City.

The Editor,
THE ARCHITECTURAL REVIEW

SIR,—Where *Design Review* has dealt with a group of objects or materials in which function plays a small part, it has served a useful purpose in disclosing trends or picking up the threads of pre-war design; the practical needs have also generally been adequately dealt with. It is therefore with some misgivings that I read your review of radio cabinets. A radio is an acoustic instrument—not admittedly one so dependent on its case as a violin, but nevertheless one in which the acoustic relation between case, speaker and chassis is of considerable importance. Your remarks and illustrations overlook this question entirely and are the equivalent of a seventeenth-century dilettante reviewing the latest designs of Stradivarius and Guarnerius in terms of Baroque form alone.

Considering the large amount of experiments that have been carried out in Europe and America on the design of speaker cabinets, it seems sad that manufacturers have chosen the path of sales appeal rather than real design: by design I mean the continuous process of making an article from the raw material stage, past the fulfilment of every functional requirement to the satisfaction of the eye in the complete realisation of formal appeal—a slow, difficult and *evolutionary* process, which must break the heart of any but the most farsighted sales-manager. What, however, is far sadder is that you have also taken the line of least resistance and accepted this attitude: I expect that more architects and readers of THE ARCHITECTURAL REVIEW will be engaged on Industrial Design and it is therefore essential that your Design Reviews are based on the most deep-seated and factual considerations.

The chief requirements of a radio cabinet, accepting the existing design of moving coil speaker—just as one would accept the string system in a violin until such system is superseded by another to give the same tonal characteristics—would seem to be as follows:—

1. The distribution of sound waves from the loud-speaker.
2. The segregation of the speaker and chassis to avoid mutual interferences.
3. The placing of the speaker in such a position as to minimise the absorption of some frequencies by soft furniture, and to take advantage of the acoustic qualities of the average living-room.
4. The prevention of focusing of high notes.
5. The prevention of low notes from the back of speaker cancelling out those from the front.
6. The avoidance of resonance in the cabinet, or the use of resonance to even out the frequency response of the speaker.
7. The placing of controls in a convenient position for operation.

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The effect these needs may have on the design should probably take the following form :—

1. It is inevitable, I think, that a circular speaker propagating sound waves in a circular form—high notes in the centre, low notes at the perimeter—should be expressed by a circular opening.
2. This segregation should be given expression by keeping the speaker opening and control panel separate rather than drawing them together as in so many designs.
3. The speaker should be inclined upwards or be so arranged that the sound waves are reflected upwards : this inclination has the added advantage of avoiding reflection of sound between parallel walls in a small room.
4. High note focusing could be avoided by a properly designed diffuser or by the reflection of sound waves.
5. The need of a certain distance between back and front of speaker to avoid the low notes being out of phase and cancelling each other out ; or the provision of some phase reversal system to reinforce rather than detract from the bass.
6. The careful design of the cabinet shape to avoid irrelevant resonance, probably in the form of a non-rectangular box : or at least to help the speaker to achieve an even response.
7. Whilst in the ordinary commercial set it is probably not worth while separating the controls from the speaker, it is definitely worth while in more expensive sets in order that volume and tone may be controlled from the distance at which listening takes place.

The manufacturer will answer that all this is not worth while in a small set : my answer is that the inadequate reproduction from even the best commercial set so far produced makes careful acoustic research imperative if further progress is to be made. Energy must be spent on *evolving* a radio and not merely on sales boost.

Incidentally, it is interesting to see that the cabinet you select as being the most satisfactory conforms most nearly to the various points I have mentioned.

I am, etc.,

4, Downshire Hill, Hampstead, N.W.3. A. G. GIBSON.

The Church and the City Churches

The Editor,

THE ARCHITECTURAL REVIEW

SIR,—I am happy to afford to Mr. Williams-Ellis the proof which he seeks that the alleged callousness on the part of the Church (to which he gives publicity in your pages) is a malicious fabrication.

So anxious was the Bishop of the diocese that the City churches should have the special attention they deserve, that they were not left to the care of the Committee of which I am Chairman, which deals with all the other Churches in London. A Committee with that sole charge, to look after war damage claims and loans and to advise on fire prevention arrangements and measures to preserve damaged and undamaged churches as well as their fittings, furniture and memorials, has been at work for five years. You would not, I fear, give me the space to detail all that this Committee has effected. Perhaps it will be sufficient if I say that in the Church of which I am Rector, St. Andrew Undershaft, under the directions of the Committee referred to, arrangements were made between ourselves and the City A.R.P. officers. A careful review of our own A.R.P. efforts was made by the Committee and more adequate fire-fighting equipment was installed. Reserve water tanks were supplied and ladders provided to give access to the roof. Thirty-one lorry loads of the finest woodwork, which included our own organ case, were sent into the remoteness of Somerset. Our monuments and most precious pulpit were protected with elaborate and costly brick work. Two of our best windows were taken down and stored : the bells were removed to a place of safety. All this was done either directly by the Committee itself or at their suggestion, and the same is true of every other Church in the City of London.

I need not, I think, continue the story of what the Committee has done after damage has been caused. Enough has been said, I think, to show that disastrous as our losses have been, the authorities of the Church have done all that they could to reduce the loss to its lowest, and it may be assumed that a similar care and devotion will be displayed when the day of complete restoration comes.

I am, etc.,

HENRY KENSINGTON.

33, Bedford Square, W.C.1.

A Greenwich Treasure Hunt

The Editor,

THE ARCHITECTURAL REVIEW

SIR,—I should be glad if you would make a correction in your next issue, as it would appear from your introduction to the article that I am the Surveyor to the Borough of Greenwich.

This is not the case ; the Borough Engineer and Surveyor is Mr. C. H. Jennings, M.Eng.,M.I.C.E., and my position is that of Chief Architectural Assistant.

I am, etc.,

C. W. CRASKE.

Trade Notes

Hunting Aerosurveys. One of the Companies of the Hunting Group have now moved from their temporary war address at Byron House, St. James's Street, S.W.1 to permanent offices at 29, Old Bond Street, W.1. Telephone No. Regent 5211-2-3. The Company's technicians are now waiting for the ban on civilian flying and photography to be lifted and will then be ready to recommence immediate operations. Enquiries are already being dealt with.

For greater convenience of location, the Sales Department of **P. I. M. Board Co. Ltd.** has been transferred from their works at Sunbury-on-Thames, Middlesex, to Aldwych House, London, the new address being Sundeala Board Co. Ltd., Aldwych House, Aldwych, London, W.C.2. Telephone No. Chancery 8159.

The above entails no alteration in staff arrangements of P. I. M. Board Co. Ltd. Mr. H. Rixon has been appointed Manager of the Sales Department at Aldwych House.

All P. I. M. Board Co.'s products in future will be known under the one trade name of "SUNDEALA" : the range including Hardboards, Medium Hardboards and Insulation and Building Boards.

Henry Hope & Sons Ltd. announce that Mr. E. Litherland, a Director of the Company for the last twenty years, has been obliged to retire on account of ill-health, and that Mr. F. Palmer Cook, who has been a member of the staff for twenty-four years, has been appointed to succeed him as Manager of the London Area. Mr. Palmer Cook has served throughout the war in the Royal Engineers, where he held the rank of Lieut.-Colonel, and was awarded the O.B.E.