

# ROYAL COMMISSION

ON

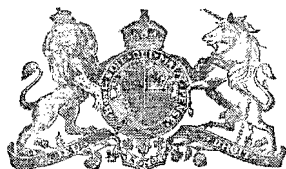
# INDUSTRIAL TRAINING AND TECHNICAL EDUCATION

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REPORT OF THE COMMISSIONERS

Volume I of Part III

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OTTAWA

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ROYAL COMMISSION ON INDUSTRIAL TRAINING AND  
TECHNICAL EDUCATION.

OTTAWA, 31st May, 1913.

The Honourable T. W. CROTHERS, K.C., M.P.,  
Minister of Labour.

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

JAS. W. ROBERTSON,  
*Chairman.*

THOS. BENGOUGH,  
*Secretary.*

## CONTENTS OF VOLUME I OF PART III.

### ENGLAND.

	PAGE
CHAPTER I. OUTLINE OF THE EDUCATIONAL SYSTEM....	443
SECTION 1. INTRODUCTORY.....	443
A Word on Nomenclature; The Menace of "Payment by Results"; Specialization for Examinations; Much Progress Recently; To Rescue the Perishing.	
SECTION 2. ORGANIZATION AND ADMINISTRATION.....	446
Local Organization; Working of the Act of 1902; An "Example" Education Committee.	
SECTION 3. THE ELEMENTARY SCHOOLS.....	450
Staffing of Schools; Handwork in Schools; Medical Inspection; Care Committees and their Work; Efficiency of Elementary Schools.	
SECTION 4. HIGHER ELEMENTARY SCHOOLS.....	454
SECTION 5. SECONDARY AND HIGHER EDUCATION.....	455
General Interest in Industrial Education; Science, Drawing and Shopwork; The Universities.	
CHAPTER II. TECHNICAL EDUCATION.....	458
SECTION 1. GENERAL PROVISIONS.....	458
Grants to Technical Education; Generous Aid to Industrial Arts; Drawing, Design and Art; Existing Provisions.	
SECTION 2. EVENING CLASSES.....	460
A Characteristic Feature; Striking Facts and Figures; Views of the President of the Board; Provisions in London; The University of Sheffield; Applied Science Department; Evening Classes; Associateship in Iron and Steel Metallurgy.	

	Page.
CHAPTER III. CONVERSATION WITH MR. FRANK PUL- LINGER.....	468
<p style="padding-left: 40px;">Day Continuation Schools; Practical Teachers and Trade Atmosphere; Intermediate Schools — the New Apprenticeship; Full Time Technical Schools; Two Sorts of Highest Technical Schools; The Sandwich System; Part Time Day Schools; Government Dockyard Schools; Evening Schools; Grouped Courses Best; Workshops in Schools; Drawbacks to the Course System.</p>	
CHAPTER IV. CONVERSATION WITH MR. ROBERT BLAIR	476
<p style="padding-left: 40px;">High Social Purpose in Education; London's School Population and Scholarships; Free Secondary and Technical Education; Social Grades Discouraged; Three Classes of Schools; Evening and Trade Schools; Trade Classes and Trades Unions; Consultative Committee for Trade Schools; Boys' Trade Preparatory Schools; How Time is Apportioned; Girls' Trade Preparatory Schools; Description of Bloomsbury School; Securing Positions for Girls; Cost of Girls' Trade School; Polytechnics too Big for Efficiency; London County Council Organization; Important Work of Care Committees.</p>	
CHAPTER V. TYPES OF INSTITUTIONS IN LONDON.....	489
SECTION 1. CENTRAL SCHOOLS IN LONDON.....	489
<p style="padding-left: 40px;">West Square Central School; Industrial History; Drawing; Childerley Street School; Other Central Schools.</p>	
SECTION 2. CENTRAL SCHOOLS — EVENING WORK.....	491
<p style="padding-left: 40px;">Hugh Myddelton School (Clerkenwell); Barrett Street Evening Commercial School; William Street Science and Art and Commercial Centre.</p>	
SECTION 3. BOROUGH POLYTECHNIC INSTITUTE.....	493
<p style="padding-left: 40px;">Placing Boys and Girls; Social Value of these Schools; Aim of this Institute; Day and Evening Classes.</p>	
SECTION 4. THE NATIONAL SCHOOL OF BAKERY AND CONFECT- IONERY.....	497
<p style="padding-left: 40px;">Name and Aim; History; Finance; Buildings; Curriculum and Time Table; Staff and Committee; Results of Training; Opinions of Employers.</p>	
SECTION 5. THE SCHOOL OF BUILDING, BRIXTON.....	500

SESSIONAL PAPER No. 191d

	Page.
CHAPTER VI. TWO IMPERIAL INSTITUTIONS.....	503
SECTION 1. IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY	503
An Imperial Idea; Buildings and Schools; Admission and Training of Students; Technology and Research; Shop Training <i>vs.</i> Formal Studies.	
SECTION 2. THE UNIVERSITY OF LONDON.....	506
CHAPTER VII. MANCHESTER.	
SECTION 1. INTRODUCTORY.....	509
Evening Classes the Feature; Day Classes also; Training for Girls; Diagram illustrating Graded Systems of Courses; Diagram showing Courses of Instruction for Technical Students.	
SECTION 2. THE MUNICIPAL SCHOOL OF TECHNOLOGY.....	513
Evening Students; Origin of the Municipal School; Technological Day Courses; Cotton Manufacture; Special Day Course for Engineers' Apprentices; Special Day Course for Plumbers' Apprentices; Evening Classes: Science and Technology; Architecture and Builders' Work.	
SECTION 3. "CONVERSATION" WITH MR. J. H. REYNOLDS...	519
Value of Evening School; Germany Gains on England; Education Helping Workingmen; Education in Manchester; Training of Leaders; Day-time Compared with Evening Instruction; When Boys Leave Schools; Attitude of the Trades Unions; Machinery Discourages Skill; The Institute's Cost and Policy.	
CHAPTER VIII. LEEDS.....	525
SECTION 1. INTRODUCTORY.....	525
Technical Courses; Evening Courses, etc.	
SECTION 2. "CONVERSATION" WITH MR. JAMES GRAHAM....	526
Practical Industrial Art; How Advisory Committees Help; Boot and Shoe Trade Revolutionized; Interest of Employers Aroused; Practical Ability Developed; Compulsion and Half-Time; Scheme Linked With University; Strong Secondary Education Wanted.	

	Page.
SECTION 3. "CONVERSATION" WITH MR. BEES.....	532
Education One Complete Plan; Securing Parents' Interest.	
SECTION 4. HOLBECK DAY TRADES PREPARATORY SCHOOL...	533
Plan of Instruction; Syllabus of Work.	
SECTION 5. TECHNICAL EVENING SCHOOLS.....	538
Grade I: General Evening Schools; Grade II, Branch Artisan Schools; Grade III, Advanced Technical Evening Schools; Grade IV, The University of Leeds. Commercial Education and Training; Art Instruction and Training; Domestic Arts.	
SECTION 6. TRAINING COURSES FOR TEACHERS.....	546
SECTION 7. UNIVERSITY OF LEEDS.....	547
CHAPTER IX. HALIFAX.....	550
SECTION 1. "CONVERSATION" WITH DR. J. CROWTHER.....	550
65 per cent of Boys Join Evening Classes; Co-operation of Employers; Preparation of Apprentices; Objections to Compulsory Attendance; Better to Put Compulsion on Employers.	
SECTION 2. MUNICIPAL TECHNICAL COLLEGE.....	554
Science and Technology; Textile Industries; Day Classes for University Examinations; Evening Classes at College; Evening Schools, Co-ordination; Evening Continuation Schools; Curricula of Evening Continuation Schools; Workshop Practice; Special Classes; Drawing and Art.	
SECTION 3. PREPARATORY TRADE SCHOOL.....	564
Object of the School; Subjects and Courses of Instruction; Requirements for Admission; Time Table.	
CHAPTER X. THREE BOROUGHES IN LANCASHIRE.....	567
SECTION 1. BARROW-IN-FURNESS.....	567
The Provision and Training of Teachers for Technical Schools; The Introduction of Machinery into Technical Schools; What Technical Schools Can Do to Assist in Social Reform; Evening Schools. The Technical School; Sections of Technical Instruction; Mechanical Engineering Course.	

SESSIONAL PAPER No. 191d

	Page.
SECTION 2. ACCRINGTON.....	580
The Evening Continuation Classes; Municipal Technical School; Subjects of Art Instruction; Science and Technical Courses.	
SECTION 3. WIDNES.....	581
Municipal Technical School; Miscellaneous Classes; Employment Register; Prizes and Rewards for Students.	
CHAPTER XI. DRAWING, DESIGN AND ART.....	584
SECTION 1. ROYAL COLLEGE OF ART, SOUTH KENSINGTON..	584
Full Associateship; Schools Associateship; Craft Classes; Recommendations of Departmental Committee; Exhibition and Competition for Designers; Course in Teaching; Awards; Literary Course.	
SECTION 2. VICTORIA AND ALBERT MUSEUM.....	590
Circulation Division of Museum; Loans to Permanent Museums and Exhibitions; Loans to Schools of Art and Art Classes; Money Grant in Aid.	
SECTION 3. ART INSTRUCTION UNDER LONDON COUNTY COUNCIL.....	591
Drawing in Infant and Elementary Schools; Teacher Training; Evening Art Classes; Art Work in Secondary Schools; Schools with Artistic Bias; Art and Craft Schools; Central School of Arts and Crafts, London; The Royal Female School of Art; The School of Photo-Engraving and Photography; Camberwell School of Arts and Crafts.	
SECTION 4. PROVINCIAL SCHOOLS OF ART.....	598
Value of Art School to Industry.	
Industrial Art in Leeds; Central School of Art, Leeds; Instructors, Craft-work, Exhibitions, etc.; Training of Teachers, Research, etc.; West Leeds High School; Manual Training Departments.	
Municipal School of Art, Manchester; Museum of Art and Handicraft; Library Lectures, Prizes, etc.	
Art Training in Leicester; Special Museum Features; Courses in Close Relation to Trade.	
Bradford School of Art; Artistic Trade or Craft Classes; Courses in Lithography; Courses in Typography; Painters and Decorators; Cabinet Makers' Course; Notes of Interest.	

## SCOTLAND.

	Page.
CHAPTER XII. OUTLINE OF EDUCATIONAL SYSTEM.....	611
SECTION 1. INTRODUCTORY.....	611
Education Democratic, Practical and Graded; Enlargement of Areas; The Route of Evolution; Creation of School Boards.	
SECTION 2. SCOPE OF THE SYSTEM.....	613
Obligations and Powers under Act of 1908; Effect of Act of 1908; Burgh and County Committees; Provincial Committees; Nomenclature; Functions of Various Schools; Specialized Education of Adolescents.	
SECTION 3. PRIMARY EDUCATION.....	617
Supplementary Courses; Selection of Course; The Line of Safety. Department's Suggestions for Supplementary Courses; Their Main Objects; Developing Self-Reliance; Individual Study Directed to Practical Ends.	
SECTION 4. INTERMEDIATE AND SECONDARY EDUCATION.....	622
SECTION 5. CONTINUATION CLASSES.....	622
Duties and Powers of School Boards; Advanced Work by County Committees; Progress in Continuation Class Work; Teachers for Continuation Classes; Compulsory Attendance at Continuation Classes.	
SECTION 6. DEPARTMENTAL SUGGESTIONS TO SCHOOL BOARDS.	625
Extent of Continuation Class Work; Improvement to Come Gradually; Supplementary Courses Prepare for Continuation Classes; Importance of Supplementary Courses; Object of Supplementary Courses. Developing Public Opinion; Co-operation of Employers and Employed; Voluntary or Compulsory Attendance; Analysis of Occupations; Teachers Should Know Occupations of Pupils. Rural Education.	
SECTION 7. CENTRAL INSTITUTIONS.....	630
Influence of Central Institutions; The University Grants.	



SESSIONAL PAPER No. 191d

	Page.
SECTION 8. HOW EDUCATION IN SCOTLAND IS FINANCED....	632
Sources of Income;	
Central Funds; The Education (Scotland) Fund;	
District Education Fund; Relief of Rates; Bursaries.	
Local Funds; Finances of the School Boards;	
Income of School Boards; Expenditure of School Boards; Finances of Other Local Bodies.	
CHAPTER XIII. CONVERSATION WITH SIR JOHN STRUTHERS.....	639
Department of Education and National System;	
Compulsory Attendance; Act of 1872; Act of 1908; Secondary Education Committees; Stress upon Conditions for Health; School Boards—Functions and Powers; Suggestions for Canada.	
Vocational Instruction and General Education; Vocational Training and Special Occupations; Trade Instruction; Continuation Classes by School Boards; Continuation Classes by Employers.	
Vocational Training in Secondary Schools; Specialized Courses in Secondary Schools.	
Local Management with Central Guidance; System of Organization and Co-operation.	
The Agricultural Colleges; Agriculture; Parish Schools and Bursaries; Intermediate Schools, "Centres" and Bursaries.	
Training Teachers for Technical Education; "Education for Scotland Fund"; Other Funds for Technical Instruction; How the Education Fund is Divided; Financing Schools of Art, etc.; Development Fund for Research.	
CHAPTER XIV. ORGANIZATION OF EDUCATION IN EDINBURGH.....	655
SECTION 1. THE EDINBURGH SYSTEM.....	655
Administration of Education; Vocational Guidance; Educational Finances.	
SECTION 2. PRIMARY EDUCATION.....	659
Classification of Pupils; General Features of the Primary Curriculum.	
Supplementary Courses.....	660
The Commercial Course; The Industrial Course; The Household Management Course; General Studies; Central Schools; Details of Some Subjects.	

	Page
SECTION 3. CONTINUATION CLASSES.....	662
Origin and Progress of Classes; Scope of Work; Requirements of Departments; Extent and Character of Classes; Courses and Subjects; Elementary Trade Instruction; Numbers of Classes and Teachers; Percentage of Attendance; Co-ordination with Central Institutions; Methods of Advertising Classes.	
SECTION 4. CENTRAL INSTITUTIONS.....	668
(1) The Heriot-Watt College; (2) Edinburgh and East of Scotland College of Agriculture; (3) Edinburgh College of Art; (4) Edinburgh School of Cookery and Domestic Economy; (5) The Royal (Dick) Veterinary College; (6) Training Colleges for Teachers; (7) Edinburgh University.	
SECTION 5. "CONVERSATION" WITH MR. J. W. PECK.....	678
Continuation Class System; A Census Survey; How Teachers are Secured; Students and Employers; <i>Re</i> Compulsory Attendance; Six Hours of Daylight Teaching Suggested; Advisory Committees and their Functions.	
CHAPTER XV. ORGANIZATION OF EDUCATION IN GLASGOW.	682
Introductory.	
SECTION 1. "CONVERSATION" WITH MR. J. CLARK.....	682
Selection of Vocation; Attitude of Employers; Admissions and Bursaries; Co-operation with Labor Exchange; Elementary Education; Secondary Education; Continuation Classes.	
SECTION 2. A CENTRE FOR THE WEST OF SCOTLAND.....	687
Organization of Science Classes; Plan of Technical Education in Renfrewshire; Employers' Co-operation in Continuation Classes; General Summary of Employers' Opinions; Bursaries; General Conditions.	
SECTION 3. CENTRAL INSTITUTIONS.....	690
(1) Glasgow and West of Scotland Technical College; Representative Board of Governors; Freedom under Scotch Department; Day Students; Evening Classes—General Section; Evening Trade Classes; Special Institution for Trade Classes; The Baking School; Preliminary Examinations; Evening Classes; Enrolment of Students; Occupations of Evening Students, 1909-10.	

SESSIONAL PAPER No. 191d

SECTION 3—Continued.	Page.
(2) West of Scotland Agricultural College.	
(3) Glasgow Athenaeum (Commercial College).	
(4) Glasgow School of Art; Art related to Industries; The Functions of a School of Art; Glasgow Industries Requiring Art; Courses in Design and Decoration; Beginnings and Development; Relation of Art School to Primary Schools; Enrolment of Students.	
“Conversation” with Mr. Newbery; Need of Education in Taste; Should Schools Manufacture Goods?; School Produces Designers, not Designs; Art and Practical Processes; Revival of Art Needlework; The Dorset Smock; Collaboration with Architects; Keeping in Touch with Things Outside the School.	
 CHAPTER XVI. ORGANIZATION OF EDUCATION IN THE COUNTY OF FIFE.....	707
SECTION 1. CONTINUATION CLASSES.....	707
Inspector’s Report on Continuation Classes; Percentage of Attendance; Practical Measures Suggested.	
SECTION 2. COWDENBEATH MINING SCHOOL.....	710
Objects of School; Courses of Instruction; Conditions upon which the Scholarship is Paid; The Mining Course; Organized Mining Course; Organized Mechanical Engineering Course; Organized Electrical Engineering Course; Continuation Classes.	
SECTION 3. SPECIAL PROVISIONS AT DUNFERMLINE.....	715
The Lauder Technical School; Information and Employment Bureau; Carnegie Dunfermline Trust; College of Hygiene and Physical Training; Vacation Classes.	
 CHAPTER XVII. GALASHIELS AND HAWICK.....	718
SECTION 1. HAWICK.....	718
Continuation Classes; Successful Evening Classes; Hawick Technical Institute; Training Women Workers; Teaching Methods are Important; Kinds of Classes.	
SECTION 2. GALASHIELS.....	721
The Galashiels Technical College; “Conversation” with Dr. Thomas Oliver; German Progress in Woollens; Education Made Applicable.	

## IRELAND.

	Page.
CHAPTER XVIII. OUTLINE OF THE EDUCATIONAL SYSTEM.	729
Introductory; Occupations of the People.	
SECTION I. THE NATIONAL SCHOOLS.....	727
Two Classes of Schools; System of Management; Curriculum; Teachers and Grants; Training Colleges; Inspection; Model School Departments; Evening Schools.	
SECTION 2. DAY SECONDARY SCHOOLS.....	731
Grants for Secondary Education.	
SECTION 3. AGRICULTURE, INDUSTRIES AND TECHNICAL INSTRUCTION.....	732
Recess Committee's Work; Lessons for Canada; Members of the Recess Committee.	
CHAPTER XIX. CONVERSATION WITH M. T. P. GILL.....	735
Funds Available and How Applied; Science and Art Regulations; School Garden Work; Branches of the Department; Broad Principles of Administration; Local Rates and Department Grants; Direct and Indirect Means.	
CHAPTER XX. CONVERSATION WITH MR. GEORGE FLETCHER.....	741
Science Teaching in Secondary Schools; How Teachers were Trained; Advisory Committee a Safety Valve; Grants--How Allotted; Co-operation of Intermediate Board; Practical Training in Science; Records of Pupil's Progress. Dealings with Treasury; How Schemes are Framed; Local Rates and Grants.	
Itinerant Classes; Domestic Economy Teachers and Scholarships; Day Trades Preparatory Schools; Aid to Home Industries.	
The Department's Various Grants; Lack of Suitable Buildings; Scholarships for Boys at Schools and Trades.	
CHAPTER XXI. ORGANIZATION OF THE DEPARTMENT..	751
SECTION I. THE VARIOUS BODIES CONSTITUTED.....	751
Council of Agriculture; The Agricultural Board; Board of Technical Instruction; The Consultative Committee; Local Organization.	

	Page.
SECTION 2. ADMINISTRATION AND FUNDS.....	753
Principles of Administration; Relations with Local Authorities; the Endowment Fund; Aid to Local Schemes; For Agricultural Instruction; For Technical Instruction; The Parliamentary Votes.	
CHAPTER XXII. THE AGRICULTURAL BRANCH OF THE DEPARTMENT.....	759
Introductory.	
SECTION 1. ARRANGEMENTS FOR INSTRUCTION.....	759
Functions of Local Authorities; Relations with Department; Attitude towards Agricultural Education; Policy of the Department; A Graduated System of Education.	
SECTION 2. ALBERT AGRICULTURAL COLLEGE, GLASNEVIN..	762
Admission, Staff, Diploma, etc.; Courses of Instruction; Agricultural Course; Horticultural Course.	
SECTION 3. AGRICULTURAL STATIONS FOR FARM APPRENTICES.....	765
The Station at Clonakilty; Students and Their Work.	
SECTION 4. ITINERANT INSTRUCTION IN AGRICULTURE.....	767
Itinerant Instructors; Winter Agricultural Classes; Horticulture and Bee-Keeping; Poultry-Keeping; Butter-Making.	
SECTION 5: AGRICULTURAL SCHEMES.....	770
Duties of Committees; Instruction in Agriculture (Scheme No. 9); Syllabus of the Course; Winter Agricultural Classes (Scheme No. 10); Instruction in Horticulture and the Management of Bees (Scheme No. 14).	
SECTION 6: AGRICULTURAL OVERSEERS.....	774
Work in Congested Districts; Suggestions for New Canadian Settlements.	
SECTION 7: INSTITUTIONS FOR WOMEN AND GIRLS.....	775
The Munster Institute, Cork; Course of Training; Conditions of Entrance, Study, etc.; The Ulster Dairy School, Cookstown; Schools for Rural Domestic Economy; The School at Loughglynn.	

	Page.
CHAPTER XXIII. THE CO-OPERATIVE MOVEMENT.....	778
SECTION 1: AGRICULTURAL ORGANIZATION.....	778
Why It Was Necessary in Ireland; The Origin of the I.A.O.S.; Sir Horace Plunkett's Work; Agricul- tural Banks.	
SECTION 2: RAFFEISEN BANKS.....	781
Average of Liabilities.	
SECTION 3: AGRICULTURAL CREDIT IN IRELAND.....	783
CHAPTER XXIV. THE TECHNICAL INSTRUCTION BRANCH OF THE DEPARTMENT.....	784
SECTION 1: THE TRAINING OF TEACHERS.....	784
Teachers of Day Secondary Schools; Teachers of National Schools; Instructresses of Domestic Economy.	
SECTION 2: SCHOLARSHIPS AND GRANTS FOR SCHOOL PUPILS..	787
Grants to Day Secondary Schools; Subjects; Grants; Courses of Instruction; Laboratories; Duration of Lessons; Size of Classes; Extent of the Work in 1909-10.	
SECTION 3: TECHNICAL SCHOOLS AND SCIENCE AND ART SCHOOLS AND CLASSES.....	790
Difficulties and Advantages of Evening Classes; Some of the Regulations for Grants; Day Schools for Apprentices and Others Engaged in Business; Schools of Art.	
SECTION 4: SCHEMES UNDER LOCAL AUTHORITIES.....	793
Introductory; Occupations of Young Men; Occupations of Young Women; General Conditions for Each of the Schemes.	
Specimen Technical Instruction Scheme, County Kil- kenny; Chief Industries; Objects of the Scheme; Finance; Subjects of Instruction; at Evening Classes; at Temporary Centres; in the Day Trades Preparatory School; Teaching Staff; Day Trades Preparatory School; Itinerant Instruction; Schol- arships for Boys; Evening Technical Classes.	
Specimen Technical Instruction Scheme, Urban Dis- trict of Portadown; Finance; Subjects of Instruc- tion; Day Trades Preparatory School.	

	Page.
SECTION 5. CENTRAL INSTITUTIONS AND SCHOLARSHIPS.....	802
<p>The Royal College of Science; Faculties; National Museum, Dublin; Metropolitan School of Art, Dublin; Courses; Artistic Handicrafts; Drawing on the Blackboard; Scholarships; for Agriculture, Horticulture, etc.; for Science and Technology; for the School of Art.</p>	
CHAPTER XXV. THE MUNICIPAL TECHNICAL INSTITUTE, BELFAST.....	808
<p>Introductory; Scope of the Institute; Equipment; Trade Preparatory School; Outlines of Courses. Day Mechanical Courses; Allocation of Time in Second Year; Occasional Students; Day Course for Engineer Apprentices; Day Courses for Printing Trades' Apprentices.</p> <p>Evening Division; Mechanical Engineering; Naval Architecture; Physics and Electrical Engineering; Building Trades and Furnishing Trades; Equipment; Textile Industries; Public Textile Testing and Conditioning House; Printing Trades; Various Trades and Industries; Natural Science; Pure and Applied Chemistry; Department of Commerce. The School of Art; Explanation of the Courses.</p>	
CHAPTER XXVI. THE ARTANE INDUSTRIAL SCHOOL.....	831
<p>Workshops for Boys; Apprentices in Junior Department; Trade Teaching on a Commercial Basis; Equipment, Discipline, Physical Training; Character Building at a Shilling a Day.</p>	
<b>DENMARK.</b>	
CHAPTER XXVII. THE COUNTRY AND ITS PEOPLE.....	834
<p>Introductory; The Appearance of the Farms; Sizes of Farms and Holdings; Frugality, Co-operation, Education; Intellectual and Social Preparation; Intelligence and Persistence; Co-operation and its Results; Opinion of Count Carl Moltke.</p>	
CHAPTER XXVIII. OUTLINE OF THE EDUCATIONAL SYSTEM.....	840
SECTION I. DANISH NATIONAL SCHOOLS.....	840
<p>The Administration of the Public School; Municipal Council's Management; Compulsory Attendance. The Teaching Staffs of the Public Schools; Qualifications and Appointments; Salaries; Retirements and Pensions.</p>	

SECTION I— <i>Continued.</i>	Page.
Expenditure in Connection with the National School; The Instruction in the Public School; Subjects and Equipments. Rural Schools. Schools for Advanced Instruction; The National School in Copenhagen.	
SECTION 3. TECHNICAL INSTRUCTION.....	848
Introductory; Due to Private Initiative; Subjects of Instruction; Instruction in Drawing; Inspection and Government Grants.	
SECTION 4. THE PEOPLE'S HIGH SCHOOLS.....	851
High Aims; The Susceptible and Accessible Age; Evolution and Growth; The Development of Other Schools; The Schools Transformed the Nation; "Highly Developed Common Sense"; Peasantry Enlightened, Wealth Diffused; How the High Schools Originated; The Schools De- veloped the People; The People Developed the Schools; Courses of Study or Work; The Spirit and Method; Attention at Lectures; Social Qualities Developed; How the Schools are Fin- anced; Many Scholarships are Provided; The Uplift of Rural Life. The People's High School at Ryslinge; The People's High School at Vallekilde; The People's High School at Askov; Winter Courses for Young Men and Young Women in the Advanced or Extension School.	
SECTION 5. THE AGRICULTURAL SCHOOLS.....	869
Students and Courses; Gymnastics by Swedish Method; The Ladelunde Agricultural School; The Agricul- tural School at Lyngby; The Agricultural School at Dalum.	
SECTION 6. THE HUSMAND SCHOOLS.....	874
The School at Ringsted; Fees, Finances, Motto, etc.	
SECTION 7. A SCHOOL FOR WOMEN FOR RURAL HOUSEKEEPING.	880
How the Day is Spent.	
SECTION 8. ROYAL AGRICULTURAL AND VETERINARY INSTITUTE.	882
Students and the Courses; Theoretical Instruction and Research.	



	Page.
CHAPTER XXIX. AGRICULTURAL ORGANIZATION IN DEN- MARK.....	884
The Royal Danish Agricultural Society; Farmers' Associations; Provincial Organization; National Executive; Small Holders' Associations; Special Associations; Dairying Organizations; Co-opera- tive Associations; Travelling Scholarships.	
FRANCE.	
CHAPTER XXX. OUTLINE OF THE EDUCATIONAL SYSTEM.	891
SECTION 1. ORGANIZATION AND ADMINISTRATION.....	891
Under Three Ministries; Duties of the District Rectors; Functions of the Inspectors; Three Grades of Education.	
SECTION 2. PRIMARY INSTRUCTION.....	893
Public Primary Schools.	
SECTION 3. HIGHER PRIMARY SCHOOLS AND SUPPLEMENTARY COURSES.....	894
Distinctions between Higher Primary and Supple- mentary; Higher Primary Instruction; Technical Sections; Time Tables; Details of School Work.	
SECTION 4. PRIMARY TECHNICAL INSTRUCTION.....	898
Primary Training Strictly Vocational; Technical Instruction Defined; Intensive Specialization Ap- proved.	
SECTION 5. SCHOOLS FOR TEACHERS.....	900
Primary Normal Schools; Examinations for Admission; Course of Instruction; Higher Normal Schools.	
SECTION 6. SECONDARY INSTRUCTION.....	903
Secondary Schools; Attendance and Grants.	
SECTION 7. HIGHER EDUCATION.....	904
CHAPTER XXXI. ELEMENTARY TECHNICAL INSTRU- CTION.....	905
SECTION 1. NATIONAL VOCATIONAL SCHOOLS OR SCHOOLS OF MANUAL APPRENTICESHIP.....	905
New Types of Schools; Attitude of Government; Practical Aim of Courses; Councils and Commit- tees; Entrance Examination; Studies, Exam- inations and Final Diploma; Fees, Scholarships, Expenses.	

Page.

SECTION 2. PRACTICAL SCHOOLS OF COMMERCE AND INDUSTRY	910
How Established and Managed; Councils of Improvement; School Programs for the Sections; Commercial Section (Boys); Commercial Section (Girls); Industrial Section (Boys); Industrial Section (Girls).	
CHAPTER XXXII. TYPICAL SCHOOLS OUTSIDE PARIS.....	916
SECTION 1. VAUCANSON SCHOOL, GRENOBLE.....	916
The Industrial Section; The Commercial Section; The Chemistry Section; Glove-making Section; The Course and Time Table.	
SECTION 2. HIGHER PRIMARY COMMERCIAL AND INDUSTRIAL SCHOOL FOR BOYS, NANCY.....	924
Differentiation of Courses.	
SECTION 3. EASTERN VOCATIONAL SCHOOL FOR BOYS, NANCY	925
Mechanical, Commercial and Other Sections; Expenses, Scholarships, etc.	
SECTION 4. PRACTICAL INDUSTRIAL SCHOOL FOR BOYS, ST. ETIENNE.....	926
SECTION 5. PRACTICAL COMMERCIAL AND INDUSTRIAL SCHOOL FOR GIRLS, ST. ETIENNE.....	927
Course in Industrial Drawing; Laundry and Sewing; Shop Work, Exhibitions, etc.; Extension Work.	
SECTION 6. LA MARTINIÈRE SCHOOL FOR BOYS, LYONS.....	929
Courses of Studies; Badge of "Corporal," Diplomas, etc.	
SECTION 7. LA MARTINIÈRE SCHOOL FOR GIRLS, LYONS.....	931
SECTION 8. COURSES FOR APPRENTICES AND ADULTS.....	932
How Courses may be Established; Campaign of Agitation; The Inspector-General's Report.	
CHAPTER XXXIII. THE VOCATIONAL SCHOOLS OF PARIS	934
SECTION 1. INTRODUCTORY.....	934
Equal Rights for All; Better Training Demanded; Need for Vocational Schools; Primarily Trade Schools; Management; Two Groups of Instructors; Interesting Teaching Methods; Pupils' Work Judged by Experts; Mr. Lavergne's Answer to Critics.	

SESSIONAL PAPER No. 191d

	Page.
SECTION 2. EXTENT OF THE PROVISIONS.....	940
Higher Primary Schools; For Boys; For Girls; Primary Technical Schools; For Boys; For Girls.	
CHAPTER XXXIV. TYPICAL SCHOOLS IN PARIS.....	943
SECTION 1. BOULLE SCHOOL.....	943
Furniture Making and Metal Work; Work of Pupils; Special Rooms and Features.	
SECTION 2. DIDEROT SCHOOL (BOYS).....	945
Arts of Metal and Wood Working.	
SECTION 3. ESTIENNE SCHOOL.....	946
Printing and Bookmaking.	
SECTION 4. PRE-APPRENTICE SCHOOL IN SHEET METAL WORK	947
Mr. Kula Deplores Street Influences; Work in Tin as Basis; Relation to Apprenticeship; Specimens from All-round Work men; Wider Use of the School Plant; Boys' Mentality Transformed.	
SECTION 5. SUPPLEMENTARY COURSES IN PARIS.....	949
SECTION 6. VOCATIONAL COURSES OF THE SYNDICATES.....	950
Courses for Apprentices and Workmen.	
SECTION 7. VOCATIONAL AND DOMESTIC SCHOOLS FOR GIRLS	952
Jacquard School; Girls' School at 7 Rue de Poitou.	
CHAPTER XXXV. SECONDARY TECHNICAL INSTRU- TION.....	954
SECTION 1. NATIONAL SCHOOLS OF ARTS AND TRADES.....	954
Highly Specialized Technical Schools; Terms of Ad- mission; Plan of the Courses.	
SECTION 2. HIGHER PRACTICAL SCHOOL OF COMMERCE AND INDUSTRY.....	956
The School of Commerce; The Maritime School; The School of Navigation; Evening Classes; Experts as Teachers; Visits to Foreign Countries.	

	Page.
CHAPTER XXXVI. HIGHEST TECHNICAL INSTRUCTION..	962
SECTION 1. CENTRAL SCHOOL OF ARTS AND MANUFACTURES..	962
Discipline, Fees, etc.; Course; Building and Equip- ment.	
SECTION 2. NATIONAL CONSERVATORY OF ARTS AND TRADES..	965
Instruction.	
SECTION 3. SCHOOL OF INDUSTRIAL CHEMISTRY OF LYONS....	967
Courses and Laboratory Work; Diplomas and Promo- tions.	
SECTION 4. CENTRAL SCHOOL OF LYONS.....	969
Courses; Training in Manual Work.	
SECTION 5. ELECTRO-TECHNICAL INSTITUTE AT GRENOBLE...	971
Courses; Annual Expense to Students; Diploma of Electrical Engineers.	
CHAPTER XXXVII. DRAWING, DESIGN AND ART.....	973
Instruction in Drawing in France; What Paris is Doing.	
SECTION 1. SCHOOLS OF DRAWING.....	973
Special Schools Essential; State Subsidies for Drawing and Art; Local and National Schools; National Schools of Fine Arts; Municipal Schools of Drawing; Municipal Preparatory School of Prac- tical Drawing, Paris.	
SECTION 2. OTHER SCHOOLS OF DRAWING AND ARTS.....	977
St. Etienne District School of Industrial Arts; Courses Related to Local Industries.	
School of Drawing and Art Applied to the Industries, Paris; Work in Art Industries; Conditions of Admission.	
National School of Decorative Arts, Paris; Young Men's Section; Section for Girls.	
Local Schools of Architecture; The Training of Archi- tects.	
School of Drawing and Building Art; Correspondence Course; Course in Special Studio; Normal Class.	
School of Ceramics, Sevres; Course of Instruction.	

SESSIONAL PAPER No. 191d

	Page.
SECTION 3. INFORMATION FROM HIGHEST AUTHORITIES.....	985
"Conversation" with M. Louis Guebin; Drawing Congress "Competitions"; M. Guebin's Principles and Methods; Drawing Correlated with Language, etc.; How Children are Trained to Draw; French and German Methods Compared.	
"Conversation" with an Engineer; Development of Popular Taste.	
"Conversation" with Sub-Inspector of Drawing; Children Study Artistic Models.	
SECTION 4. SCHOOLS OF FINE ARTS.....	990
National School of Fine Arts, Lyons; Art Applied to Industries.	
National School of Fine Arts, Paris; Terms of Admission, Courses, etc.; Courses Outside of the Studios; The School Proper and the Studios; Competitions in Painting and Sculpture; Work Done in Studios; Section of Architecture; Simultaneous Teaching of the Three Arts; The Roman Prize ("Prix de Rome").	
CHAPTER XXXVIII. SCHOOLS FOR SPECIAL INDUSTRIES	997
SECTION 1. NATIONAL SCHOOL OF WATERS AND FORESTS, NANCY.....	997
Military Service; Subjects of Study; School Year, How Arranged; Classification of Pupils; Outside Students.	
Station of Forestry Investigation and Experiments.	
SECTION 2. MUNICIPAL SCHOOL OF SILK WEAVING OF LYONS.	1,000
In the Superior School.	
SECTION 3. FRENCH SCHOOL OF PAPER-MAKING.....	1,002
CHAPTER XXXIX. AGRICULTURAL EDUCATION IN FRANCE.....	1,003
Introductory; Special Teaching in Ordinary Schools.	
SECTION 1. FOUR KINDS OF SCHOOLS.....	1,004
Schools of Horticulture; Farm Schools; Practical Schools of Agriculture; National Schools of Agriculture; Qualifications for Entrance.	
Grignon School.	
The National Institute.	
Relations of the Schools and the State.	

	Page.
SECTION 2. DOMESTIC SCHOOLS OF FARMING AND DAIRYING. . .	1,009

Cœtlogon School; Courses of Instruction.  
Itinerant School of Dairying at Pas-de-Calais; Courses,  
Diplomas, etc.

## LIST OF ILLUSTRATIONS.

## ENGLAND.

	Page.
University of Sheffield: The Tool Room.....	464
University of Sheffield: 2-ton Siemens Furnace.....	465
University of Sheffield: Half-ton Electro-Pneumatic Hammer and Re- heating Furnace.....	466
Metal-work shop: Holbeck Day Trades Preparatory School.....	535
Mechanical Laboratory: Holbeck Day Trades Preparatory School.....	536
Woodwork Shop: Woodhouse Day Trades Preparatory School.....	537
Cockburn High School: Leeds.....	541
Cockburn High School: Mechanical Laboratory.....	542
Cockburn High School: Elementary Physical Laboratory.....	543
Cockburn High School: Engineering Workshop.....	544
Cockburn High School: Machine Drawing Room.....	548
Cockburn High School: The Forge.....	548
Cockburn High School: Cookery Demonstration Room.....	549
Cockburn High School: Art Room.....	549
County Borough of Halifax, Municipal Technical College.....	549
Mechanical Engineering Testing Laboratory: Municipal Technical College, Halifax.....	556
Central Portion of the Spinning Shed, Municipal Technical College, Halifax.....	557
Corner of the Spinning Shed, Municipal Technical College, Halifax.....	558
Technical School: Barrow-in-Furness.....	570
Technical School: Mechanics Laboratory.....	574
Technical School: Elementary Electrical Laboratory.....	575

## SCOTLAND.

Duddingston, Edinburgh: Working on Vegetable Plots.....	648
Duddingston, Edinburgh: Fruit Plot.....	648
Kettins, Forfarshire: Cleaning Vegetable Plots.....	649
Kettins, Forfarshire: Rockery and Herbaceous Section.....	649
Heriot-Watt College: Physics Laboratory.....	670
Heriot-Watt College: Applied Mechanics Laboratory.....	671
Woodcarving Class in College of Art Edinburgh.....	674
Stonecarving Class in College of Art ".....	675
Fife County Committee Mining School and Beath Higher Grade School, Cowdenbeath, Scotland, 1911.....	712

## IRELAND.

The Municipal Technical Institute, Belfast: Perspective View.....	810
Trade Preparatory School: Physical Laboratory.....	811
Mechanics Laboratory: Municipal Technical Institute Belfast.....	818
Building Trades- Plumbers' Workshop: Municipal Technical Institute, Belfast.....	819

	Page.
Flax Preparing and Spinning Room: Municipal Technical Institute, Belfast.....	822
Printing Trades Department—Composing Room: Municipal Technical Institute, Belfast.....	823
Cookery Class: Municipal Technical Institute, Belfast.....	826
Millinery Class: Municipal Technical Institute, Belfast.....	827

## DENMARK.

Summer Students of the Popular High School, Lyngby.....	860
Sewing Class at Haslev.....	862
Housekeeping School—Haslev.....	863
Husmand School at Ringsted.....	876
Recreation at Ringsted.....	877
Physical Culture at Ringsted.....	878, 879

## FRANCE.

Vaucanson School, Grenoble: Fitting Shops.....	917
Vaucanson School, Grenoble: Carpenters' Workshop.....	918
Vaucanson School, Grenoble: Specimen of Cabinet work.....	919
Vaucanson School, Grenoble: Chemical Laboratory.....	920
Vaucanson School, Grenoble: Glove-making Workshop.....	922
Higher Practical School of Commerce and Industry, Paris.....	957
Pupils' Laboratory: Higher Practical School of Commerce and Industry, Paris.....	957
Gymnasium: Higher Practical School of Commerce and Industry, Paris.....	960
Shower Baths: Higher Practical School of Commerce and Industry, Paris.....	960



# ENGLAND.

## CHAPTER I: OUTLINE OF THE EDUCATIONAL SYSTEM.

### SECTION 1: INTRODUCTORY.

A reasonably full statement is made of the character of the provisions for general education in England, and then a report is given in greater detail of examples of organization and of some types of classes, schools and institutions which provide education for industrial and technical purposes. It is not practicable to put within the limits of this Report anything like a full description of all that is being done or planned for in Industrial and Technical Education.

Perhaps nowhere else are better examples to be found of the separate parts of education, or of education organized for a single community, than in spots or places in England. The alleged defects and shortcomings of the "system" or want of a national system, were not discernible to the Commission in the several schools and institutions visited.

The outstanding feature was the extent and character of the work in Evening Classes. The voluntary attendance was surprisingly large—in some cities over 3 % of the total population. In the case of the University of Sheffield the attendance at Evening Classes in 1909 was 1390 as compared with 500 day students. At the Manchester Municipal School of Technology about 300 students attend the full day courses, about 700 come part time not exceeding one day per week, and nearly 5,000 take the Evening Classes.

No doubt the cities and towns visited were among the foremost in educational activity; and the leaders in them were those who spoke more anxiously concerning the need for covering the whole of their field still more adequately and effectively. Of what was left undone the Commission could not inform itself; but it learned much which will doubtless prove of benefit to Canada, from visiting the schools, seeing the attitude and work of the pupils, meeting the teachers, discussing the problems and outlook with the educational leaders, and examining the provisions made in the several communities.

#### A WORD ON NOMENCLATURE.

The nomenclature of the English schools is somewhat different from that of the schools of Canada. A word or two here will suffice to guard against misapprehension.

A Public Elementary School is known as a "Provided School" or "Council School" when it is provided and maintained by a public education Authority; it may be a "Voluntary School" or "Non-provided School" when it is provided by some other Body or persons. In both cases the Local Education Authority exercises control over expenditure for the maintenance of the educational work.

The Managers of "Non-provided Schools" are required to comply with certain conditions specified in the Education (England and Wales) Act 1902 in connection with the appointment and dismissal of the teachers, making such alterations and improvements in the buildings as may be required; keeping the school premises in repair; and giving religious instruction in accordance with the provisions of the trust deed relating to the school.

The renowned Public Schools like Eton, Rugby, Winchester, etc., are not in any sense "public" as Canadians use that word; but are privately endowed and controlled residential schools, attended almost exclusively by boys of the higher social classes, many of whom who are being prepared for the Universities or other institutions.

"Grammar" Schools are Secondary Schools for boys, and correspond in the main to the High Schools, Academies and Collegiate Institutes of Canada.

On the other hand, "High" Schools in England are usually Secondary Schools for girls, of a rank somewhat similar to the "Grammar" schools for boys.

#### THE MENACE OF "PAYMENT BY RESULTS."

It was frequently put forward that the absence of a logically arranged system or gradation of schools, each duly recognized as covering a definite field, led to the duplication of provision for pupils of different stages of advancement, particularly in Secondary Education; and that the provision for Secondary Education of recognized grade is greatly below the needs of the population in some localities. The passion for standardization by examination is disappearing. It is not forgotten that the greatest menace and injury to real education in England occurred during the period when the attempt at standardizing educational attainment was greatest and when stimulation from the Board of Education was given through a system of "payment by results." The results were ascertained by written examinations on prescribed subjects which led to "cram and drill" to circumvent the examiner, and to earn grants and promotions regardless of the education of the children by self-realization through their experiences. There is gratitude in the tones which speak of that as a thing of the past.

#### SPECIALIZATION FOR EXAMINATIONS.

No less an authority than Sir Joseph J. Thompson, President of the British Association for the Advancement of Science, at the time of the Winnipeg Meeting in 1909, said in regard to this matter in the case of more advanced students:—

The chief evil from which we at Cambridge [University] suffer, and which you have avoided is, I am convinced, the excessive competition for scholarships which confronts our students at almost every stage of their education. You may form some estimate of the prevalence of these scholarships if I tell you that the Colleges in the University of Cambridge alone give more than £35,000 a year in scholarships to undergraduates, and I suppose the case is much the same at Oxford. The result of this is that preparation for these scholarships dominates the education of the great majority of the cleverer boys who come to these universities, and indeed, in some quarters, it seems to be held that the chief duty of a schoolmaster, and the best test of his efficiency, is to make his boys get scholarships. The preparation for the scholarship too often means that about two years before the examination the boy begins to specialise, and from the age of sixteen does little else than the subject, be it mathematics, classics, or natural science, for which he wishes to get a scholarship; then, on entering the university, he spends three or four years studying the same subject before he takes his degree, when his real life work ought to begin.

SESSIONAL PAPER No. 191d

How has this training fitted him for this work? I will take the case in which the system might, perhaps, be expected to show to greatest advantage, when his work is to be original research in the subject he has been studying. He has certainly acquired a very minute acquaintance with his subject—indeed, the knowledge possessed by some of the students trained under this system is quite remarkable, much greater than that of any other students I have ever met. But though he has acquired knowledge, the effect of studying one subject, and one subject only for so long a time, is too often to dull his enthusiasm for it, and he begins research with much of his early interest and keenness evaporated. Now there is hardly any quality more essential to success in research than enthusiasm. \* \* \* \*

I am convinced that no greater evil can be done to a young man than to dull his enthusiasm. In a very considerable experience of students of physics beginning research, I have met with more—many more—failures from lack of enthusiasm and determination than from any lack of knowledge or of what is usually known as cleverness. \* \* \* \*

#### MUCH PROGRESS RECENTLY.

There is more or less intimate and cordial co-operation and more or less distant and intensive competition between the local Education Authorities, private Foundations, public and quasi-public Bodies, Universities and the Board of Education in the promotion of educational effort.

The Commission was impressed by the intellectual and social qualities of the men and women who were on educational committees; by the earnestness with which educational matters were being dealt with; and by the high attainments and abilities of the officials and teachers who were in charge of the administration of education in the several areas.

From all sides the Commission gathered the impression that during the past ten years a great awakening of endeavour had occurred, and that marvellous progress was being made in providing for the further education of boys and girls after the legal age for leaving the Elementary School. Only by an intimate knowledge of local conditions and history, would it be possible to trace the movement in such a way as to indicate all the forces at work. That was not attempted, but the Commission feels warranted in recording that what impressed it most deeply was the fact that the earnest service of a comparatively few enthusiastic and forceful men and women in any locality was concurrent with convincing evidence of progress, comprehensive planning, enlarged public support and increased efficiency in educational work.

A system or want of system that encourages local initiative, and the exercise of local responsibility and control, has obvious excellences not to be dismissed as a matter of course in favour of a system which calls for uniform conformity to detailed regulations and even high standards appointed without local action and advice. A variety of vital individual contributions ministers to growth and power among the vigorous. A proper function of "system" is to see that the weak and indifferent are not neglected.

#### TO RESCUE THE PERISHING.

The unsolved problem of England seems to lie with the multitudes of young people between 13 and 18 in the factory towns who are under par in physique, without the bracing stimulation of good homes and without the vision or the ambition to seek educational preparation for mature life. One cannot expect an old head on young shoulders, especially when the backbone has not been

well nourished morally or physically. However side by side with the glaring evidence of stunted life, from huddled conditions of working and living, are found plenty of proofs of strenuous efforts to meet the situation educationally and to bring about better conditions.

One did not find better classes or schools in Germany than in England; but the appearance of the young workers in the textile industries, for example, was immensely superior in Germany. That applied in some measure to the other factory workers in the two countries. On the other hand the factory workers in the woollen industries in the south of Scotland were evidently superior to the Germans in housing conditions and general bearing and surroundings. The intelligence, self-control and ability, that come from the union of education and industry, are perhaps only in their fullness for the children's children. England has a long way to make up; but the present direction and pace impressed the Commission as full of promise for the stability, growth and well being of the headquarters of the British Empire.

## SECTION 2: ORGANIZATION AND ADMINISTRATION.

The Board of Education, which administers education in England, consists of a President, Parliamentary and Permanent Secretaries and office staff. The Premier, Chancellor of the Exchequer, the Principal Secretaries of State and the Lord President of the Council are ex-officio members of the Board, which is assisted by a Consultative Committee.

The chief Departments are: Elementary Education, Secondary Schools, Technological, Medical, Royal College of Art, Universities, Special Enquiries and Reports, Museums and Geological Survey. The Board has a full staff of Inspectors of both sexes for Elementary, Secondary and Technological Education and for physical exercises. The Welsh Department has a Permanent Secretary and Chief Inspector and a staff of Inspectors.

### LOCAL ORGANIZATION.

By the Education (England and Wales) Act, 1902, School Boards—which up to that time served as the Authority for dealing with Elementary Education—were abolished, and the Council of the Borough, or in every administrative County the Council of the County, became the Local Education Authority, with powers of control and supervision over Higher as well as Elementary Education. Higher Education in this connection means “Education other than Elementary,” and includes the training of teachers and the giving of all kinds of education, whether technical, manual instruction, or any other kind. In regard to Elementary Education the Local Authorities somewhat vary. For instance, the Council of every County Borough (that is, a borough with a population of 50,000 and upwards which is constituted a county borough under the

SESSIONAL PAPER No. 191d

Local Government Act, 1888) is the sole Authority for Elementary as well as Higher Education, whereas the Council of a County has full powers as to higher education for the whole of its area, whilst the Council of every Borough within the County with a population of over 10,000 and the Council of every Urban District with a population of over 20,000 will each be, within its own area, the Local Education Authority for the purposes of Elementary Education. In the case of Higher Education the Council of every borough which is not a County Borough, and the Council of every Urban District, no matter what is its size, have concurrent powers to supply or aid the supply of education other than Elementary, provided that it does not raise, in any year, a sum exceeding that which would be produced by a rate of a penny in the pound. County Councils, acting quite independently of the small boroughs and urban districts, are empowered to raise rates for higher education for the whole of the County not exceeding two-pence in the pound, or such higher rate as the Local Government Board may, in exceptional circumstances, consent to.

Every Local Education Authority exercises the powers and duties formerly undertaken by the School Boards and School Attendance Committees, and is responsible for and has control of all secular instruction in Public Elementary Schools, whether in a Council School (that is, a school provided by the late School Board or by the present Education Committee) or a Voluntary School (that is, a school provided by any other persons or Bodies). In this way the Education Committee of a Borough Council or a County Council or the Council of an Urban District is made responsible for the maintenance and efficiency of all Public Elementary Schools within its area. In other words it has unrestricted control over its own schools, technically known as "Provided Schools"; whilst it has complete control over all expenditure required for the purpose of maintaining and keeping efficient all Voluntary Schools technically known as "Non-provided Schools."

Each Local Education Authority appoints an Education Committee composed of Members of the Council and other persons interested in education, in a proportion defined by the Scheme for each Education Committee, with the approval of the Board of Education.

The Local Education Authorities under the Education Act (1902) include 62 County Councils, 72 County Boroughs, 136 autonomous Municipal Boroughs, 56 Urban Districts and the Scilly Isles; a total of 327. The Administrative Provisions Act authorized Local Authorities to aid by scholarships or bursaries the instruction in Public Elementary Schools of scholars from the age of 12 up to the limit of age fixed for the provision of instruction in Public Elementary Schools (16 years) and with the consent of the Government Board of Education to extend this aid beyond the age of 16 years. This Act also provides that money may be expended in maintaining vacation schools and classes, play centres or other means of recreation for children attending the Public Elementary Schools. Medical inspection of children immediately before or at the time of their admission is required of the Local Authorities.

## REGULATIONS OF BOARD OF EDUCATION.

The regulations of the Board of Education endeavour to discourage early specialization by insisting on sound general education up to 16 at least, and require that the curriculum provide duly graded and continuous instruction in subjects necessary for a well-balanced education. They provide for elasticity in the scope and content of the courses and for the encouragement of local initiative in meeting the varying requirements of different areas and making fullest use of existing means. A large amount of liberty is allowed in framing the curricula according to the requirements of the area, and in defining the aim which the particular school sets before itself.

The Board encourages experiments and a healthy variation of type. The fullest freedom is allowed, consistent with real efficiency in the education provided. In addition to the general increase of elasticity, which has always been kept in view, and which the Board has been able to give in successive revisions of the regulations, special provision has lately been made for encouraging, by means of a special grant, any carefully devised educational experiment of a pioneer and promising nature in methods of teaching.

All improvements of curriculum depend on the establishment of Preparatory Schools with a satisfactory age of entry and adequately prolonged school life, and a sufficient and efficient staff.

In 1906 the Board introduced a regulation forbidding grant-earning Secondary Schools to have classes containing more than 35 pupils, and fixing the normal maximum at 30. Subsequent regulations make it clear that classes of between 30 and 35 are allowed only as an exceptional arrangement to meet special or temporary difficulties of classification.

The County Funds for Higher Education are provided by a general County rate and by Government grants (Customs and Excise) and from the various Trade Guilds which are both numerous and wealthy, especially in London. In recent years the amounts derived from the Customs and Excise have decreased considerably and the Government has promised to set aside a portion of the Land Tax to make up the deficiency.

## WORKING OF ACT OF 1902.

A good example of how the Act of 1902 works out is furnished by the Administrative County of Lancashire.

The County Education Committee, when considering the best method of obtaining the funds for Higher Education, decided in favour of levying a general county rate for the purpose of aiding or supplying Higher Education throughout the county. They came to the conclusion that, owing to the great difficulty of determining the area which a Secondary Day School, or in a less degree an Evening Technical School, should serve, a system of differential rating could not be devised which would be practicable and generally recognized as just.

"Local" Higher Education Committees were formed as sub-committees of the County Education Committee and these sub-committees were made

SESSIONAL PAPER No. 191d

responsible for all evening schools and classes within their respective districts. Each local Higher Education sub-committee must submit annually to the Lancashire Education Committee for approval: (1) the scheme of work to be carried out within the area of the local sub-committee, and (2) an estimate of the income and expenditure for carrying out the proposed scheme.

It is necessary that the scheme of the local sub-committee should be submitted for approval in order to ensure that the instruction given within the area of that sub-committee shall fit in with the general scheme of education for the county and avoid the unnecessary establishment of schools and classes doing similar work of an advanced character within immediately contiguous areas, and in the interests generally of efficiency and economy.

#### AN "EXAMPLE" EDUCATION COMMITTEE.

The Lancashire Education Committee undertakes to provide out of County funds for the carrying out of any approved scheme of a local Higher Education sub-committee to the following extent:—

(a) In the case of rural districts where there are no concurrent rating powers the County Committee provides the whole cost after taking into consideration the fees and Government grants which the rural districts may receive.

(b) In the case of Boroughs or Urban Districts possessing concurrent rating powers the County Committee provides a sum equal to that contributed by the Borough or Urban District until the amount of the contribution is equal to that of the proceeds of a local penny rate. For any expenditure beyond this amount the County Committee undertakes the entire responsibility.

At the close of each financial year the Higher Education accounts of each District are audited by the County Auditor, who in the course of his examination of the accounts requires to be satisfied that the actual expenditure has been in accordance with the approved scheme.

The Lancashire County Education Committee urges upon local committees the importance of bringing the Day and Evening Schools into closer contact. With this object in view they have empowered the local sub-committees to admit to the Evening Classes free of charge (a) children who have left the Day School during the twelve months immediately preceding the session during which they attend Evening Classes for the first time, (b) children who are qualified to leave the Day School at the commencement of the Evening School session or who are expected to leave before the end of December. In addition to this, under a recent revision of the scale of salaries paid to school attendance officers, increases of salary were granted only to such of the officers as definitely undertook to interview children about to leave the Day School with the object of inducing them to immediately enter Evening Classes.

### SECTION 3: THE ELEMENTARY SCHOOLS.

In the Public Elementary Schools in 1907-8 there was an enrollment of 5,984,130 pupils, equivalent to 17% of the population; and the average attendance was 88% of the enrollment. The number of professors and teachers in these schools was 177,628. In the Training Colleges for elementary teachers there was an attendance of 10,492.

The total expenditure for Elementary Education in 1907-8 amounted to £21,987,002 (\$107,000,000) almost exactly one half of this coming from Parliamentary grants and the balance from rates, fees and other local sources. The Children's Act, though not strictly an educational measure, extends the province of the Local Education Authorities considerably, especially through school attendance officers, and strengthens directly and by indirect influence the compulsory school attendance laws.

The purpose and trend of Public Elementary Education is set forth in the Introduction to the Elementary School Code of 1909:—

The purpose of the Public Elementary School is to form and strengthen the character and to develop the intelligence of the children entrusted to it, and to make the best use of the school years available, in assisting both girls and boys, according to their different needs, to fit themselves practically, as well as intellectually, for the work of life

With this purpose in view, it will be the aim of the School to train the children carefully in the habits of observation and clear reasoning, so that they may gain an intelligent acquaintance with some of the facts and laws of nature; to arouse in them a living interest in the ideal and achievements of mankind, and to bring them to some familiarity with the literature and history of their own country; to give them some power over language as an instrument of thought and expression, and, while making them conscious of the limitations of their knowledge to develop in them such a taste for good reading and thoughtful study as will enable them to increase that knowledge in after years by their own efforts.

The school must at the same time encourage to the utmost the children's natural activities of hand and eye by suitable forms of practical work and manual instruction; and afford them every opportunity for the healthy development of their bodies, not only by training them in appropriate physical exercises and encouraging them in organized games, but also by instructing them in the working of some of the simpler laws of health.

It will be an important though subsidiary object of the School to discover individual children who show promise of exceptional capacity, and to develop their special gifts—(so far as this can be done without sacrificing the interests of the majority of the children), so that they may be qualified to pass at the proper age into Secondary Schools, and be able to derive the maximum benefit from the education there offered them.

And, though their opportunities are but brief, the teachers can yet do much to lay the foundations of conduct. They can endeavour, by example and influence, aided by the sense of discipline which should pervade the school, to implant in the children habits of industry, self-control, and courageous perseverance in the face of difficulties; they can teach them to reverence what is noble, to be ready for self-sacrifice, and to strive their utmost after purity and truth; they can foster a strong sense of duty, and instil in them that consideration and respect for others which must be the foundation of unselfishness and the true basis of all good manners; while the corporate life of the school, especially in the playground, should develop that instinct for fair play and for loyalty to one another which is the germ of a wider sense of honour in later life.



## SESSIONAL PAPER No. 191d

In all these endeavours the school should enlist, as far as possible, the interest and co-operation of the parents and the home in an united effort to enable the children not merely to reach their full development as individuals, but also to become upright and useful members of the community in which they live, and worthy sons and daughters of the country to which they belong.

The Code sets forth the following principles and suggestions:—

## INFANTS:

The principal aim of the school in relation to infants is to provide opportunities for the free development of their bodies and minds, and for the formation of habits of obedience and attention. The subjects should include physical exercises in the form of games; the telling of stories to the children by the teachers to lead them to form ideas and to express them in simple language of their own.

For older infants the exercises should be supplemented by short lessons in recitation, drawing, reading, writing, very simple arithmetic and singing.

Instruction in sewing and knitting *may* be given, but care must be taken to avoid fine work and injury to eyesight.

## OLDER SCHOLARS:

In schools for older scholars the subjects described below should be taught in a manner suitable to the age and capacity of the several classes. It is not necessary that all the subjects should be taught in every class:—

The English language, including recitation, reading silently for information, and composition; Handwriting, taught with a view to speed as well as legibility; Arithmetic, including practical work in measuring and weighing and practical instruction in mensuration; Drawing, including modelling, avoiding the use of flat copies and instead practising the direct representation, at sight and from memory, of actual objects, proceeding from simple to complex forms; Observation lessons and Nature study, which may be connected with the teaching of gardening to the older scholars; Geography, including the use and making of maps; History, including a knowledge of the lives of great men and women and the lessons to be learnt therefrom, and, in connection therewith, lessons in citizenship in the higher classes; Singing, and elementary musical knowledge; National and Folk songs to be freely used throughout the school; Hygiene and Physical training, which may include instruction and practice in swimming; Domestic subjects (for girls only), including needlework, knitting, cookery, laundry work and housewifery; Moral instruction, specially directed to the inculcation of courage, truthfulness, cleanliness of mind, body and speech, the love of fair-play; consideration and respect for others, gentleness to the weaker, kindness to animals, self-control and temperance, self-denial, love of one's country, and the appreciation of beauty in nature and in art.

## STAFFING OF SCHOOLS.

Every school or department must have a head teacher either certificated or recognized by the Board of Education as having, under their regulations, the status of a certificated teacher. He must undertake no outside duties which occupy any part of the school hours.

Every school or department must have at least one certificated teacher (inclusive of the head teacher) for every complete group of eighty scholars in average attendance.

In any school the number of scholars on the register of any class or group of classes under the instruction of one teacher must not exceed 60.

No person who is a clerk in Holy Orders or the regular Minister of a congregation can be recognized as part of the staff of a school or department.

A certificated teacher under the regulations of the Board is one who has passed the Board's Final Examination of Students in Training Colleges for Teachers or an alternative final examination recognized by the Board (e.g. The final examination for certificate of the University of Cambridge in theory, history and practice of teaching together with the certificate of practical efficiency in teaching, etc.).

A candidate for recognition by the Board as an uncertificated assistant-teacher must have passed the King's Scholarship Examination or the Preliminary Examination for the Elementary School Teachers' Certificate held by the Board or an alternative examination recognized by the Board as of equal value.

Where the Board are satisfied that the circumstances of the case render it necessary they may recognize from time to time as supplementary teachers, suitable women over 18 years of age who are specially approved by the Inspector for their capacity in teaching, but not more than two supplementary teachers will be recognized on the staff of a department at any one time.

Student teachers or Pupil Teachers are recognized by the Board as "teachers undergoing preliminary education" under special regulations.

In no case will the staff of a school be considered sufficient by the Board of Education unless (in the aggregate) it is *at least* equivalent for the average attendance of the school or department allowing approximately 35 scholars for the Head teacher, 60 for each certificated teacher, 35 for each uncertificated assistant teacher, and 20 for each student teacher or supplementary teacher.

#### HAND WORK IN SCHOOLS.

Since the Education Act of 1902 the development toward a system providing instruction adapted to the needs of all children has given to industrial arts work in many schools a place almost as important as that of any other school subject. In most of the English cities handicraft work for boys, and domestic economy for girls are found with well equipped shops and laboratories. Although there is great variety in details of curriculum and method, most of the schools are developing the work from the industrial standpoint. Its purpose is avowedly vocational, yet there is increasing attention to the educational or liberal elements involved. In most towns "centres," are established in connection with one school, and the pupils of that school and neighboring schools are given instruction in that centre. These centres are well equipped. In London by 1909, accommodation had been provided for over 80 per cent of all the children. All boys in Grade VI who are eleven years of age or more may take the handicraft work, as may all boys also who are over twelve but below Grade VI. Most of the centres for handicraft give woodworking, and this is suitably combined with drawing. Metal work is given in a few centres.

For girls, centres are provided for domestic economy. Three divisions of this work are offered—cookery, laundry work, and housewifery. Girls of Grade V, and girls of twelve years of age below Grade V, are eligible to receive instruction in domestic economy. The work varies with the need of the particular districts in which the centres are located. Practical utility for the girls in their homes is a dominant factor in shaping the courses. A full half-day is usually given to the work each week for both boys and girls, the teacher thus having two groups each day. In a few cities in England periods are so shortened as to permit of three groups each day. In almost every school a series of models is found which usually combines the logical sequence idea with the industrial, that is, projects of appreciable utility are chosen and are so arranged that they

## SESSIONAL PAPER No. 191d

provide the sequence for the development of tool processes and technical progress. In a few cities the Sloyd system is found almost wholly unmodified. Most courses are planned to cover two or three years.

Below the grades doing work in centres or shops, there is often a well-developed course in handwork. Paper folding, cardboard construction, wire-work, cord-work, and parcel-tying are often found. Clay modelling is occasionally employed. Knitting and needlework are very common in the lower grades.

## MEDICAL INSPECTION.

According to Dr. Sadler, medical inspection of schools is conducted in co-operation with the medical department under the Board of Education, which was constituted in 1907 and has been extended and strengthened each following year. In the 327 local education areas, 307 school medical officers have been recognized, and in 224 of these cases the medical officer appointed was the medical officer of health of the area, and thus in the majority of the cases a more or less complete unification of the two medical services was secured, while in the remaining cases some degree of effective co-ordination, either personal or administrative is the rule. The experience in this service thus organized illustrates in a striking manner the vital relation between medical inspection of schools taken in this most restricted sense and consideration of the external sanitation of the school, the sanitation and hygiene of the home and the whole business of securing cleanliness. Much of the medical work is already of proved value and the medical inspection is yielding substantial results in practical form. In almost all educational areas this new work is contributing to wider knowledge of child life than has been obtainable in the past. It cannot fail to guide, encourage and foster the highest kind of social development. To this must be added the beneficent result of medical treatment for tens of thousands of school children, while the increased attention devoted to school hygiene, including the whole health conditions and physical training of the child, is already beginning to bear fruit in a better conception of the true ends of a State system of education.

## CARE COMMITTEES AND THEIR WORK.

The organization of Care Committees, under the general direction of Local Authorities, to look after the condition of necessitous children attending the schools is one of the most interesting signs of the awakening of the public conscience of England to responsibility for the welfare of the people. These Committees are of the greatest utility in much of the work in relation to the physical condition of the children. They take an interest in all matters concerning the physical well-being of the children and co-ordinate all agencies bearing on this work outside the school. When a Children's Care Committee is appointed the members endeavour to procure cleansing medical treatment or the amelioration of the existing physical condition of all children referred to them by doctors or nurses in the medical report book of the school, penetrating to the

3 GEORGE V., A. 1913

homes and endeavouring to interest more particularly the indifferent parents who do not attend to see the doctor and whose children are the difficult cases in which to obtain improvement. The Committees have also the duty of determining which children are necessitous.

#### EFFICIENCY OF ELEMENTARY SCHOOLS.

The efficiency of the Elementary School training was strikingly illustrated by Mr. R. Blair, Education Officer of the London County Council, in a paper before the Educational Science Section of the British Association, at the Sheffield meeting. As a result of enquiries he had sent out to many leading industrial and commercial firms in England, he stated that almost all of them explained their preference for Elementary School boys in such a way as to pay a well deserved compliment directly to the adaptability of the Elementary School boy and indirectly to the existing system of education. A good many spoke in high terms of the value of Evening Schools, including Technical Institutes and Schools of Art. Banks and Insurance and some other firms generally sought for the Secondary School product. Mr. Blair drew this conclusion: "catch the boy as soon as he leaves the Elementary School and induce him to attend Evening Classes; add to that the training of the workshop or the business house and you have the fairly common plan of training those who will rise above the rank of "hands." One of the greatest industrial leaders in England states that at the present moment all the men who fill positions of responsibility in his office came from Elementary Schools. He adds that they belong to a period when Secondary Schools were not so accessible as now and that the same remark may not be applicable to their successors."

#### SECTION 4: HIGHER ELEMENTARY SCHOOLS.

The Higher Elementary Schools take children at about twelve years of age, giving them a course of three or four years. The curricula are made to fit the needs of particular localities. Some are distinctively industrial in their bearings, giving work as in the Centres for Industrial Arts but devoting more time to the shops or laboratories, and making the mathematics, English and drawing as definitely practical as possible. Others of these schools emphasize commercial subjects, while still others are general in their nature.

These schools afford the only means of prolonging the systematic education of the majority of the children in Great Britain, and the Government offers an inducement to Local Authorities to maintain schools of this advanced grade by an extra grant when they conform to specified conditions.

Manchester, which under the regime of the School Boards, led the country in the establishment of Higher Grade Schools, has recently organized six Higher Elementary or Central Schools of a new type which are more fully dealt with in our report under Manchester.

SESSIONAL PAPER No. 191d

While the conditions attached to the extra grant for these schools are especially helpful in smaller communities they have not proved entirely satisfactory to the education authorities of the large cities. In London, schools of this class have been withdrawn and Central Schools have been started with an industrial or commercial or domestic arts bias. These schools are organized for pupils over 11 years of age and are more directly industrial in their aim than those subject to the regulations of the Board of Education for Higher Elementary Schools. They are vocational in character, using that word as now current in educational discussions in this country, and are reported on hereafter under Central Schools in London.

From 1901 to 1904 Higher Elementary Schools provided four courses of instruction of a predominantly scientific character and the minimum age of admission was 10. Under the Code of 1905 and subsequent Codes a new type was created which provided for only a three years course, but the former requirements as to science instruction were withdrawn and the aim now is to continue the general education of the pupils and provide them with instruction bearing on their future vocations, but not of a specialized character. Such curriculum must provide "a progressive course of instruction in the English language and literature, in elementary mathematics, and in history and geography; drawing and manual work for boys and domestic subjects for girls must be included in every case as part of the general or special instruction." With some necessary exceptions admission is to pupils over 12 who have been at least 2 years in a Public Elementary School. The Schools must also be organised to give at least a 3 years course approved by the Board of Education, but this course may be extended if, in the opinion of the Inspector, the pupils would profit thereby, and a suitable fourth year course has been organized. Courses beyond the fourth year are not recognized in the distribution of the Government grant. In this way the Board of Education sets the highest limit for the courses of Elementary Education.

Such Higher Elementary Schools are established either by Local Education Authorities or by Voluntary Managers. In either case they are supported by Government grants and by local rates imposed under the authority of the Council. The Voluntary Managers cannot establish one of these schools without the consent of the Local Education Authority.

Further information regarding this field of education is given from page 80 to page 87 in Part II. of the Report, and also in Chapters VII., IX. and X. of this Part of the Report.

## SECTION 5: SECONDARY AND HIGHER EDUCATION.

The distinction between Elementary and Secondary Schools was formerly in large measure a social one, but since the Act of 1902 this distinction is disappearing. Further, there is a tendency in England, as in France and Germany, to make the upper and lower age limits of Secondary Education 12 and 18 years.

The Board of Education is taking steps to enforce where necessary the definition of a Secondary School as regards the normal length of school life, and

3 GEORGE V., A. 1913

normal leaving age. Several authorities have adapted, with effective results, rules by which parents undertake (in some cases under penalty) to keep children at the Secondary School either for the full school course or for a named minimum period, unless for some approved reason. The education authorities in one of the larger County Boroughs in the North of England lowered the age of candidates for Junior Scholarships to between 10 and 12, and require an undertaking that pupils shall not leave before the end of the school year following their 15th birthday. They have also established a system of maintenance allowances in suitable cases, extending to the completion of the school course, and will seek for the repayment of these allowances, and all fees remitted, in the case of pupils who without sufficient reason fail to complete the full period arranged for.

They hope thus to solve the problem of the flooding of schools with pupils who leave after a year or two, and hence cause a waste of a great part of the educational effort and expenditure.

Practically nothing has existed in England which could be regarded as a system of Secondary Education under State control. It is therefore almost impossible to say anything in general of work in industrial arts in Secondary Schools. The great so-called "public" schools, Eton, Rugby and others, have very largely retained their distinctly classical character. St. Albans is a notable exception in its giving much attention to science, practical mathematics, and industrial arts.

#### GENERAL INTEREST IN INDUSTRIAL EDUCATION.

Although system, in the way of organized uniformity of type and progression, has been wanting in the whole field of Secondary Education in England, and has but slowly developed in Elementary Education, the general interest in Industrial Education has been so keen as to have exercised a marked influence on the character of the work undertaken in the schools maintained for general education. Holding to a theory different from that prevailing generally on the continent, English educators have felt that it was undesirable and unwise to treat Industrial Education as a thing separate from general education. The theory that a trade cannot be taught in a school, and also that it cannot now be taught fully without a school, is tending towards such a correlation of technical work and cultural subjects that a form of general and vocational education is being evolved for the industrial workers which appears to be yielding satisfactory results and meeting with general favor.

#### SCIENCE, DRAWING AND SHOP WORK.

Through Government grants from about 1881, aid was given to local initiative in the organization of science schools of Secondary rank. In 1889 authority was given to the County Councils to aid schools of whatever kind in furthering Technical Education by local taxation, and in 1890 local rates were largely relieved by a substantial annual grant from Parliament. Through this aid and influence the Secondary Schools willing to develop the "modern side" have introduced

SESSIONAL PAPER No. 191d

strong courses in science, drawing and shop work. Many schools of a distinctively industrial type, as the Central School of Arts and Crafts, London, have been developed in recent years. These are maintained or aided by public funds. But they are distinctly separate in their aim from the plan of general education, and are to be classed with the numerous and effective Technical and Evening Schools for the further education of those who have left the regular schools and, in most cases, who have already entered the ranks of industrial workers.

#### THE UNIVERSITIES.

Inasmuch as Universities have set the standards (by means of examinations) and given an impetus to almost all educational methods, they have been dominating factors in the direction of educational effort. The Universities have also provided the training for the highest grades of teachers, have educated most of the leaders in scientific research and in public affairs in relation to education, and have steadfastly set forth their ideals.

The Oxford and Cambridge type has been supplemented by the rise in 1880 of Victoria University of Manchester, with which was affiliated, at a later date, University College at Liverpool and Yorkshire College at Leeds. In 1903 the latter two became respectively the University of Liverpool and the University of Leeds.

The University of Birmingham arose in 1900 out of Mason University College and took in the Queen's Medical College of Birmingham.

There are Universities also at Bristol, Newcastle-on-Tyne, Nottingham, Reading, Sheffield and Southampton.

At these 10 modern Universities there were 7,796 Day Students and 5,736 Evening Students in attendance in 1910. Besides these there were 9,600 Day Students and 405 Evening Students as Internal Students of the 31 Colleges and Schools of the University of London, about 3,800 Students in the 22 Colleges of Oxford and about 3,700 Students in the 18 Colleges of Cambridge.

Wales is served by University Colleges at Aberystwyth, Bangor and Cardiff. On the occasion of the opening of the new buildings for the University of Wales, His Majesty King George V, as Chancellor of the University, said: "We must look ahead and endeavour to be ready to meet all the requirements of scientific and intellectual progress. The imperative necessity for higher education and research is becoming more and more recognized."

## CHAPTER II: TECHNICAL EDUCATION.

### SECTION 1: GENERAL PROVISIONS.

Although England since 1837 has given State Aid for diffusing a knowledge of the Mechanic Arts and the principles of design, and had as early as 1815 encouraged such instruction in Mechanics' Institutes, her first attempt to provide for so doing through the regular school system was not until about 1860. The "Great Exhibition" held in 1851 in the famous Crystal Palace, London, by demonstrating the inferiority of English manufactures, resulted in the organization of the Science and Art Department at South Kensington, which made grants in aid of classes covering work in these branches.

In 1857 the Education Department was re-organized and made to include the Science and Art Department.

In 1859 that Department established an examination for teachers, and those who obtained certificates of competency to teach could earn payments in proportion to the number of pupils passed. The instruction had to be given in a school approved by the Department, and local managers were required to guarantee for the school's support a sum equal to the Government grant.

From 1861, Government grants were made for work in both Science and Art in some of the Secondary Schools in which it was found readily applicable, where the modern side of education was developing.

Under the Act of 1870 the work in Science and Art was introduced into the upper grades of the Elementary Schools. In 1872 special programs were promulgated giving definite plans for this work in the schools, but as reported by the Royal Commission of 1895, "County Councils have generally found it unwise, if not impossible, in dealing with children of school age, to treat Technical Instruction as a thing separate from general Secondary Education."

#### GRANTS TO TECHNICAL EDUCATION.

The Technical Institutions Acts of 1889 and 1891 authorized the levying of a local tax of a penny in the pound for Technical Education, and the Local Authorities receive also considerable revenue from grants under a Customs and Excise Act. Such grants are commonly known as the "Whisky Money."

In recent years the amounts derived from that source have decreased considerably, and the Government has promised to set aside a portion of the land tax to make up the deficiency. The Government also gives other grants for the support of Technical Education. These are paid to Local Education Authorities on the basis of work provided for and done.



SESSIONAL PAPER No. 191d

## GENEROUS AID TO INDUSTRIAL ARTS.

Although it is not quite exact to speak of England's "system" of schools prior to 1902, it is fair to say that the schools providing for general education of Elementary and Secondary rank had often received, where disposed to utilize it, rather generous aid in the introduction and development of subject matter in Industrial Arts. The distinctively industrial bearing of the drawing and of the science work, wherever introduced, seems to justify rating these subjects as industrial. The impetus given to industrial drawing, industrial design, and industrial physics and chemistry, as these subjects were directed by the Science and Art division of the Education Department in the 70's, 80's, and 90's, is said to have meant much to England in the development of manufacturing industries through this last quarter of a century.

During the last twenty-five years the "Manual Training movement" had made itself markedly felt. The infant schools had developed simpler forms of handwork through the influence of the kindergarten idea. Woodwork for boys, and knitting and sewing for girls, made their way slowly into the upper grades.

Although great numbers of boys left school at 12 or 13 years of age to enter the ranks of the industrial worker, many had a foundation laid or an interest developed in the Science and Art work which brought them immediately into the Evening Schools or into the numerous supplementary day schools for continuing the work in science and industrial design.

## DRAWING, DESIGN AND ART.

Throughout England the Provincial Schools of Art are doing excellent work in forming popular taste, while the Elementary and Secondary schools are laying strong foundations by means of instruction in drawing, and in artistic handicraft.

Mr. Dalgety Dunn, in speaking before the International Congress on Drawing and Art as to the position of these subjects in Great Britain, said:—

When we consider the extraordinary progress made in drawing during the past ten years, we may reasonably anticipate a further advance, due to greater cohesion between classes, simplified instruction, higher professional and practical attainments on the part of teachers, and an extended school age for pupils. . . . Art teaching as a vital and necessary feature of public instruction is now generally recognized. In many ways our work has extended from the drawing of a few years ago; apparent difficulties have been smoothed away, and now nothing is heard of the impossibility of finding time for Nature and other kinds of drawing. . . . Drawing, Modelling, Colouring are some of the means by which we may hope to develop and direct self-activity.

## EXISTING PROVISIONS.

In Technical as well as in popular education, England has been a laggard. In commerce and industry she had a long start, but not until she felt the pressure of competition from Germany and France did she face the question of providing educational opportunities for training her artisans. Until the great educational enactment of 1889, the Mechanics' Institutes were in the main the

only means whereby the working or the middle classes continued or supplemented the inadequate provision of the Elementary schools. These Institutes from the early days of the nineteenth century were the fore-runners of the present Technical Education.

The forms of provisions for further education are recognized under three divisions viz.—(1) Evening Schools and Classes; (2) Schools of Art; and (3) Technical Institutions.

Technical Education is now provided by Technical Day Schools, "Trade" Schools and Evening Classes, to which should be added the Central Schools and the Higher Elementary Schools, some of which provide courses with an industrial outlook, but without attempting instruction of a specifically technological character. The higher forms are provided for at the Municipal Technical Institutes, at many of the Universities and at the Imperial College of Science and Technology.

Practically all the English towns have well organized co-ordinated systems of Technical Education, but only such institutions have been featured in this Report as seemed to the Commission to offer specially useful suggestions for Canada.

## SECTION 2: EVENING CLASSES.

### A CHARACTERISTIC FEATURE.

All authorities agree that Evening School instruction has been one of the most characteristic features of the English educational system. In no other country is greater zeal shown in the attendance at Evening Classes organized upon a purely voluntary basis. The educational facilities thus afforded are evidently appreciated more than ever by intelligent and vigorous young people, especially in the great centres of industry and commerce.

Dr. M. E. Sadler, one of the leading authorities on education in Great Britain says " I can find no country in which voluntary attendance at Evening Classes is so large in proportion to the adult population as it is in England and Wales."

In all the English cities visited by the Commission, Evening Classes were an outstanding feature. This remark, subject to local modifications, would apply to Great Britain generally.

### STRIKING FACTS AND FIGURES.

The following figures show the position of Evening Schools under Government Inspection in England and Wales in 1906-7:—

Number of Evening Schools recognized by the Board of Education	5,933
Number of students in respect of whom grants were paid by the Government.....	551,968
Number of students who attended at any time during the year. (A student attending more than one school is counted once for each school).....	736,512

## SESSIONAL PAPER No. 191d

The same in groups of ages at entry:

Between 12 and 15 years of age.....	132,898
Between 15 and 21 years of age.....	362,627
Over 21 years of age.....	240,987

The same divided according to sex:

Male.....	442,416
Female.....	294,096

Fees:

Number of students who paid for instruction.....	613,806
Number who received free instruction:	
Admitted without fees.....	92,426
Whose fees were subsequently returned in full.....	30,280
Amount of grant paid by the Government.....	£361,596

Taking the population of England and Wales in 1906-7 (Statesman's Year Book) at 34,701,776, the percentage of attendance at Evening Classes would be 2.12, or over 21 per thousand of the population. There has been considerable increase during more recent years.

## VIEWS OF THE PRESIDENT OF THE BOARD.

The Rt. Hon. Walter Runciman, President of the Board of Education, in his address on the Budget in the House of Commons in 1910, stated that the work done in these Evening Classes covers a vast range of subjects, and the Board of Education was not prepared to exclude any subject providing that it came properly within the category of the classes and that any reasonable subject of real educational value might count for the purposes of the grant. He added that a great deal of the work was of the greatest value, instancing a visit to a technical class at Burnley where he found some of the best pure science classes in the United Kingdom, no fewer than four of seven scholarships granted in the Kingdom having been won by that school. He expressed the opinion that the work done in these classes must depend largely on the amount of time occupied by the student's daily work, and thought it was impossible for the student commencing work at six in the morning and continuing till 5.30 in the evening with short intervals for breakfast and dinner only, to have enough energy to take full advantage of the Evening Classes, the usual time allowed for these classes (six hours per week) placing a strain upon the students far beyond what they could bear. He had heard of some young students in Leeds breaking down under it. He instanced places where they would have been able to attend such classes during the day by permission, and even encouragement of employers, citing Middlesboro', Manchester, Harwich, Birmingham, Coventry, Derby and Swindon. He thought a word of credit was due to the Admiralty for having led the way in this matter, because as early as 1843 they allowed some of the young persons working in their dockyards and shops to attend technical classes during work hours. Some of the railway companies are now taking this subject up with a degree of enthusiasm which does them every credit. Recently the Great Northern Railway Company have been insisting that in every case, boys

in their employ in London, of whom they have a very large number, should attend some classes, many of which are held during working hours. He believed that only by following this plan would it be possible to get into the schools the boys between the ages of 13 and 17 in such a way as to enable them to take full advantage of the facilities there offered them.

#### PROVISIONS IN LONDON.

In London the Evening Schools tend to five fairly distinct types:—(1) The ordinary Continuation School, collecting the old scholars from neighbouring day schools, staffed as far as possible with teachers from those schools, and mainly concerned to keep those scholars together and prevent their losing what they have learned; (2) Higher Grade Continuation Schools often developing into the Commercial School, the scholars, generally from the better class of homes, being past the VII standard and coming to the Evening School with a definite object; (3) Polytechnics and Schools of Art where the apprentice or improver and also the skilled workman find the means of widening their knowledge and skill; (4) The Commercial School, where the clerk finds instruction in languages or commercial geography or the machinery of business; (5) The distinctively College work, represented by such Colleges as King's College, the Birkbeck, the London School of Economics and also by some of the Polytechnics and other institutions.

#### THE UNIVERSITY OF SHEFFIELD.

The following brief statement concerning the University of Sheffield is given chiefly to indicate the extent and character of the Evening Classes carried on by the University. There are 500 day and 1,390 evening students in attendance. Similar Evening Classes are conducted by other Universities.

#### APPLIED SCIENCE DEPARTMENT.

The reputation of the city of Sheffield as the birthplace of the iron and steel manufacture is one which the city fathers and manufacturers are most anxious to maintain. The intention of the Department of Applied Science is to train students in the best known scientific methods of producing steel. Evening Classes and week-end lectures in the surrounding district are co-ordinated with the Department.

The Department specially concerns itself with the application of Science to (i) Mining; (ii) Metallurgy; (iii) Commercial life.

#### I. Mining.

A. The work done *at the University* includes,—

- (a) Degree Course, covering 3 or 4 sessions;
- (b) Diploma Course, covering 3 or 4 years, during which students receive instruction concurrently at the University and at a colliery;

SESSIONAL PAPER No. 191d

(c) Saturday Courses:—

1. Certificate Course in Mining, covering Mining, Chemistry, Mechanics, Mine Surveying, Machine Drawing, and Steam—2 years course, held on Saturday afternoons.
2. Electricity applied to mining—2 years course, held on Saturday afternoons;
3. Mining Teachers' Course, for practical men who have had a good training and wish to teach in local Mining Classes under County Councils—1 year, Saturday afternoons.

B. The work done *outside Sheffield* includes,—

- (a) Saturday Course at Derby, similar to the one held at the University;
- (b) Extension Lectures in Mining, Mining Chemistry, Mechanics and Physics;
- (c) Work done in connection with local Mining Classes under the supervision of the University.

*Applied Chemistry.*

The Department of Applied Chemistry is closely allied to the Mining Department, Chemistry being an important and necessary subject for future mine managers or engineers.

The literary side of mining education is not overlooked, being as important as the technical side.

*II. Metallurgy.*

Students are not promoted in this Department until they have satisfactorily completed the Mining Course, although the two Departments are quite separate. A special feature of this Department is a Laboratory for the use of former students, who can come here to study problems which they have encountered in their daily work. This post-graduate laboratory is greatly appreciated.

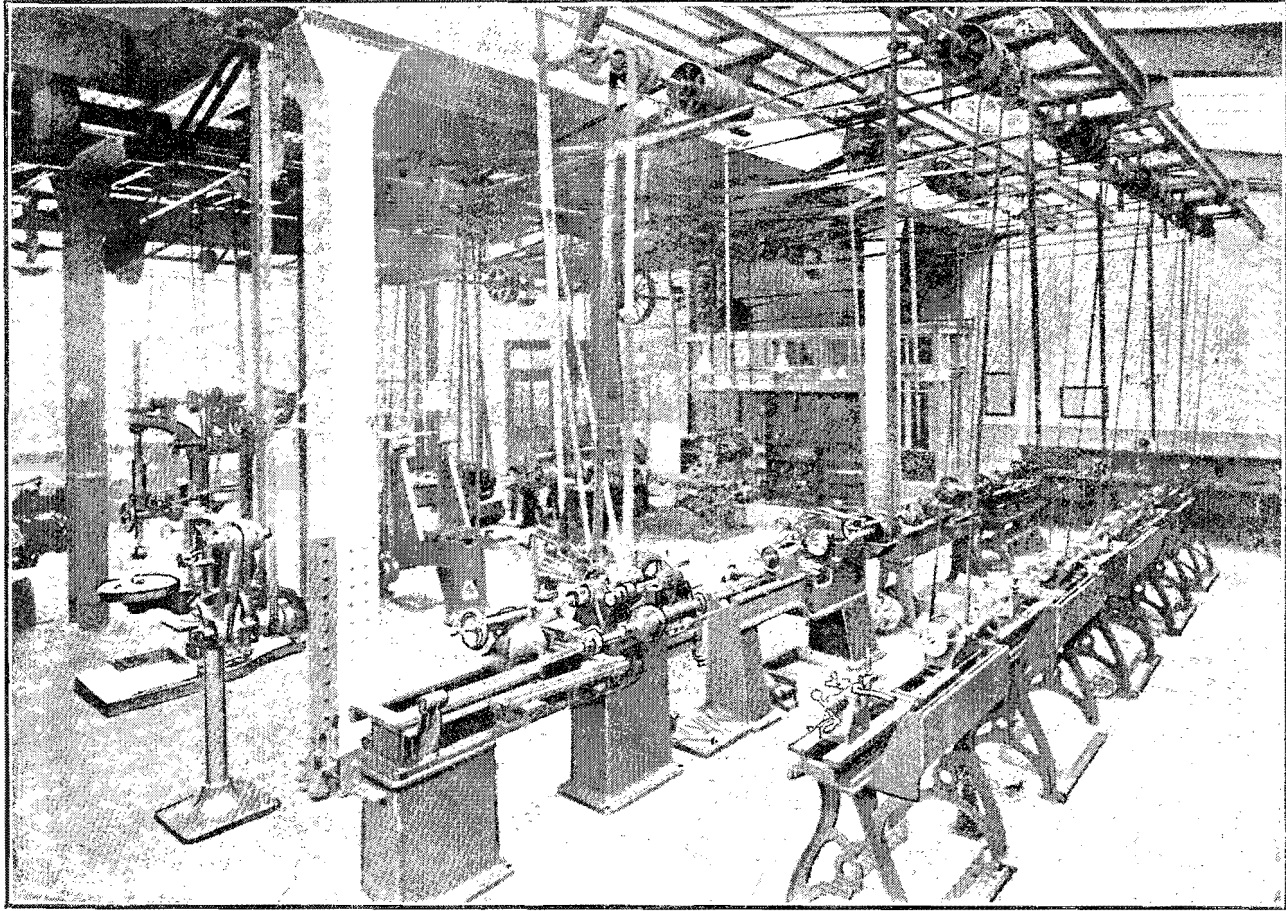
The equipment is ample and up-to-date, suitable for the requirements of students in every branch of this Department. There is a carpentering shop, in which students make patterns for the machines, of which they sometimes make the moulds in the foundry, cast and fit them up in the tool shops. The workshops include fitting shop, machine tool shop, woodwork shop and smiths' shop fitted up with the most modern machinery. The drawing office accommodates 80 students at a time.

*III. Electrical Engineering.*

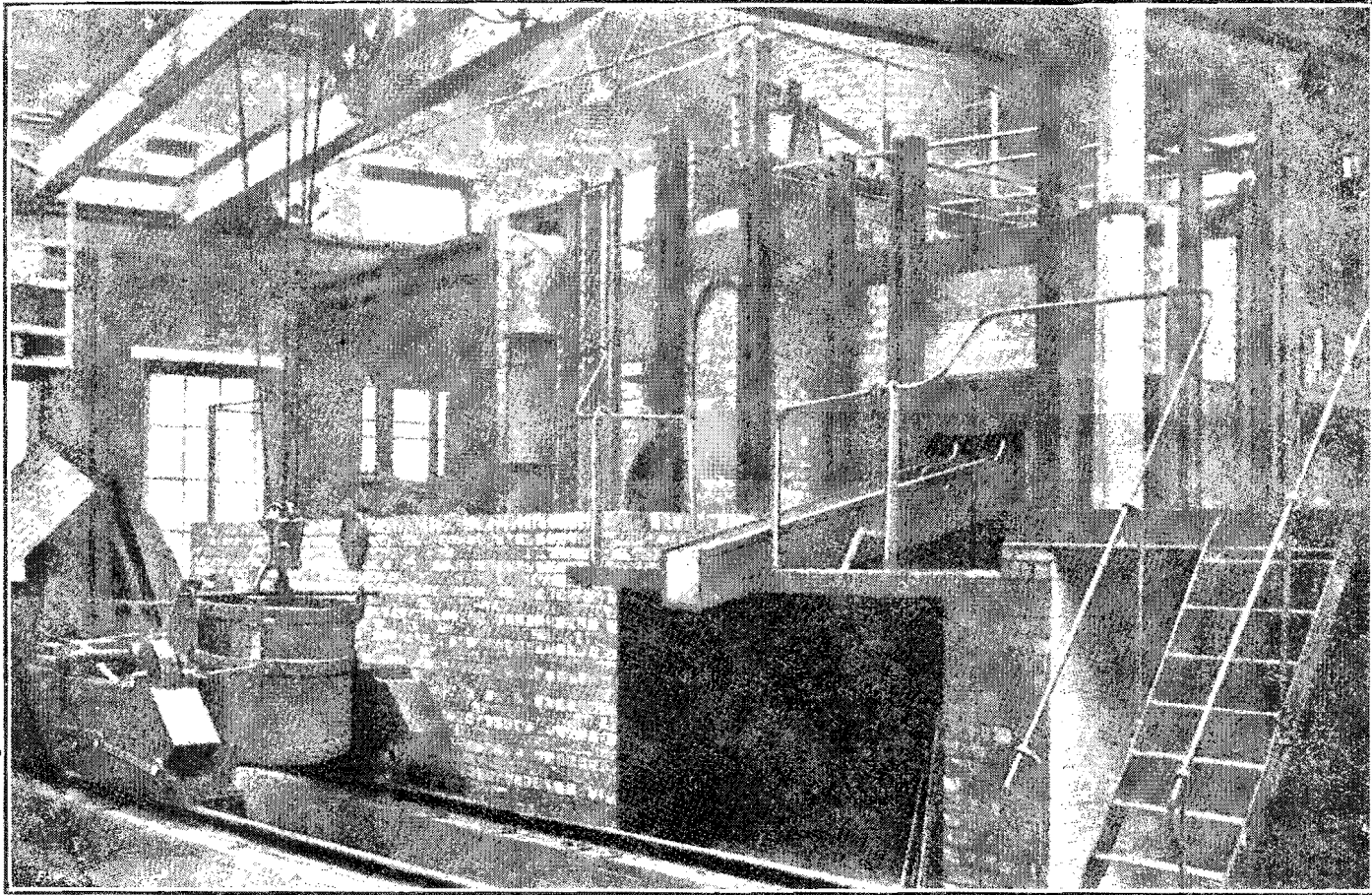
The Engineering Course covers 3 years, and includes attendance at lectures and classes, experimental work in the laboratories, and practical work in the drawing office, workshops and machine tool shops. The Department of Electrical Engineering has three electro-technical laboratories, one for each year of the Course.

EVENING CLASSES.

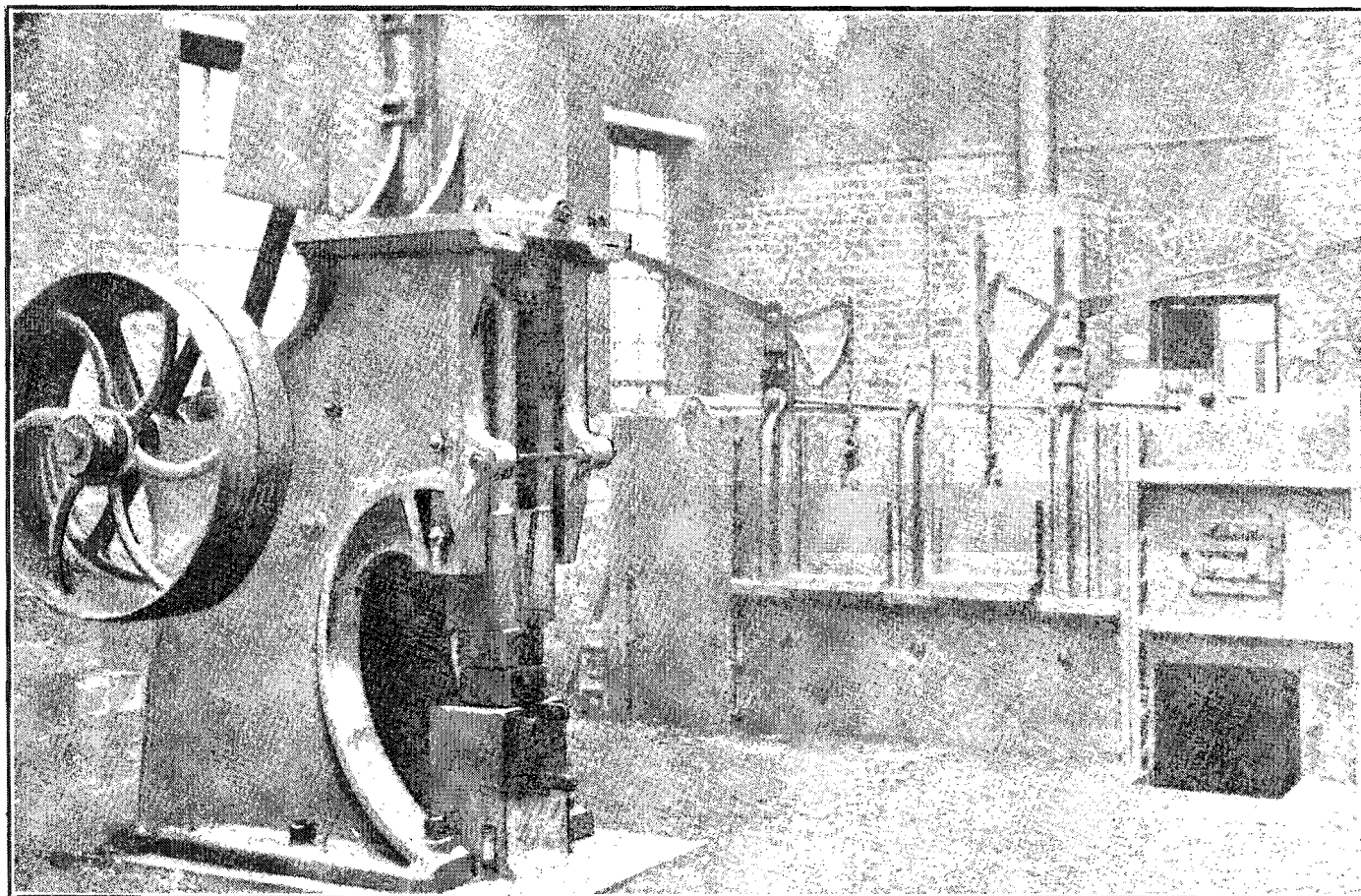
The Evening Classes, which are a most marked and successful feature of the University, have full advantage of the organization and equipment of the Applied Science Department. Many of the students take the Associateship Examination.



UNIVERSITY OF SHEFFIELD: THE TOOL ROOM.



UNIVERSITY OF SHEFFIELD: 2-TON SIEMENS FURNACE.



UNIVERSITY OF SHEFFIELD: HALF-TON ELECTRO-PNEUMATIC HAMMER AND RE-HEATING FURNACE.



## SESSIONAL PAPER No. 191d

1. Before going to the Examination for Associateship, they must furnish certificates of having attended during at least four University years a Course of Study approved by the University of not less than six hours a week.

2. They must satisfy the Examiners in five subjects selected from the following:—

1. Pure and Applied Mathematics.
2. Theory of Machines.
3. Strength of Material and Theory of Structures.
4. Hydraulics.
5. Thermodynamics, Heat Engines.
6. Civil Engineering and Surveying.
7. Civil Engineering Design.
8. Generation, Transmission and Distribution of Electricity.
9. Design of Electrical Machinery.
10. Theory and Practice of Machine Tools.
11. Machine Drawing and Design.
12. Geology.

*Associateship in Iron and Steel Metallurgy.*

To take this Associateship, applicants must furnish the Examiners with certificates of having attended three years of Day Classes or four years of Evening Classes, including, for Evening students, attendance of six hours a week.

They must furnish certificates of having passed in:—

1. Metallurgy of Crucible Steel.
  2. Metallurgy of Cast and Wrought Iron and Siemens and Bessemer steel.
  3. Fuel and Refracting Materials.
  4. Geology and Mineralogy.
  5. Mechanical Drawing (only required for Day Students).
- They must satisfy the Examiners at the end of their Course in
6. Pyrometry.
  7. Micrographic Analysis.
  8. Chemical Physics of Iron and Steel.

They must pass an oral examination in 1, 2, 3, 6, 7, 8.

## CHAPTER III: CONVERSATION WITH MR. FRANK PULLINGER.

*Information obtained in "Conversation" with MR. FRANK PULLINGER, Chief Inspector of Technical Schools for The Board of Education for England.*

The border line between Elementary and Technical Schools and Elementary and Secondary Schools has not been very sharply defined in England. The Board of Education finds it a difficult matter to deal with, but hopes the new regulations will make a better line of division than at present.

There are three kinds of schools for Industrial or Technical Instruction:—(1) the Evening Schools; (2) what may be called part-time Day Schools; (3) full-time Day Schools.

The latter are perhaps the most important, though not the most numerous. There are three grades of those. The first grade is for boys and girls who have just left the Elementary Schools, called Day Continuation Schools, which Mr. Blair will have called Trade Schools. In those schools it is hoped to have a continuation of the general education such as is given in Elementary Day Schools, and with it a definite instruction in trade subjects.

As a rule the Day Continuation Schools will make 12 years the lowest limit of age for entrance. It depends on the age in any particular town at which the scholars leave the Elementary Schools. In London they leave at 14, and some trades in London, especially those for girls, do not admit scholars till they are 14. The Borough Polytechnic admits pupils at 12. Arrangements must be made at those schools in accordance with different trades. For instance, a boy at 12 cannot be taught a heavy trade like engineering, for he is not strong enough, and such trades will not be taught; but trades connected with such industries as light wood-work, especially cabinet making, etc., could be taught to such boys. Girls could be taught laundry work, dressmaking, waist-coat making and such light trades.

### DAY CONTINUATION SCHOOLS.

Under the head of Day Continuation Schools there will be a great variety of schools. It is not proposed to lay down any regulations as regards curriculum, but none of those schools will ever do less than 6 hours a week of Manual Instruction—that term including not merely wood and iron work, but laundry work, dressmaking, etc.—and some of them will do nearly twice as much, out of a total of 30 hours a week.

## SESSIONAL PAPER No. 191d

These schools will no doubt provide a good deal of teaching in manual work in wood and iron, but for the most part the curriculum will be rather general, with a decided bent in the direction of those studies which will be useful to the boy when, on leaving school, he enters some mechanical engineering trade. He will do plenty of Drawing of a very suitable kind—drawing from actual objects, first of all simple geometrical models, then from actual machine details of one kind or another that are found in various machines.

No doubt a good many of the Central Schools in London will be classed as Day Continuation Schools and carried on under the regulations for Technical Schools. Similar schools can be seen in Leeds. Those schools do not grow very quickly, having had little encouragement from the Board of Education in the way of grants. The Board's experience with them hitherto has not been very satisfactory, because to succeed they must be thoroughly appreciated and supported by employers, who have no very great faith in Technical Education. As a general rule the education must first be provided without the demand, which has to be created.

In seeking to bring about the attendance at the Day Continuation Schools of those who might be disposed to earn money, or whose parents might be careless about them continuing in the school, the arrangement preferred is one under which employers give first preference, in filling up the posts of apprentices, to lads who have been educated in these schools, where tolerably advanced work is done by boys who have remained there for three or four years.

## PRACTICAL TEACHERS AND TRADE ATMOSPHERE.

The headmasters of the Day Continuation Schools and as many instructors as possible will be drawn from the ranks of the Elementary teachers, but especially from men who have had trade experience. That will be one of the tests which will distinguish between a Day Continuation School carried on under the technical regulations of the Board of Education, and any other school, whether Secondary or Elementary.

In a Cabinet-making School, for example, the greatest effort will be made to secure that there shall be a thoroughly practical atmosphere in the school and that the staff for mathematics, science and the different advanced technical subjects shall be equipped by trade experience, and shall have been themselves trade apprentices. The proportion of the week's time to be given to manual or manipulative or trade work has not been settled.

## INTERMEDIATE SCHOOLS—THE NEW APPRENTICESHIP.

Above the Day Continuation Schools there are a number of schools—which might be called Intermediate Schools, in which boys are admitted at 15 or 16 after having attended a Secondary School from the age of 12 and received a purely general Secondary Education. All Secondary Schools are supposed to have a certain amount of Manual Training, but it only comes to about two hours a week.

These full time schools for scholars of 15 or 16 are going to be very important indeed. Their main object is to give lads a two years' course of preparation for an apprenticeship which starts rather later than the usual apprenticeship, taken by boys leaving Elementary Schools. A great many of the better class workmen, foremen and managers, can afford to let their boys stay at school until 16 or 17, and then send them on as ordinary apprentices into the works. These schools will be able to do a good deal better work than the more elementary Day Continuation Schools, because the lads will have had a better preliminary education, and they will be staying at school longer; but of course the standard of instruction will not reach that of the Universities and large Technical Colleges. They will have definitely a two year course. As a matter of fact, there are very few places where employers will take apprentices when they are more than 17; and some engineering firms will allow two or three years in a Technical College to count towards the third year of apprenticeship. That is the sort of thing it is desirable to see extended. While it might be thought a boy at 18 would be very acceptable in industries after such a school as this, yet numbers of industries do not want such as those, for a boy who pursues his education up to 18 or 19 wants more salary than the average apprentice could get; and some engineering employers say that they can run their works on a very small proportion of highly-educated men. The graduates from these Intermediate Schools are the men who would, after experience in the works, become foremen and heads of departments, etc. The combination of school and workshop would be a new species of apprenticeship.

#### FULL TIME TECHNICAL SCHOOLS.

The captains of industry would be recruited from the next kind of full-time Day Technical School, namely, those which are held in Universities and in the best Technical Colleges, to which it is expected nobody will be admitted until 17 or 18. This kind of school is already in existence in a good many universities and big Technical Colleges, such as Northampton College.

These three different kinds of Day Technical School are in many places in England now very much mixed up. There is a very considerable tendency in schools which ought to be of the highest grade, in which there are not very many students, to admit boys who are not sufficiently prepared. In quite a number of cases the schools could not at present be classified.

The curriculum of the lowest grade of Continuation School should be prepared definitely for lads who are to be apprentices at 15 or 16, and cannot give enough time to general training in mathematics, science or literary subjects to be prepared for the next grade. The first grade of school would be very much like the Central Schools in London, with a bent towards industry or commerce. It is not desired to have boys going to the Central Schools and then on to the University, the ordinary avenue to which is through the Secondary Schools. A boy should get to the Secondary School from the primary at 11 or 12.

As regards co-ordination of these three different kinds of schools, the Day Continuation School will not as a general rule be a place of preparation for the

SESSIONAL PAPER No. 191d

next higher grade, it being considered that every grade of day Technical Instruction should be preceded by full-time day instruction of a thoroughly general character. Thus a student preparing for the highest grade of Technical School would get purely Secondary Education at the Secondary School till 17 or 18, though in the last year or two he might devote more attention to mathematics or science than purely literary subjects. The desire is to see boys go to the intermediate grade of Technical School from Secondary Schools where they have been getting a purely general education till 15 or 16.

Although as a general rule every grade of full-time Day Technical School should be preceded by a purely general education, yet there must be exceptions such as in the case of boys who develop for the first time when they reach these technical schools; and if they develop, there should be no bar to them going on to the next grade of school. The teachers would have to be relied on for guidance in such cases.

#### TWO SORTS OF HIGHEST TECHNICAL SCHOOLS.

There will be two sorts of Technical Schools of the highest grade: (1) That to which boys are admitted after four or five years in the Secondary School; (2) Another, intended for boys who started their apprenticeship between 14 and 16, have attended Evening Schools and then have been selected by rigorous tests as being sufficiently qualified to go on with full time day education for two or three years.

A scheme of that kind is going on at present on the North-East coast. A boy leaves the Elementary School at 13 or 14, goes into engineering works at once, and starts attending Evening School; then, at 18, the best of those lads are selected by the principals of the Technical Schools and the employers jointly. The employer has a record as to whether the apprentice is a satisfactory workman, a good time-keeper, and all the rest of it; the principals of the Evening Technical Schools have a record of his intellectual attainments, and between them they pick out the very best apprentices and give them a three years' full time day course. The Board of Education gives grants to those schools. In some cases the boy's employer pays his fees; in some cases he also pays wages; sometimes he may pay half wages, but wages are not paid to as great an extent as they should be. There are scholarships as well. That is the sort of school it is desired to increase.

#### THE SANDWICH SYSTEM.

In an engineering town like Sunderland or Manchester, it is desired to have a boy stay at a Public Elementary School till 13, then go full time to a Day Continuation School till 16, then to the works as an apprentice attending Evening School, then have a chance of getting to another full-time school at 18, after two years in the works—the sandwich system. This latter school, having regard simply to the interests of the students, is a very different kind from the ordinary technical course carried on in the University and attended by boys

whose previous education has been in Secondary Schools; yet these artisan students at the places named do extraordinarily good work, and very advanced; they are first-grade students. They give their whole time to the day school for six months a year for three years after having spent two years in the works.

#### PART-TIME DAY SCHOOLS.

Part-time Day Schools, where employers arrange to let apprentices off for periods from two to four hours in the daytime, come next. These are a very varied class of school. In some cases the schools go on for one, two, three or four months in the year, the best examples of these being the Farm Schools, carried on in winter. It is hoped to have a considerable development of Building Trade Schools in winter, when these trades are slack. There are, perhaps, 100 part-time schools where employers allow their apprentices to attend school for half a day, one or two days, per week. There are schools for two hours a day, such as railway schools, from 7-9 in the morning, before starting work. In the School of Technology at Manchester, instruction is given on Mondays from 9 a.m. to 6 p.m., with an hour off for dinner, making 8 hours per week, the employers letting their apprentices off. Another school is in Harwich, near Bolton, the headquarters of the Bolton & Lancashire Railway Co., where they have two afternoons a week. In such cases the employers pay the apprentices their wages during the time they are in school; it counts just as though they were in the works. This sort of thing needs very careful organization. The mere fact that a lad is picked out by his employer as being a first-class apprentice and fit to attend school in the daytime for a number of hours per week generally gives that lad a better opportunity of getting higher wages. Cases have arisen where a lad has started as an apprentice under one employer, who paid his fee at the beginning of the session in September or October, and by January that lad had gone off to another employer and was getting higher wages. Such might be remedied by reserving part of the boy's wages till the end of the year. It may be taken as a rule that whatever time is given under this practice to school work is paid for. At the School of Technology in Manchester they have a similar course for plumbers and painters and decorators; at Middlesborough, in Yorkshire, they have a school of that kind, and at a good many other places.

Mr. Pullinger thought the best arrangement was to give instruction on one day of the week, especially on Monday, after the lad's week-end rest. At the Westminster Technical School, in London, there are part-time day classes for Gas Works apprentices of the London Gas, Light & Coke Company. These are young lads who have just left the Elementary School and become apprentices, and they do not all come on the same day, but have some sort of a shift arrangement.

SESSIONAL PAPER No. 191d

## GOVERNMENT DOCKYARDS SCHOOLS.

One of the very best examples of part-time day instruction is to be found in the Government Dockyard Schools carried on by the Admiralty in all the dockyard towns. Before a lad can become an apprentice in a Government dockyard, he must pass an examination, and as the number of candidates is very large, the Admiralty have a pick of boys. When a lad gets into the dockyard he attends the part-time school for 12 hours a week—six hours in the day and six in the evening. At the end of the first year the Admiralty have an examination and weed out from their school about 50% of those lads as unfit for further instruction; at the end of another year they rule out 50% of the remainder. The result is that in the third and fourth year they have material of extraordinary excellence; and these lads, with 12 hours' instruction weekly, do splendid work. These dockyards have been going on for 60 years, and it is amazing to find that, with such an experience before them, other employers in engineering do not follow the example, for the Admiralty certainly would not do it unless it paid them. A boy must be 14 before he enters for the admission examination, and if he fails the first time, he can have an examination the year after.

## EVENING SCHOOLS.

As to Evening Schools, they are very numerous in England, and as good as they are anywhere. Mr. Pullinger did not like the notion of a boy working at night, especially the young boys. The leakage from one year to another in the Evening Schools is enormous, which, he had no doubt, was due largely to the fact that the lads were physically unfit to stand it three times a week for a couple of hours after working 10 hours.

In some towns the organization is excellent, and it has not been at all difficult to lay down a scheme of what the Department wants carried out. In the best organized towns there are preparatory courses for lads who leave the Elementary Schools rather prematurely—say, at 13—and other boys who have left the Elementary School and have neglected to go on to an Evening School immediately, but have allowed two or three years to elapse. In a few cases there are Preparatory Classes for people of 20 or 30, or even older, who have gradually dropped all their educational knowledge and attend school again to learn, in some cases, how to read and write and do simple sums in arithmetic.

Above these Preparatory Courses are what may be called Junior Courses, normally for boys and girls from 14 to 16, in which subjects of general education are continued, though these do not amount to very much, being carried on for only six hours weekly. The Board of Education intends to insist in future on English being continued for boys from 14 to 16, and that arithmetic should always have a place; but in the Junior Industrial Courses there are no definite technical or technological subjects. In the Northern towns the Industrial Courses comprise practical arithmetic and mathematics, instrumental drawing,

a little elementary science, in some cases English, and a little wood or iron work, so that it is really a general education with a very definitely industrial bent.

In the Commercial Courses, shorthand and book-keeping are taken, also English and arithmetic; in the Domestic Courses for girls, besides English and arithmetic, there are cookery, dressmaking and the like.

Speaking generally, these Junior Evening Courses for boys and girls between 14 and 16 should not be and are not of a definitely technological nature; they are really preparatory—to fit boys and girls to take up at 16 some definite trade teaching. Then at 16 and beyond, the courses for boys and girls may be called Senior Courses, being definite Trade [or Industrial] Courses. If a boy is an engineer, he goes on with some mathematics, and also does mechanics and machine drawing; next year he will have the same subjects carried on to a more advanced stage, or he may take up heat engines, motor-car work, or electrical work, or whatever his particular requirement is. Similarly in commercial work, a boy will begin what is called business methods or commercial correspondence and also take up a modern language.

#### GROUPED COURSES BEST.

Where these Junior and Senior Courses are carried on in the best way, they are grouped, that is, they are carried on about six hours a week, and most of the students are compelled to take the whole Course as laid down. Before 1902, students were allowed to pick their own subjects at Evening Classes; engineering apprentices would take machine drawing and nothing more, or applied mechanics without having the fundamental knowledge for either applied science or mechanics. This was an immense disadvantage, and led to a serious dropping out in perhaps 20 lessons, when students would find they could not go on with the work. They are now required to take definite instruction,—either to take it all or leave it all. Statistics prove that one of the results has been a wonderful improvement in attendance. The boy who takes the necessary fundamental subjects is the one who will get a thorough grounding in his work and can go on to thoroughly advanced work; and as he can grasp it all, he retains interest in his work and stays on, not only during a particular session, but for years, taking three evenings a week.

#### WORKSHOPS IN SCHOOLS.

There is not much opportunity for shop practice in six hours a week; for a great many trades there is very little workshop practice in the Evening Schools. That has to be gained in the works. All the evening Technical Schools contain workshops, so that if a lad, employed in a large engineering works on one job all day, finds that he is not getting the kind of experience in the works that he needs, he can put in some other nights in the week and get a knowledge of tools and machines that he does not use in the workshop. In addition to



SESSIONAL PAPER No. 191d

this, however, he would be expected to take the standard Course laid out by the Board. The boys who attend the Junior and Senior Classes need not be apprentices, but no doubt 90% of them are, and they are all at work. There is no objection to anybody else taking this Course. In a few cases classes are confined to people in the trade on account of trouble between the trades unions and school authorities, but that is not general.

The Junior Course is two years, from 14 to 16, and the Senior Course three years. By the time a boy has attended both Courses, he is 19, and it is probably unnecessary to exercise compulsion on him to continue on his Group Course work. If he has been at all a satisfactory student, he will find it absolutely necessary to reduce the number of subjects studied, for in those advanced stages the study of some particular branch is really sufficient to occupy the evening student's whole time. It is anticipated that students beyond the age of 19 will be allowed to choose their own studies, with the help of the teachers and the school Principal. There are large numbers of students between 20 and 30 years of age.

#### DRAWBACKS TO COURSE SYSTEM.

One of the great drawbacks in evening technical work is that young men of 19, 20, or even older attend, who have done no educational work at all since leaving the Public Elementary School, and want to have some technical trade instruction, but are not willing to start and go on with the elementary subjects of science and mathematics. Some schools will not take students without being satisfied that they have adequate preliminary instruction; the authorities make other provision for such students. There has been no regulation of the Board of Education making it compulsory that there should be Grouped Courses, but a certain amount of encouragement had been given to that end through additional grants. The Course system did not become general, even in the North of England, until 1903-4, and it is not now fully in operation in the South of England and the Midlands.

## CHAPTER IV: CONVERSATION WITH MR. ROBERT BLAIR.

*Information obtained in "Conversation" with MR. ROBERT BLAIR, Chief Education Officer, LONDON COUNTY COUNCIL.*

The first landmark of recent times in English education is the Act of 1870. The next is the Act of 1902. These are the two great legislative Acts in modern English education. The former made Elementary Education public and afterwards made it compulsory and free; it established Elementary Education in its present public form, the governing bodies being School Boards; the latter Act gave power to organize Secondary Education, and made County Councils and County Boroughs the authority for education, which was a great change in the character of the authority and also of the powers given to it.

In London up to 1904 there was a School Board which looked after Public Elementary Education, and the Technical Education Board of the County Council which had existed since about 1890, which looked after Technical Education. The Voluntary Schools were not under any common government; but the School Board Schools, and then the Secondary Schools, were all placed under the County Council by the Act of 1903, which made the general Act of 1902 applicable to London, and also made some other modifications for London. In 1904 the London County Council came into power with these three amalgamated powers and also additional power to co-ordinate all forms of education in London. So that the London County Council as local educational authority is concerned not only with Elementary Education, but with Secondary, Technical and University Education. It is not the responsible authority for the University, but it aids the University both on its technical and academic sides to such an extent now, and in future will aid it so much, that it will have a very large influence in University Education in London.

### HIGH SOCIAL PURPOSE IN EDUCATION.

The County Council has had only seven years' control of education and the London people think the rates have gone up enormously in that time. Mr. Blair admitted that they had to a certain extent. The whole of the Elementary School system was permeated, he said, with a strong influence of recently developed high social purposes finding scope for its activity in medical inspection, medical treatment, fresh air and greater attention to feeding, cleanliness and future occupation. This social influence has resulted in the organization of what are known as "Care Committees" which have no less than 6,000 voluntary workers. The work has been divided up into three departments as follows:

SESSIONAL PAPER No. 191d

(1) *Medical Inspection and Treatment*:—All entrants and leavers of Elementary Schools are medically inspected, and this results in medical treatment every year of 100,000 children, which is about one-sixth of the total. In Mr. Blair's opinion this is bound to have a very important effect on the future of the schools.

(2) *Feeding of Children*:—At the worst periods of the year, 55,000 or 60,000 children are fed at the public expense under all sorts of arrangements.

(3) *Juvenile Labor*:—The Board of Trade is developing Labour Exchanges not only for adults, but for juveniles, and the latter will be connected with the schools.

#### LONDON'S SCHOOL POPULATION AND SCHOLARSHIPS.

The administrative County of London, which Mr. Blair serves, is not quite the same as what is popularly known as London, the latter being really Greater London, with perhaps seven millions of people. The London County Council is the local education authority, with a statutory commission to promote the general co-ordination of all forms of education within the County area. This administrative County area with its four and three quarter millions represents but a part, though much the larger part, of what is popularly known as London. There is a daily attendance in the Public Elementary Schools of 650,000 children, mostly between 5 and 14 (the years of compulsory attendance).

The Council's annual expenditure on education approaches £6,000,000.

In public or semi-public Secondary Schools (some maintained, some aided, and some not aided by the Council) there are on the roll 30,000 pupils, the nominal leaving age varying from 17 to 19. One important feature about the Secondary Education is that it is not free except to those who by proved ability in the Elementary Schools win scholarships which put them in position to take full advantage of it. These children, about 1,700 boys and girls in equal numbers, are selected every year from the Elementary Schools at 11 or 12 years of age on a basis of examination modified by reports of head teachers which involve school records. The teachers' reports are specially useful at the tail of the 1,700 when it is a question whether a boy should be in or out. The scholarships give them five years for Secondary Education, all they have to do being to satisfy normal conditions year by year in order to continue. A scholarship means not only exemption from fees but maintenance which enables the parent to go without the child's wages. There are about 8,000 such pupils in the Secondary Schools.

On the top of that, towards the close of 16 or 17 years of age, intermediate scholarships enable a child to stay on till 18 or 19, these scholarships being of better value, but fewer in number, about 300 a year, the total number of scholars now being about 690.

On the top of this another system of scholarships takes boys and girls to institutions of University rank, such as Oxford, Cambridge, University College (London), Imperial College of Science and Technology, etc., there being no limit to the institution except that it shall be of University rank. These schol-

arships may not be worth more than £90, and may be down to anything, but as a rule they are made equal to about £150 for a boy at Oxford or Cambridge, or £130 for a woman. They are worth a little less at London where the Colleges are not residential.

#### FREE SECONDARY AND TECHNICAL EDUCATION.

Secondary and Higher Technical Education and ordinary University Education are thus being really made free to all those who can make first-class use of them; and the Council is giving such maintenance scholarships as enable the poorest boy or girl to be put on a footing at the University with the ordinary student, in regard to clubs and games, etc.

There has to be a declaration of lack of means; all that is investigated and there are certain limits of income all the way through. The Seniors, that is those for the University, are not selected on examination at all, but on record; Juniors and Intermediates on examination.

Attending the Secondary Schools, with the 8,000 or 9,000 who obtain scholarships, are other scholars who do not possess scholarships. The endeavour is to avoid invidious social or other distinctions, though Mr. Blair was afraid the effort had not been quite successful.

The County Council says to these junior scholars: "These are the approved schools, fit yourselves in". The parents make the selection of the school. A scholarship enables a boy or girl from whatever home he comes, to get the very best education available.

#### SOCIAL GRADES DISCOURAGED.

Asked as to whether these scholarship students were segregated in a class by themselves, Mr. Blair replied that one might say "Yes" or "No" to the question. They were not segregated because they had scholarships though it might be that segregation prevailed to an extent. The idea has been to try and mix the two together, hoping that the scholar of lower social grade would learn something from the higher social grade and that he would also bring something into the school that the other fellows could learn from. The Council had done all it could to obliterate distinctions, and if they thought that a school fostered a social class that kept by itself in that way, they would strike the school off the approved list. But a Secondary School might want to classify in Latin or French—a subject that had not been taught in the Elementary School—and they might put these scholars in a Latin class by themselves and intensify the teaching of Latin for a time. The idea of the Council was that the "scholarship" element should get lost in the school, but the difficulty is that the boy does not always mix successfully.

SESSIONAL PAPER No. 191d

## THREE CLASSES OF SCHOOLS.

In the organization of Secondary Education in London, there are three classes—aided, non-aided, and ordinary. There are twenty of the Council's own Schools; another set, classified as Aided Schools, to which the Council gives £80,000 a year in Grants; then Non-aided schools, such as the Merchant Taylors', St. Paul's, and the Girls' Public Day School Company. On the Technical side there are also maintained schools; Technical Institutes, Schools of Art, etc.; also aided schools, such as the Polytechnics and the Schools of the University, including the Imperial College of Science and Technology which the Council aids with £8,000 a year, and which is increasing. There are not many non-aided Technical Schools; nearly all belong to the class of maintained or aided schools, the aid given to Technical Schools being about £80,000 a year.

As a rule, aided schools, Secondary and Technical Schools which receive grants from the County Council, also receive aid from the Board of Education; the aided schools and also the Council's own maintained schools get grants from that Board. The non-aided schools do not get grants either from the Board or Council, because they want to stand quite free. Mr. Blair thought it a very good thing for London to have the non-aided, the aided and the maintained schools working side by side. He thought it would be quite a mistake to try to make the whole thing of one common shape all over London; it was far better to let those two or three different kinds live alongside each other, as one set of schools could learn a great deal from the others. The maintained schools are probably better off in respect to all material provisions.

## EVENING AND TRADE SCHOOLS.

In the Evening Schools there are about 160,000 students belonging to all kinds of occupations, over 40% being females. No one can understand the system of Technical Education in England who has not fully grasped the meaning of the Evening School work. In these Evening Schools are to be found those students who have felt most the need of education, those who are prepared to make the greatest sacrifices for it, and consequently those who gain most benefit from it. The efficiency of the system is, however, limited by the exhaustion of the long day's toil before the Evening School begins, but the best of this Evening School work cannot be beaten. There are also some 20,000 pupils (11 to 15 years of age) in some 60 schools of a higher primary character called Central Schools. Each of these schools has an industrial or commercial bias.

As to Technical Education, the biggest Technical Schools excepting the Imperial College, are the Polytechnics. On their governing bodies are men who conduct industrial establishments. Mr. Blair admitted that the Council was not nearly as well related as it should be to industry and commerce, but this feature is being developed through so-called Trade Schools, which furnish a substitute more or less for indentured apprenticeship which has broken down. In London everything is differentiated: there is enormous competition

and sub-division so that a man does not make a chair but chair legs, and perhaps not even all the work on them; and while he acquires extreme skill in the making of chair legs, if anything happens to dislocate the furniture industry he is done; having been making chair legs all his days, he cannot make a tin can. What is required is character and a sort of genius for adaptability, so that if he is turned off chair legs he will be able to make tin cans. London is trying to do that by modifying largely the old-fashioned curriculum of the ordinary school, giving it a commercial or an industrial bias.

At the top of the elementary system are the 60 Central Schools which collect the children from various Elementary Schools at the age of 11 to 15 and give them an education with industrial or commercial colour or bias. Then there are the Trade Schools [mostly trade preparatory schools] for boys and girls, these, with one exception, being the product of the last five or six years. All teachers, except those who give mathematics or English, are trade teachers; the Committee is made up of the best trade experts that can be procured; and the boys turned out of these schools find places almost immediately in the trade or industry concerned. These Trade Schools have been established for those who have not yet entered upon an industrial career, but who are prepared to give an undertaking to enter specific skilled occupations at or about 16 years of age. The output of these schools must not exceed the industrial demand. That is not yet large, but there is a notable increase on the women's side. It will, however, take some years for recognition of the value of the Trade School training to secure a firm hold on employers generally.

#### TRADE CLASSES AND TRADES UNIONS.

In Evening Schools the trade classes are open only to those in the trade—workmen or apprentices—and that is really an agreement with the trades unions; that is, only a bricklayer can join a bricklayers' class; the ironmonger's man is not allowed to join the plumbers' class, etc. If a man wants some training in woodwork, but is not a carpenter, he cannot join the carpenters' class, but is put in the Manual Training class, where there is just woodworking with tools. For 10 or 15 years the Council has had very little trouble with trades unions. It does not matter whether a pupil belongs to the union, but he must be in the trade. The Council judges from investigation how many the trade can absorb, and trains them in that trade for local absorption. The Council would not take the stand that it was not right to train them for other places, say the colonies, because of the expense to London itself; on the contrary, they would be very glad if a boy were able to become a silversmith in Toronto, for example. As a rule however, the boys have no thought of getting places anywhere except near home. These classes are only 5 or 6 years in existence, and are just developing, hence care must be taken that the boys trained are placed, so that parents will have faith in the schools.

The London Trade schools vary considerably in their objective and in the character of the work done. Those for boys are of two kinds: (a) Preparatory Schools for allied groups of trades, e.g., woodworking, engineering, building

SESSIONAL PAPER No. 191d

trade, book production; and (b) those training for particular trades, *e.g.*, silver-smithing, tailoring, cooks (men), and bakery. The girls' Schools all aim at providing preparation for particular trades, *viz.*, dressmaking, retail and wholesale ladies' tailoring, waistcoat-making, millinery, corset-making, upholstery, laundry, cooks (women), embroidery, and photography.

For those who can secure a half-day or two half-days per week of "time off" from their daily employment "part-time" classes are provided.

#### CONSULTATIVE COMMITTEES FOR TRADE SCHOOLS.

The success of the schools is largely attributable to two salient features of the system;

(1) The thoroughness of the investigation which is made into the conditions of a trade before seeking to establish a school or a class. Information is collected by the organizer by personal visits to employers of every kind in each industry; workrooms are seen and foremen and workers as well as heads of firms are consulted. The inquiry is in fact pursued exhaustively until the organizer has a full understanding of the existing conditions of the trade, the likelihood of their permanence (geographically or otherwise), and the kind of skill that modern industry and modern social life are demanding. Every possible step is taken to make co-operation with employers a reality.

(2) The appointment of Consultative Committees of experts. The functions of these committees are solely advisory. They advise in the selection of the trade teachers; in the apparatus and scale of the operations. Either singly or collectively, they visit the schools, inspect the work, offer criticism on the work of the students in their presence, and do not spare them praise or blame according to their merits. In this way the school and the trade meet on common ground and each learns from the other. The members are chosen not only for their knowledge of the trade, but also because of their interest in the social uplifting of the workers. The composite nature of the membership of these committees has been one of their great values. Formed as they are of representatives of the Masters' and Workmen's Associations, members of City Companies connected with the craft concerned, members of important arts and crafts organizations, and of those engaged in the distributing trades, the bringing together of such men, holding as they often do divergent views on art and technical training, yet keenly interested in its advancement, has resulted in an interchange of ideas and an appreciation of ideals which have frequently been productive of most useful suggestions for the development of the work. On the one hand there are among them those who contend that the training should be entirely utilitarian, and that the classes should merely provide such training as cannot be given in the workshop, or as may be required to meet the demand of the fashion of the day. On the other hand there are those who represent the æsthetic side, who are equally insistent on the primary importance of training in the traditional styles of art, and a knowledge of the history of the crafts concerned; on the necessity for training students to apprehend wherein beauty exists; and the fostering and encouraging of individual expression of ideas. These urge that the schools should not only aim at training highly competent workmen, but

should also be a means of cultivating a taste for beauty, and of diffusing a sound knowledge of craftsmanship, and of thus becoming a lever by which the general standard of æsthetic taste, not only of the worker but also of the distributor and the purchaser, may be slowly but surely lifted. The interchange of ideas thus rendered possible by these meetings not infrequently results in the recognition of the value of technical training from both these points of view, and of the formulations of proposals for securing these ends.

### BOYS' TRADE PREPARATORY SCHOOLS.

The object of all the boys' schools is to prepare boys to become intelligent workmen, with a fair chance of occupying later on the better paid positions. The schools do preparatory work for which there is no time under modern workshop conditions, and send into the shops youths who have been taught to use hands and brains, and who will be in a position to make the utmost use of that experience which the workshop alone can give. The whole school atmosphere should be creative of a pride in workmanship and of faith in the power and value of the craftsman.

The general education given should, broadly speaking, spring out of and be related to the trade instruction. It should induce the reading sense, so that students may independently seek information related to their crafts or trades. It should also seek to develop, at all events in the better students, the critical attitude towards quality of workmanship, the general life and thought of the craft or trade, and especially the industrial and social conditions under which the craftsmen live and work. Art is in one way easily related. The silversmithing boy or the young architect will draw objects or examples of the goldsmiths' or silversmiths' or architects' work. But the relation must be carried further whatever the object, *e.g.*, if a chalice, its purpose should be described and some time devoted (with examples or sketches) to showing how its fashion has followed the art of the times, and so on.

Mathematics is not treated too ambitiously. A few fundamental principles well driven home are considered worth a hundred tricks. The science master who cannot show at once how much and why his curriculum differs from what he would propose for an ordinary Higher Primary or Lower Secondary School is regarded as misplaced.

The work in history and literature should give the best of the students the historical sense which will enable them to appreciate the part their craft or industry is playing in the development of civilization, and should induce them to explore the masterpieces of history and literature where the great craftsmen have so often found inspiration for their work.

Teachers of sufficient interest, originality, persistence, and sufficiently capable of applying the ordinary subjects of the curricula to each new trade included in a school's objective are by no means readily found; and this difficulty is an additional reason for the slow development of the system.



SESSIONAL PAPER No. 191d

## HOW TIME IS APPORTIONED.

School-time is apportioned about as follows:—

In furniture trades workshop instruction, including workshop drawing, occupies in the first, second, and third years of the course, roughly one third, one-half and two-thirds respectively. Of the remaining time, one-half is devoted to instruction in science, mathematics, and art, and one-half to English. In engineering schools about one-quarter of the whole time is spent in the workshops; about one-half to instruction in related subjects, such as drawing, mechanics, and mathematics, and less than one-sixth to English. In the School of Building (Brixton) boys taking the trade course, as distinct from the professional course, spend rather more time in the workshop, but in no case does the time spent in the workshop exceed half the school time.

The School of Bakery at the Borough Polytechnic is in the main attended by the sons of Master Bakers.

The last of the schools to be established is a school for boy cooks. The work of this school is guided by an advisory committee of expert chefs. The object of the school is to instruct youths who desire to become professional cooks and to train them by scientific methods in all branches pertaining to cookery and the making of pastry and confectionery. The kitchen is fitted up like the kitchen of a good hotel. The course of instruction lasts for three years.

The Beaufoy Institute gives rather more time to English and general subjects and rather less to science, mathematics, and drawing, as the boys are younger than in the other schools. In the Schools of Artistic Crafts between 9 and 10 hours a week are devoted to drawing and modelling. The artistic craft schools and the school for boy cooks stand in a somewhat different position from others, for in these occupations craftsmanship counts for more than in heavier trades, and a case can be made out for the devotion of rather more time to workshop practice.

A more detailed description of the work of one of the schools will serve to illustrate the nature of the work. (See School of Building, Brixton).

## GIRLS TRADE PREPARATORY SCHOOLS.

There are six day Trade Schools for girls in London. In addition trade training is given in three schools for physically handicapped girls.

These schools provide instruction in eleven different skilled trades which afford opportunity for efficient women workers to rise to positions of responsibility, which have been found to require a constant recruiting of skilled workers, while affording within themselves insufficient means of training young workers, and which lend themselves to class teaching.

The task of a Trade School for girls is not merely to teach the manual skill required in the trade workroom, but to supervise the development of the young worker both in health, trade knowledge, and character, so that she may be fit to hold her own in the industrial world.

## DESCRIPTION OF BLOOMSBURY SCHOOL.

A description of the work of one of the Trade Schools (Bloomsbury) will give an idea of what is being attempted. The classes range from 16 to 20 in number. The school hours are from 9-5, Saturdays being free. Four needle trades are taught, viz., dressmaking, ladies' tailoring, corset-making and lingerie, and millinery. Photography is also taught. The course lasts two years. A girl can in this time only be trained for one trade. The age of admission is from 14-16. Girls enter either by scholarship, by award of free places, or by paying a fee of 30s. a year.

Of 170 girls attending about half are promoted scholars, and the rest fee-payers. No girl is admitted who does not undertake to stay two years and to enter the trade at the end of the course. The school authorities reserve the right to exclude any girl who proves incapable of attaining a certain standard of efficiency, or to change her trade if advisable. The first three months is a probationary period during which the pupil is carefully watched, and her suitability for the trade she has chosen is gauged. The importance of a right selection of trade cannot be over-estimated, and the school serves a useful purpose in selecting, as well as in training, girls for the work best suited to their capacity.

The trade teaching is in the hands of teachers who have obtained their knowledge of the trade in first-class business houses. As far as possible in a classroom, workroom conditions are set up. The equipment and arrangement of the room is similar to that of a trade workroom. Workroom methods and trade standards of work are adopted, except that whereas in a workroom many combine to produce one article, in a classroom each girl is responsible for and required to carry through all the processes of the article she makes. Very little formal work is done; as far as possible all completed work is real work made for a particular purpose. A record is kept of the trade work of each girl and of the time spent in producing it. Throughout the course, each girl is made to bear in mind that she must in the end have a market value, and for the credit of the school this must not be below the average agreed upon. It is recognized that speed must be combined with skill if the latter is to command a price.

The trade school is kept in as close connection with the trades as possible—members of the trades visit the school, inspect and criticise the work of the girls in their presence, and do not spare them praise or blame according to their merits. The connection with the trades is becoming closer as the school becomes more firmly established, and the girls who pass through the school pass into the trade workrooms.

About two-thirds of the school time is devoted to trade work, the remainder being given to art and general education.

The art teaching, English literature, industrial history, composition, arithmetic, and hygiene lessons which, together with physical exercises and singing, fill the rest of the school time, are all arranged as far as possible to supplement the trade training. The literature lessons are aimed at awakening a love of

SESSIONAL PAPER No. 191d

wholesome reading, the history at making clear the system of which the industrial worker forms part. Composition lessons include business correspondence, and arithmetic lessons deal with workroom problems. Hygiene lessons are aimed at being of a practical work-a-day kind, dealing in the knowledge of personal and public health, which should be familiar to the worker.

#### SECURING POSITIONS FOR GIRLS.

Careful records are kept of each girl's antecedents, her progress through the trade school, her physical condition and development, and her subsequent career. After she leaves every effort is made to keep in touch with her and, with very few exceptions (*e.g.*, girls who have moved away from London), the lady superintendent of the school is able still to watch the fortunes of her old girls. An old girls' club flourishes, which meets at the school. Arrangements are made for the senior girls to be present at old girls' meetings, in order that they may learn direct from their former schoolfellows what the work-a-day world is like.

All firms applying are visited by the trade teacher, who, in consultation with the lady superintendent, picks out the girl she considers suitable for the vacancy, and offers her at the wage she is judged to be worth. It is found that a girl's career depends greatly on her making a successful start in her first place. The experience of the trade teachers proves invaluable both in judging of the suitability of the places found and in helping the girls to meet difficulties and discouragements they may first encounter in the workroom.

The trade school course enables girls to enter the trade workrooms as junior assistants; thus stepping over the earlier stages of apprentice and improver.

Each year it is proving more easy to find places for the girls and a larger field of employers are anxious to engage them. The initial wage tends to rise. The first years that girls were placed out, 8s. or 10s. was the average. This year 12s. and 14s. have been received in many cases.

Girls who have passed through the school appear to have no difficulty in keeping in steady work and in getting promotion. They are favourably commented on both for their workmanship, good manners and reliability, and in cases, where several have worked together, for the improvement in the tone of the workroom. In many cases they have encountered jealousy, but in very few have they been unable to live this down. Employers who have had trade school girls send back for more. In several cases this year girls have left the trade school to work under their former schoolfellows, now promoted to be first or second hands.

It was found in the first years of the trade school that not a few girls after leaving the school broke down in health in the strain of the workroom. Increased care is given to physical fitness. All girls are examined on entry, and re-examined at intervals during their trade school career. Parents are required to get carried out necessary treatment advised by the school doctor. Eyes, teeth, crooked backs, &c., are attended to and opportunities for remedial exercises are given in school. The improvement in physical well-being of

3 GEORGE V., A. 1913

the girls during their sojourn at the school is very marked. The school aims at keeping in touch both with the elementary and other schools from which the pupils are drawn, and also with the parents of the girls themselves. Two or three times a year an open day is held for head mistresses and other teachers who are invited to bring intending pupils, as well as for the parents and friends of the girls. Exhibitions of work to which the trade are invited are also held annually.

#### COST OF GIRLS' TRADE SCHOOL.

The L.C.C. Trade School for Girls, Bloomsbury, for the session, 1909-10 (173 students), cost per head, gross £21.2s.6d.; net, £14.8s., as follows:—

RECEIPTS.		EXPENDITURE.	
	£		£
Sale of materials.....	164	Equipment.....	29
Fees.....	63	Materials.....	523
Stock in hand (estimated).....	160	Salaries.....	1,829
Grant (estimated).....	685	Other expenses.....	79
		Scholarships (85).....	876
		Establishment charges (not including loan charges on buildings).....	318
	<hr/>		<hr/>
	£1,072		£3,654

#### POLYTECHNICS TOO BIG FOR EFFICIENCY.

Mr. Blair's view is that the big Polytechnics have become just a little too big, and if they contain Schools of Engineering, Printing, Bookbinding, Building, etc., he thinks the interests of one school often have to give way to the interests of the whole, and that it is really better to have those schools taken out and managed separately. The Principal of a Monotechnic drives his school harder than can a Polytechnic Principal, yet the latter is the one who ought to push what Mr. Blair calls the commercial-traveller work between the schools and the firms, so as to have the two related. He believes that even the Universities are now trying to push a closer relationship with commerce and industry, and probably before long there will be a Bureau established in London with a man whose business it will be to see what is going on in all the industries.

#### LONDON COUNTY COUNCIL ORGANIZATION.

Mr. Blair gave an interesting sketch of the London County Council's organization for education.

The Council has 137 members, with Committees on Education, Finance, Highways, etc.; Education is so big, compared with the rest of the Council's work, that it is one half. The Education Committee consists of 50 members, 38 of whom are members of the Council and 12 are co-opted members—people selected from the outside to represent various phases of education; but the co-opted member is not a member of the Council, and when the Education Committee goes to the Council it is only 38 strong, whereas the Education Committee

SESSIONAL PAPER No. 191d

in committee is 50 strong. The Council itself co-opts, on the recommendation of the Education Committee; but the co-opted member has not any powers on the Council. The members of the Council have to stand the racket of the general election, and they have important functions to fill. The Education Committee of 50 members meets once a week, the press and public being present; and its business is conducted more or less like the business of the Council—formal debate, formal management, etc.; in fact if it were not done formally they could never get through it. Then about 10 sub-committees meet every week to deal with Elementary Education, Secondary Education, Books and Appliances, etc. The committees are formed largely of members of the Council, and partly of co-opted members. The sub-committee meeting will last on an average two or three hours. These men are not paid at all. Some people of leisure and some means give twenty and thirty hours per week to the work of education; they like the work, and they devote their whole time to it. There are gains and losses that way. The people who devote their whole leisure to education are educationists. It is a good thing to have men to deal with education finance who are probably directors of banks, railway companies, etc.

It is a mistake when education gets away from life, and gets a place all by itself; it needs to be related to all phases of the community life. Some people in London are very anxious to have an *ad hoc* body specially elected for education. Mr. Blair thought that would be a mistake. The Council is growing so large that it will be like Parliament; but on the estimates every year they can debate any subject they like; and throw their influence on to those subjects. The Education Committee meets in public, but the main work is done in sub-committees, and sections of sub-committees.

The Elementary School has a statutory body of managers, selected partly by the Council and partly by the boroughs of London, of which there are 29 inside the county area. These boroughs have separate powers for certain things, but no power over education except to elect certain managers for individual Elementary Schools. It is not a very happy arrangement.

The numbers on a Board of Managers are usually a multiple of 3 to 9. Their powers in connection with the school are on the whole not large. They call for repairs and for things to be done on the schools. The architect reports on them, and they come through the architect's report to the Building Committee, which looks after the buildings as a whole.

#### IMPORTANT WORK OF CARE COMMITTEE

The Care Committee has activities, such as getting the child placed well, looking after the scholarships, and saying "Now, you must do this and that," and and if the children are bad, looking after them. Those Committees are nominated part by the management and part by the Council. Those six Managers nominate two. Managers can nominate another two from the list, and the central Care Committee nominates others.

If a child is neglected the Committee does not bring the child before the Council, but can prosecute before the magistrate in respect to neglect in feeding

3 GEORGE V., A. 1913

or medical treatment, or being left wandering in the street, or not being clean. There are four kinds of prosecutions that the Board is engaged in almost daily-- for non-attendance at school there are probably 10,000 to 15,000 prosecutions a year, most of them successful, and the school-going habit has become a good one in London now—91% of the roll is present every day in our schools, and in some places it is up to 96 or 97 in Elementary Schools. When you have 91% of your roll in school you have got about to the limit.

Under the Children's Act there may be a prosecution for neglect for want of food, or neglect in allowing the child to run about the streets at night, and so on. Those are not yet very numerous. Under that Act if the Council thinks the parent ought to pay for the child's food, he can be prosecuted for it. First there is a demand made on him, and if not complied with he is prosecuted. Prosecutions have been fairly successful. There is a fixed price for each meal, say 8 meals at 1½d. each, and the bill is sent in for a shilling. If the parent is known to be in good work he is sued for the payment; in case of poverty from illness or other causes the Board meets that without any prosecution. Then the same in regard to medical treatment. For medical treatment there is a charge. The treatment is obtained; sometimes it is pretty costly, but on the average it costs about 5s. per case, and if the Council thinks the parent ought to pay, he is sued. It does not come often. Suing in respect of feeding and medical treatment has been so much labor that one wonders whether the moral effects secured are worth all the trouble, and the Council or Parliament will likely do away with the charge, which is really a block in the way of getting medical treatment.

## CHAPTER V: TYPES OF INSTITUTIONS IN LONDON.

### SECTION 1: CENTRAL SCHOOLS IN LONDON.

In addition to the Elementary Schools which supply the usual type of general education the London County Council has organized a number of Central Schools with a view to providing for those boys and girls who are to stay at school till over 15 years of age an education which, while being general, will have a commercial or an industrial bias. It is proposed that there should be about 60 such schools, and that they should as far as practicable be distributed uniformly throughout London. The pupils are selected from the ordinary schools when between the ages of 11 and 12, and are chosen partly on the results of a competition for scholarships and partly on the results of interviews with the head-teachers and Managers. A limited number of bursaries or scholarships tenable from the age of 14 to about 15½ are awarded to those pupils who need financial assistance to enable them to stay at school beyond 14. These schools are distinguished from the ordinary Elementary Schools by the fact that the pupils are selected and go through a complete four years course with a special curriculum. They are also distinguished from the Secondary Schools by the fact that they are Public Elementary Schools providing free education, and that the curriculum is framed with a view to enable pupils leaving school at the age of 15 to be in a better position to earn their living. The total number of Central Schools that had been organized up to 1911 was 39. Of these 13 have an industrial bias, 13 a commercial bias, and 13 a bias both industrial and commercial.

The Commission understood that it was the intention, when the Central School scheme is in full operation, to have the schools reserved only for pupils over 11 years of age.

The Commission visited a number of typical Central Schools, The following are notes of some of the features suggestive or instructive for Canada:—

#### WEST SQUARE CENTRAL SCHOOL.

This is a school for boys and girls. It is a centre with an industrial bias. About half of the whole time was given to practical or manipulative work, including Drawing. Out of 10 sessions per week 1½ were devoted to work at benches in the workshop. The bench work was with wood only. The Principal of the school would prefer wood-working during two years, and then wood and ironworking concurrently during two years.

3 GEORGE V., A. 1913

The courses of study are grouped under several divisions, namely, Industrial History, Economic Geography, English, Mathematics, Handicrafts, Drawing. These are all closely correlated. For example, in the wood-working department the boys make the apparatus required in the science laboratory. The school is situated in a working district and is specialized towards industrial life. Other Central Schools at the differentiation period give both commercial and industrial instruction. This school leaves out the commercial. The Commission received a volume containing a statement of the schemes of work in detail, and illustrated by the pupils. It is a matter of some regret that space cannot be found for a representation of this document. Several hundred drawings illustrate the general syllabus for science, handicrafts and drawing.

### INDUSTRIAL HISTORY.

In the division of Industrial History, the following brief statements are given as illustrations of the syllabus:—

*First year's Course: General Scheme:* Outlines of general history 1066—1485, with special reference to the Doomsday Book and the Feudal system; origin and growth of towns and guilds; economic effects of the Feudal system; agriculture, the principal industries, manufactures and trades, England's monopoly of wool, the effect of the Crusades on foreign trade; the Black Death and its economic results; the Peasants revolt of 1381, and the subsequent conditions of the people at the close of the Middle Ages, 1472.

Then follow details of the syllabus and the mention of reference books.

*Second year's Course: General Scheme:* Outlines of general history 1485-1689 with special reference to trade and industries and the conditions under which the people lived; the conditions prevailing at the close of the Middle Ages and the great changes arising from the Wars of the Roses; the rapid growth of foreign trade owing to colonization; the increase of the mercantile classes and the revival of learning.

Then follow detailed particulars with mention of reference books.

*Third year's Course: General Scheme:* Outlines of general history 1689-1820, with reference to the "Bloodless Revolution" and its effects on industry and trade; the rising power of the Trading Classes; the acquisition of colonies and dependencies and the expansion of foreign and colonial trade; the transition from the domestic system of industry to the establishment of factories; the age of inventions.

Then follow detailed particulars with mention of reference books.

*Fourth year's Course: General Scheme:* Outlines of general history 1820 to the present time, with special reference to the industrial progress of the nation; the improved means of transit internally and with colonial and foreign ports; introduction of penny postage and the electric telegraph; the growing power of the industrial classes and organization; the general reform of social conditions; local government and extension of self government to the colonies.

Then follow details of the syllabus with mention of books for reference.

### DRAWING.

In the division of drawing, free drawing and mechanical drawing are carried on concurrently during the whole of the four years. Free drawing from nature in the form of stems, leaves, flowers and shells goes practically hand in hand with mechanical drawing. In the fourth year the free drawing takes up the application of the forms of stems, leaves, flowers and shells to simple design, while the mechanical drawing goes as far as simple mechanical drawing as applied to machine construction, with Isometric drawing as applied to technical work.

A serious effort is made to shape the instruction so as to qualify the boys for the industrial life of the district. No attempt is made to qualify them



SESSIONAL PAPER No. 191d

directly for the trades, but rather to give them a degree of familiarity with tools in general, besides the scientific elementary principles applicable to all trades.

Similarly girls are trained so as to be fitted for home-life. The girls' courses cover cooking, laundry, housewifery or house-keeping, dressmaking, needlework, or embroidery, and preparation was being made for the introduction of millinery.

#### CHILDERLEY STREET SCHOOL.

A detailed course of study was also obtained from the Childerley Street Central School. It is somewhat different from that of West Square Central School, and was framed to meet the conditions of working and living in its area.

At the Childerley Street School the children are drawn from 17 other schools between the ages of 11 and 12. The Commission was impressed by the evident interest of the boys and girls in their work. As a case in point, upon entering a drawing room where 25 boys were at work, instead of the presence of the Commission creating distraction there was only a casual glance of observation, then every boy went intently on with his work.

#### OTHER CENTRAL SCHOOLS.

Other Central Schools were visited. A volume would be required to contain particulars regarding all the good work carried on at them. The Commission was impressed by the enthusiasm, native ability, alertness and educational experience of the Headmasters and the Headmistresses.

Physical drill and music were in evidence, with boys singing what appeared to be difficult music in excellent harmony. Boys between 9 and 10 drilled with a precision of movement that was quite remarkable. In the physical drill of the girls more attention was directed towards grace of movement as illustrated in simple dances.

From one of the Central Schools it is reported that 70% of the boys enter industrial work. The Headmasters are in touch with employers and do their best to place every boy in a situation on the completion of his course.

## SECTION 2: CENTRAL SCHOOLS—EVENING WORK.

#### HUGH MYDDELTON SCHOOL (Clerkenwell).

At this school classes are held every evening except Saturday, attended by 400 to 500 students. The building is also used for social meetings, concerts, boys' brigade, and for Sunday School.

The Subjects covered in the Evening Classes are Mathematics, Book-keeping, Commercial subjects, English, French, German, Irish, Latin, History, Italian, Spanish, Welsh, Shorthand, Typewriting, Business Management, Economics, Art, Art (Teachers' Class), and Literature Lectures.

Organized courses of study are arranged, and pupils strongly urged to take a complete course instead of isolated subjects. No student under 18 is enrolled except for a complete course.

The teachers receive 7s.6d. per evening for ordinary subjects, 10s. 6d. for Languages, Law, and more advanced subjects. Some of them teach day classes under the London County Council; others are in business during the day.

There are no fixed entrance conditions, age and suitability being the only tests.

The School does nothing directly to find employment for pupils, but its certificate is a help to securing work. Chamber of Commerce pupils are referred to that body. Masters interest themselves in special cases.

The attendance is largely affected by overtime work.

The fees are small, being 2s.6d. a session for students over 16; 1s.6d. for those under 16, for one or more subjects; a charge of 5s. and 2s. 6d. respectively being made for Art. Fees may be remitted in special cases.

Pupils are prepared for various public examinations, the Civil Service, etc.

#### BARRETT STREET EVENING COMMERCIAL SCHOOL, (OXFORD STREET, LONDON, W.)

This School has an average attendance of 250 pupils a night for 5 nights a week from September to Christmas; after Christmas, 200. It originated under the old School Board, at the request of employers, some of whom had previously subsidized commercial classes. It has been in existence about 10 years, and is supported by grants from the London County Council and by fees, the latter being merely nominal, viz. 2s. 6d. per session for pupils over 16 and 1s. 6d. for those under that age.

The School is self-contained. The entrance requirement is the 7th Standard of an Elementary School. The staff prepare the curriculum to meet the needs of the neighbourhood, which is the central shopping district, occupied by large drapery and furniture establishments. The employers of the district encourage their employes to attend. The majority of the students are engaged in stores and offices, banks, etc., their ages being 20 to 30. The teachers are drawn from men engaged in office work, the instruction being entirely of a commercial nature. Each teacher is a specialist in his own department. The head of the establishment is an Elementary School teacher, and prepares the curricula after conference with the staff. Textbooks are furnished to the students by the L.C.C. at the lowest possible prices, and stationery is provided free.

The building is used as an Elementary Day School, and the equipment is supplemented for Evening Classes by special desks and seats. The caretaker is paid extra for evening work.

The teachers receive from 7s. 6d. to 10s. 6d. per night, according to subject, teaching  $2\frac{3}{4}$  hours each night. Teachers must hold recognized certificates.

Students may compete with other London schools for 10 scholarships, tenable at the London School of Economics. The L.C.C. also give prizes in

SESSIONAL PAPER No. 191d

the form of books. At the time of the Commission's visit there were 400 entrants for examination, of whom the responsible master expected three-quarters to pass.

The lessons are adapted to the requirements of students; Shorthand, Languages, etc., being given in the phraseology of the student's business. There is a Russian class for employes of firms doing business with Russia. One new subject is added each year. In 1910-11 English classes for foreigners were established.

The Vocal Class is affiliated with the Night School Choral Union, the music being supplied at cheap rates by the L.C.C.

WILLIAM STREET SCIENCE AND ART AND COMMERCIAL CENTRE (LONDON, W.)

This school has Evening Classes. It is also under the L.C.C., and run on similar lines to the foregoing. The district being chiefly commercial, the instruction is given on these lines. Teachers' Classes are held in Art, Care of Children, etc., for teachers living near by.

The school aims to carry on the work begun in the ordinary Evening Schools of the district, and to prepare for Polytechnics and Art Schools; also for Teachers' Certificates in the Sections of Art, Science, First Aid, Home Nursing and Infant Care.

The Courses of Study are commercial and literary, students being urged to take complete courses, and those under 18 are obliged to do so.

The teachers are trained and certificated, and usually specially qualified. The Art instructors are teachers from the Council Day Schools. For special subjects such as languages, specially qualified people are chosen, not necessarily trained teachers—*e.g.*, a barrister lectures on Commercial Law, a doctor on First Aid, etc. The Shorthand teacher holds a gold medal for highest speed in Pitman's shorthand competition. The responsible master's salary is fixed; the other teachers are paid by the lesson.

The entrance requirement is a good general education, students under 16 being taken only if their previous training is adequate.

A few social gatherings, dances, etc., are held during the session.

The fee is 2s. 6d. per session, 1s. 6d. for pupils under 18.

### SECTION 3: BOROUGH POLYTECHNIC INSTITUTE.

There are 3,000 students in attendance; 4,000 students and members used the building last year. The neighbourhood (Borough Road) is one of the poorest in London.

Boys must have passed the 6th standard (about 12 years of age); but half of them cannot read a passage in any standard author such as Scott, Dickens, etc., and understand it. This is because of the large classes and largely mechanical teaching. Here history and geography are taught industrially—work and wages; literature as taught means not grammatical analysis but a love of

literature—ability to grasp the story. Language is taught by the direct method—phonetics.

Principal Millis expressed the opinion that there is a good deal in the atmosphere of the school in which a boy works, and this atmosphere is governed largely by the equipment and by the style of the men under whom he works. As boys are leaving, these men, who have worked in shops and have scientific knowledge applicable to the trade, can talk in a general way and plan out the work, and use influence outside in getting boys into work. There are various ways in which a piece of metal can be worked, and a boy at once gains the sympathy of men in the shop and inspires confidence in employers and firms by the way he handles metal, and the method he shows in the work. About the age of 16 boys go into occupations by various conditions—physique, deftness for mathematical instruments, etc.

#### PLACING BOYS AND GIRLS.

Mr. Millis stated that it was difficult to get boys into employment, due to the fact that the employers could get boys from the Elementary School. No boys were admitted to this Polytechnic unless they intended to take the full three years' course and afterwards follow some mechanical or industrial pursuit. At the end of that course a list of the boys who are leaving is sent out to various firms engaged in those trades for which the boys are trained, giving particulars of each boy's work, both theoretical and practical, with remarks as to his general character. An Advisory Committee connected with each trade acts with the object of linking up the education given in the school with the industrial activities of the neighbourhood. Of the 30 boys who left the day school in July, 1910, 16 obtained employment directly through the school influence; 2 went to Technical Colleges, and the remainder found work either through the influence of their parents or by the help of other agencies such as District Apprenticeship Committees.

In the Girls' School they have Waistcoat-making, Ladies' Tailoring, Dress-making, Upholstering, and Laundry. Girls come at age 14 to 16; 20 hours out of the 30 are devoted to actual trade work; the other 10 hours for general education, Physical Drill, History, Drawing and Art. Girls are employed at high wages before their time is up. Girls' trades are not so highly organized, and the employers are wanting them. The aim is to give a good all-round training. Girls get an average of 8s. to 10s. and sometimes 10s. to 17s. a week.

Girls are not trained here for domestic service, but the intention is to train young women as first-class cooks. Mr. Millis believes the cure of snobbishness which leads girls into clerking and as ordinary English typists, is to be found in the trade classes.

#### SOCIAL VALUE OF THESE SCHOOLS.

Principal Millis, who has been in educational work for 33 years, thinks that many of our social problems will be cured by having Trade Classes from which properly trained young people can be sent into every trade. He also

SESSIONAL PAPER No. 191d

believes that the educational work of the Technical Institute, whether Trade or Evening School, is one of the greatest temperance organizations to be found, without saying one word about temperance. On these grounds alone they are worth all the money that is spent on them, for it is known that all the pupils will be better men and women. The workers and people connected with temperance organizations know that the changes have been enormous amongst the actual workmen; they are much more temperate. These schools get the more thoughtful people in all the trades; people see that the man who works with his hands is as "good" as the one who works with his pen. The improvement in physique has been marvellous; hence social conditions are being improved.

#### AIM OF THIS INSTITUTE.

The Borough Polytechnic was founded in 1892 to provide, in the first place, sound technical instruction for young men and women engaged in various trades and industries in the district of Central South London. It must be specially noted that this instruction is designed, not to *supersede*, but to *supplement*, the training of the workshop or other place of business.

The secondary object of the Institute is to promote general knowledge by means of classes in arts and crafts, higher commercial subjects, languages, domestic economy, music, etc.

Lastly, the Institute does much to facilitate social intercourse amongst its students. Membership of the Institute carries with it certain privileges, and healthy recreation and amusement is afforded by its various Clubs and Societies.

The income of the Institute is chiefly derived from grants made by the following bodies:—London County Council, Board of Education, Central Governing Body, Governors of Herold's Foundation, Trustees of St. Mary Newington, National Association of Master Bakers and Confectioners, London Master Bakers' Protection Society, and Trustees of St. Olave and St. John, Southwark.

#### *Day and Evening Classes.*

The work of the Institute is divided into two branches: (1) Day Schools and Classes, (2) Evening Classes.

*Day Schools and Classes.*—Under this head are comprised—

1. Trade School for Girls to teach a skilled trade (Waistcoat-making, Ladies' Tailoring, Dressmaking, Upholstery, or Laundry work), and to continue General Education; two years course; age 14 to 16.
2. Domestic Economy School for Girls (Cookery, Needlework, Laundry-work, Housewifery, Drawing, and Physical Exercises.)
3. Technical Day School for Boys (Mechanical Drawing, Chemistry, Physics, Use of Wood and Metal-Working Tools, and English subjects).
4. The "National" School of Bakery and Confectionery.
5. Music Classes for Boys and Girls.

*Evening Classes.*—The following are the main Departments:—

1. Special Trade Classes (for Engineers, Metal Plate Workers, Bricklayers, Masons, Carpenters, Plumbers, Tailors, Boot and Shoe Makers, Printers, Bookbinders, Wheelwrights, Varnish and Colour Makers, Bakers and Confectioners).
2. Engineering and Building Trades Department (Practical Geometry, Machine Construction, Applied Mechanics, Heat Engines, Practical Mathematics, Building Construction, Builders' Quantities, Motor-car Designing and Construction).
3. Chemistry (Organic, Inorganic and Electro-chemistry).
4. Electrical Department (Magnetism and Electricity, Electrotechnics, Electric Lighting, Wiremen's Work, etc.).
5. Other Science Classes (Mathematics, Physiology and Hygiene.)
6. Arts and Crafts (Modelling, Design, etc.).
7. Women's Technical and Domestic Economy Classes (Millinery, Dress-making, Embroidery, Cookery, Needlework, Sick Nursing, etc.).
8. Higher Commercial and General Classes (Languages, Commercial Law, Economics, Banking and Currency, Machinery of Business, Accountancy, etc.).
9. Music and Elocution Classes (Pianoforte, Violin, Singing, Elocution).
10. Special Trade Classes. These are intended only for those actually working at the respective trades, and other students are not admitted.

Students are required to attend the theoretical as well as the practical classes.

In certain Trade Classes (Engineering, Brass-finishing, Pattern-making, etc.) where practical instruction only is given, students are required to attend a Drawing or Mathematics class, to which they are admitted at a reduced fee. No student is admitted to the practical class who does not fulfil this condition.

Students joining Trade Classes are admitted to any of the Science and Art classes at half-fees.

Apprentices and others under 21 years of age are admitted to any particular Trade Class at half fees on production of a letter from their employer or foreman stating that they are actually working at that trade.

This is only one of many Polytechnic Institutes in London, and only the main features of this one are stated here. The announcements of the Courses of Study of these Institutes run to hundreds of pages, and are worthy of study in detail by principals and teachers of Technical Schools and Institutes in Canada.

SESSIONAL PAPER No. 191d

## SECTION 4: THE NATIONAL SCHOOL OF BAKERY AND CONFECTIONERY.

As an example of a "Specialized School" for a particular trade the following full statement is given of the above named school:—

### NAME AND AIM.

The National School of Bakery and Confectionery at the Borough Polytechnic Institute, was established to promote industrial skill in the Bakery trade, and by sound instruction in the scientific principles underlying the trade to raise the status and skill of the worker.

### HISTORY.

The School came of small beginnings. A class in bread-making for evening students was started at the Institute in 1904 in a part of the Cookery School fitted up with necessary portable oven and other fittings. The class was inaugurated at a public meeting of the trade, and the first course had an average attendance of 66 students, notwithstanding that it was carried on under great difficulties by reason of the absence of proper accommodation for practical work. The Instructor of the class, Mr. John Blandy, was a well-known master baker who had worked hard and enthusiastically for years in the cause of Technical education for the bakery trade. The one class quickly grew to five classes and the work proved so successful that a special bakery was built in 1898, the cost of the equipment, over £700, being defrayed by a grant from the Technical Education Board of the London County Council. To mark its opening as a special department of the Institute, an influential meeting of over 200 master bakers and others connected with the trade was held. The report of the meeting in the Trade Press attracted a good deal of attention, and the National Association of Master Bakers and Confectioners showed their interest in the work by offering to co-operate with the Governors of the Borough Polytechnic in providing Technical Instruction for those engaged in the trade. As a result of this co-operation the "National" School of Bakery and Confectionery was founded in 1899 with day and evening departments.

### FINANCE.

The National Association of Master Bakers and Confectioners contributes up to £500 a year, as required, towards the upkeep of the School; the London Master Bakers' Protection Society has for some years made an annual grant of £50 to the School, and leading firms in the allied trades make gifts in kind to the value of about £200 a year. For the year ending July, 1909, the

3 GEORGE V., A. 1913

cost of the School, exclusive of establishment charges, heating, &c., was £1,416. The revenue account is as follows:—

<i>Income.</i>			
Grants:—	£	s.	d.
National Association.....	300	0	0
London Master Bakers.....	50	0	0
Gifts and Materials.....	242	6	6
Governors of the Borough Polytechnic (exclusive of Lighting, Heating, &c.).....	60	0	0
	652 6 6		
Fees.....	402	0	0
Sales, &c.....	286	5	9
London County Council and Van Marken Scholarships.....	71	9	8
Sundries.....	6	4	0
	£ 1,418 5 11		
<i>Expenditure.</i>			
	£	s.	d.
Salaries and Wages.....	576	7	6
Class, Materials, Printing, Advertising, &c.....	754	7	6
Special Equipment and Alterations.....	135	10	9
	£ 1,486 5 9		

#### BUILDINGS.

The special bakery built in 1898 was used for both bread-making and Confectionery, and this was very inconvenient, especially when the number of students began to increase, and in 1902 a further extension was built at a cost of about £3,000 towards which the London County Council made a grant of £1,750, and the National Association of Master Bakers and Confectioners gave £250 and made itself responsible for the equipment of the whole of the new building. This extension gave a new bakery which could be devoted entirely to bread-making, and the existing room was reserved specially for the confectionery side, provision was also made for a lecture room and store room. Under these satisfactory conditions the work continued to flourish and the question of further accommodation became necessary. In 1908 by means of a gift of over £5,000 from Mr. Edric Bayley, and a grant from the London County Council, the Governors were able to make valuable extensions to the buildings, which included the remodelling of the Bakery School accommodation by the erection of a large lecture room and laboratory, and by increasing the accommodation of the bakery and confectionery rooms, the National Association providing the additional equipment. The accommodation possessed by the School is two large rooms for confectionery, one large room for bread-making and an extensive lecture room and laboratory; in addition the students use the classrooms and art rooms of the Polytechnic for their special instruction in Drawing and Modelling. The equipment of the bakery consists of a large draw-plate oven, and a Peel oven in the bread-making room; and in the confectionery a large double decker oven and an extensive collection of all the modern machinery for bread-making and confectionery. There is accommodation and the usual equipment for more than 50 students at one time both in the laboratory and in the bakehouse.



SESSIONAL PAPER No. 191d

CURRICULUM AND TIME TABLE.

The full time Day Courses extend over two years and the number of individual Day Students attending for the last three Sessions are as follows:—1908, 54; 1909, 45; 1910, 51.

The instruction which all students must follow, includes Bread-making, Confectionery, Drawing and Modelling, Chemistry and Physics. The Session covers a period of about nine months, and the School is open for 33 hours per week. The fee for the Session is £7 7s.

TIME TABLE.

*Elementary.*

	9—10.	10—12.30.	2.0—4.0.
Monday.....		Icing and Piping.....	Confectionery.
Tuesday.....	Lecture on Confectionery.....	Bread.....	Bread.
Wednesday.....	Drawing and Modelling.....	Confectionery.....	Icing and Piping.
Thursday.....	Chemistry.....	Physics.....	Small Breads.
Friday.....	Drawing and Modelling.....	Bread.....	Bread.
Saturday.....	Confectionery.....	Confectionery.....	

*Advanced.*

	9—10.	10—12.30.	2.0—4.0.
Monday.....		Rolls, &c.....	Rolls, &c.
Tuesday.....	Drawing and Modelling.....	Confectionery.....	Confectionery.
Wednesday.....	Applied Chemistry.....	Bread.....	Bread.
Thursday.....	Drawing and Modelling.....	Icing and Piping.....	Confectionery.
Friday.....	Confectionery.....	Marzipan Work.....	Confectionery.
Saturday.....	Bread.....	Bread.....	

From the time table it would appear that very little attention is paid to the scientific side of bread-making, but this is not so, for whilst waiting for the fermentation processes during the time shown for bread-making the necessary Chemistry and Physics required for the technical course and a number of laboratory experiments are carried on: special laboratory note books have been drawn up for this purpose.

Evening Classes in bread-making and confectionery are held at the School, but are not dealt with in this Report. The number of individual students attending the Evening Classes for the past three Sessions is as follows:—

	1908	1909	1910
Evening Students.....	143	121	206

STAFF AND COMMITTEE.

The School is managed by a Committee appointed by the National Association of Master Bakers and Confectioners, the Chairman and Principal of the Polytechnic being *ex officio* members. The Committee superintends the working arrangements of the School and advises the Governors on all important matters connected with the management and equipment of the School, and the appoint-

ment of teachers. The School is staffed by an expert confectioner of wide experience and by an expert in bread-making possessing not only considerable trade experience but a good knowledge of the scientific side of the trade; the services of the Art Master of the Polytechnic are obtained for the Drawing and Modelling.

#### RESULTS OF TRAINING.

The School being under direct trade management, its work is always kept on trade lines. The students who are mostly master-bakers' sons are able to apply the knowledge they gain in the School in their fathers' businesses, and the few who do require situations have no difficulty in obtaining them.

#### OPINIONS OF EMPLOYERS.

That the work of the School is appreciated is shown by the fact that its fame has spread to all parts of the world, and a few students have come from Canada, New Zealand, South Africa, and Holland, to attend the classes. The large number of day students is maintained year after year, and demands for lectures from the teachers of the School are frequently received from the provinces. The annual grants from the National Association of Master Bakers and Confectioners and the London Master Bakers' Protection Society may be taken as very conclusive evidence that the work is being carried on to the satisfaction of the trade.

### SECTION 5: THE SCHOOL OF BUILDING (BRIXTON).

This school is one of the Monotechnics. It was opened in 1908. The following statement as presented by Mr. R. Blair, Chief Education Officer of London, to the Imperial Education Conference is fuller and better than the notes of the Commission.

(1) The prospectus states that "a Day School for boys has been established at this Institution, with the object of providing a sound scientific and technical training for boys preparing to enter the Building Trades and allied vocations."

Although it has not been suggested that this training should in all cases replace apprenticeship, the instruction given is that which modern conditions render almost impossible save at such an Institution as this. In the case of boys whose parents are able to maintain and pay a premium for them, apprenticeship for a reduced period may follow at the termination of the three years' course. On the other hand, boys of poorer parents entering the trades or becoming draughtsmen, clerks in builders' and surveyors' offices, etc., are at the completion of their course in a position to commence work as apprentices or learners with much more advantage both to themselves and their employers than boys securing such appointments immediately upon leaving the ordinary schools. The whole of the training is preliminary, and should be continued at Evening Classes in the Council's institutes or polytechnics.

SESSIONAL PAPER No. 191d

(2) The course is for three years, and admission to the School is restricted to boys between 13 and 15 years of age on the 31st July of the year in which they enter the school and who have passed the sixth standard of an Elementary School or its equivalent.

The curriculum, which is common to all students during the first year, and which is looked upon as a probationary period, includes Building Construction, Workshop Practice, Study of Materials, Workshop Arithmetic and Mathematics, Experimental Science, Geometrical and Plan Drawing and Lettering, Freehand Drawing of Building Details, English Literature, History, with special reference to industrial changes and the development of public and domestic architecture, Geography, with special reference to building materials, English Composition, and Business Correspondence. Briefly this is—

8	hours	per	week	Workshop	Practice	(General);
6	"	"	"	Technical	and	Drawing
10	"	"	"	English,	Mathematics,	and
4	"	"	"	Elementary	Science;	
2	"	"	"	Physical	Instruction.	

At the end of the first year the Principal advises the parents of the boys attending the School as to the most suitable vocation or craft to select for their sons; this recommendation is based upon any special aptitude shown during the first year; reports from the masters; the character of the boy; and the position of the parents.

In the second and third years the courses are divided into two main sections: (a) the Artisan Course for Bricklayers, Carpenters, Masons, Plumbers, Painters, etc.; (b) the Higher Course for Architects, Builders, and Surveyors. During these two years the instruction in Building Construction for all students is of a more advanced character, and the general Elementary Science with reference to building materials and Mechanics of Building is more directly applied. Pupils taking the Artisan Course specialise in the trade which they intend to follow. The pupils in the Higher Course receive weekly instruction in the various trades in rotation, and Builders' Quantities, Architectural Drawing, and Land Surveying are added to the curriculum.

In the second year—

10	hours	per	week	are	devoted	to	the	specialised	instruction.
6	"	"	"	to	Technical	and	Drawing	Office	work;
4	"	"	"	"	Elementary	Science;			
8	"	"	"	"	English,	Mathematics	and	Art	applied
2	"	"	"	"	Physical	Instruction.			

In the third year—

15	hours	per	week	are	devoted	to	the	specialized	instruction;
5	"	"	"	to	Technical	and	Drawing	Office	work;
4	"	"	"	"	Science;				
4	"	"	"	"	English,	Mathematics	and	Art	applied
2	"	"	"	"	Physical	Instruction.			

(3) Towards the end of the third year, as opportunities arise, the most suitable are placed. Up to the present this has been done particularly satisfactorily direct from the School. The Principal is of opinion that it is undesirable to insist on the completion of the full term of three years, as it would be extremely difficult to place, or assist in placing, say groups of 50 boys leaving simultaneously.

The nature of the School draws students from all over London, and in order to meet the needs of the boys there has been provided a cheap plain midday meal, consisting of hot meat, two vegetables and pudding for which 4d. is charged per boy, and in the case of cold meat, vegetables and pudding, 3½d. per boy.

The workshop instruction is of such a nature as to render frequent bathing a necessity. A range of six shower baths forms part of the school equipment: the great demand for their use is an instance of their necessity, and speaks for their popularity. Personal hygiene is regarded as part of the training towards good citizenship. It is hoped that this love of cleanliness, and generally a high ideal of self-respect, may be continued in after life.

As a protection to clothing, the wearing of white overalls is insisted upon in all workshops.

Finally, wherever the instruction permits, such as in the workshops, drawing offices, etc., the conditions and type of work as nearly as possible approach those obtaining in builders' shops, architects' and surveyors' offices, etc. The instructors for this part of the work are drawn from the ranks of first-class craftsmen who have had broad experience in shops, offices, etc., and who, therefore, are in a position to appreciate the condition prevailing in the commercial work.

SESSIONAL PAPER No. 191d

## CHAPTER VI: TWO IMPERIAL INSTITUTIONS.

### SECTION 1: IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY, LONDON.

*Information obtained in "Conversation" with SIR ALBERT KEOGH, Rector, SIR EDWARD THORPE, Professors PERRY, CALLENDAR, ROBERTSON, FARMER and MACBRIDE, at the Imperial College of Science and Technology, London.*

The Imperial College of Science and Technology consists of three institutions—the old Royal College of Science, the Royal School of Mines, and the City and Guilds Engineering College, formerly known as the Central Technical College. These three institutions were, in a sense, independent of one another. The Royal Colleges of Science and Mines were for many years run by the Education Department, the former having been begun as part of the old Science and Art Department. Four years ago a general feeling existed that these institutions—certainly two of them—were ceasing to fill the objects for which they were founded; that they did not progress with the general spirit of the country, inasmuch as, while they were on rather old lines, the new Provincial institutions and other schools had arisen and had met with a great measure of success. Accordingly a Committee of eminent men engaged in education—some of them the best known names in England—was convened by the Minister of Education, and brought in a report, the general meaning of which was that the relation between Science and the industries in Great Britain had never been very well established; that, as a consequence, industries were falling behind, having lost a great deal of way which they formerly had—the great object-lesson being Germany; and that this Imperial College ought to be founded.

#### AN IMPERIAL IDEA.

The Imperial part of the idea was to have a College that would provide for the higher scientific objects of the whole Empire. It is a very ambitious project, and if ever realized, must take many years. It was thought that this College should be the centre about which all the great scientific and technical interests of the Empire would revolve. Though some people might consider this a very pious idea which could never be realized, Sir Albert Keogh thought it could, and indications within the past year showed that if the country is alive to its importance, the project can be fulfilled.

The idea was to have a central institution on the very highest scientific plane, to which the rest of the Empire would look, and to which the other institutions of the Empire would send students for special study of particular branches.

The other idea, which was perhaps the more businesslike and satisfactory, was that of binding these three colleges under one governing body and providing

the highest scientific training in the country in relation to industries. The feeling of the Committee, though not perhaps expressed in the Departmental Report, was that the industries of Britain were behind, not because of lack of men and organization, but because it was impossible to get the highest scientific education directed especially towards the requirements of the country's industries. On one hand the universities were training for degrees, and on the other the industries did not want college-bred men. The syllabuses were laid out by persons who had, perhaps, no knowledge of or connection with the industries, and statements were made that the people turned out were utterly useless to the manufacturers. As a broad general principle, industrial people rather fought shy of college-trained men. Sir Albert Keogh thought that this objection applied with less force to the South Kensington institutions than to any others in the country.

The College of Science was originally started mainly for teacher training, but the effect of the Departmental Committee Report was to turn it towards scientific training of individuals who were to become masters of industry.

#### BUILDINGS AND SCHOOLS.

The Royal College of Science consists of two buildings, one comprising accommodation and equipment for Mechanics, Mathematics, both branches of Biology, and some Metallurgy; the other providing for Chemistry and Physics.

The Engineering School of the Imperial College is the City and Guilds College, in Exhibition Road. The institution is remarkable in that it is the only one in the country to which entrance is competitive. The College is always full, and the number of applicants for admission is in excess of the number of vacancies. The entrance is by examination, which in character is rising in standard. It is probably one of the most successful engineering schools in the country.

The School of Mines, as a consequence of several very considerable donations from people interested in mining and metallurgy, has been partly reorganized and its courses of study improved quite equal to anything done elsewhere. Buildings are now being erected quite worthy of the important object. There has also been considerable increase in the size of the building, this work being under contract. In connection with the School of Mines and the Engineering School the amount being spent is £260,000.

Those are the three institutions of which the Imperial College consists, and the ideal is that the standard of admission into the College be gradually raised, so that only the very highest work will be done within its walls. It is hoped that in fulness of time graduates will come; that the Dominion of Canada will send its graduates to it instead of to Continental Europe for their higher studies. The College is to be developed in accordance with the requirements of Australia, Canada and other parts of the Empire.

#### ADMISSION AND TRAINING OF STUDENTS.

These institutions now receive boys not younger than 17, who have had a good Secondary Education, and excuse them from the first, second, or third year course in accordance with the standard they may have attained when they present themselves, their fitness to be excused from the early subjects being decided by the professor concerned. Diplomas are given in Mechanics and

SESSIONAL PAPER No. 191d

Mathematics, Chemistry and Physics and other sciences, Mining and Metallurgy, and both branches of Biology. The special feature of the institution is that the training is given to the student by the professor in such a manner as the latter thinks best adapted to make this boy of use to the industry. That is where it clashes with the University system. It is an open secret that this College does not quite see eye to eye, for instance, with the University of London; and many have feared that if the College were incorporated by the University, as some propose, the whole of this feature would be destroyed; because mining and mineralogical students would have to be trained in accordance with the syllabus laid down by the University of London instead of that laid down by the industrial people of the country.

The new system of training in the Mining School was established, not by University professors, but by people actually engaged in the mining industry; and a Board of Mining and Metallurgy is now being set up to advise from time to time as to the courses of the Imperial College and also, when they think proper, to examine the system of education in the College to ascertain whether in all its details it is such as will turn students into what the profession of mining requires. This is considered a very essential feature in this institution, and it is hoped that it will run through every branch of training in the College. That is marking a very considerable advance from the old system of learning science, under which teachers in training had to go through a very large number of subjects, perhaps not very definitely connected with one another, and had to go out to classes all day to learn certain things to teach to oher people.

#### TECHNOLOGY AND RESEARCH.

The Imperial College is a great technological college whose object is to give men technical professions; that is the object of the institution, and although it is a very slow process to break away from tradition in England, it is hoped that in the long run this end will be attained.

In addition to the educational training of youth mentioned, there are post-graduate courses, so-called because one thus best understands what is meant. Of course the College trains people who are not graduates. What it cares to know is whether, when they come to the most advanced courses, their training has been sufficient to enable them to profit by them. In that direction the Imperial College must develop primarily if it is ever to be really Imperial. It is hoped that its desire and power to serve will be recognized by other institutions both at home and abroad. The authorities are endeavoring to get as near as possible to the ideal position of a higher institution for research work, etc. Of course it will take a long time to attain the things sought.

#### SHOP TRAINING vs. FORMAL STUDIES.

In answer to a question as to whether there is an equivalent in mental discipline for developing powers of perception and clear thinking and good managing in the training obtained in shops compared with formal studies in classrooms, Sir Edward Thorpe said much depended on the individual, but his own impression was that a young man who has been at a good school is very much more plastic material; he knows how to learn in a much better way than the man who has

been going only to night classes and has scratched along as best he can. Of course there were many exceptions, and there was good in both.

Prof. Perry told how excellent the workshop boys were in Physics, which was his subject. He said the training of those men had been mechanical, and the difference in their favor was something enormous; but a full comparison cannot be made, because the College does not get those who come in from Secondary Schools who have also trade qualifications.

In reply to a question as to how the Imperial College expected to reach its high aim, although admitting so many young men who have not had even what may be called Junior Matriculation standing; Prof. Perry asked, "But is it necessary that a man should have these qualifications? If you are to have a general qualification, the university qualification is a good one; but surely you are not going to keep men out of the high posts in industries because they are not able to take a little Latin? We usually assume that if a man knows a little Latin, he has been to a good school; that is all; but you can have a bright man without even his knowing French. Of course he would not live long in Montreal or Quebec without knowing French, but we are pretty certain about this—that a man can become a very good engineer without being able to pass the University examination in Latin; in fact, some of us think such training as it implies is a disqualification."

Professor Farmer (Botany) said that his experience did not accord with Prof. Perry's. He thought these students who had a good general education did a great deal better, both with him and in after life, than those who had not. The kind of subjects which his students had to know were rather more multifarious than those required in engineering, and one important fact was that the conditions under which they work render it necessary for them to have access to the work of other nations; hence languages became more or less essential to them. Prof. Perry added, "The only sort of bar to a man's following any course of instruction is the bar of not understanding what the professor himself might say. If I find a man who has not enough previous knowledge to understand what I am going to talk to my students about, and use in my laboratories, he should not attend my course."

The Imperial College, in the three institutions, was attended by about 800 students.

## SECTION 2: THE UNIVERSITY OF LONDON.

In this Section the Commission confines itself to a brief statement of some of the points of information, likely to be useful for Canada, as obtained in 'Conversation' with Dr. Henry Alexander Miers, Principal of the University, and other gentlemen who kindly received the Commission.

The affairs of the University, in respect to the working of the present organization, are in a state of flux. A Royal Commission on University Education in London, which had the matter under inquiry and consideration during nearly three years, has presented its final Report. If the Report is acted upon in full, the University will have eight Faculties, viz.—Arts, Science, Technology, Economics, Medicine, Laws, Theology and Music; and the very wide and varied educational service by the University will be continued and extended.



SESSIONAL PAPER No. 191d

The teaching in Engineering, Mining and Metallurgy for the University goes on in many institutions. Most of the Engineering and Mining teaching in London of the higher sort, for instance, goes on at the Imperial College of Science and Technology. That is recognized as a school of the University; or in other words there are teachers on the staff of the College who are recognized by the University as University teachers, and whose students can therefore enter for the examinations for University degrees. The Academic Council of the University approves of courses of instruction given in the 31 Colleges and Schools of the University, otherwise the students at such Schools could not enter as internal students of the University.

In London the situation is complicated by the extraordinary degree system. Any student entered may pass the matriculation and the degree examinations without any attendance, except in the faculty of Medicine. It is still open for a student at any institution in London, or anywhere in the world, to enter himself as an external student and take the degree, no matter who may have been his teacher or teachers. The number of external students is increasing.

The University provides for the teaching and training of internal students over an area within a radius of thirty miles. There are always a number of students from the Polytechnics, at which there are teachers who are recognized by the University.

In the case of a Polytechnic where there is an advisory body composed of the manufacturers of the locality, if and when they approve of or desire a certain course, they are represented on the University Council that supervises the course at that particular institution. The Boards, which draw up the studies at the institutions, are often composed to a large extent of gentlemen other than teachers, so that the industries are very fully represented in the drawing up the syllabi for examinations.

The students do not require University matriculation for all the courses in the Polytechnics, as it has been found that a student has great difficulty in going back and getting up matriculation subjects. At the same time, the number of the City and Guilds students who qualify to take the University degree increases year after year; and the percentage of the students who take the University degree increases yearly.

Engineering is taught on a large scale not only at the Polytechnics but in University College and King's College.

Domestic Science subjects, by themselves, do not lead to a University degree or diploma.

The various institutions, Polytechnics and Colleges, have been gradually developing themselves, and only ten years ago an effort was made to coordinate these through the instrumentality of recognizing teachers and courses of study at all similar institutions. A Commission is now considering that organization.

The institutions in connection with the University for the training of teachers are: The London Day Training College, The Goldsmith's Institution, The University College, King's College, King's College for Women, The institution in the south of London for Anthropology, and about 13 institutions which are

called Schools of the University, where there is teaching for the degree of the University.

The examination papers for these institutions are set by examiners appointed by the Senate. The mode of appointing examiners is this. On the report of the Board of Studies two, or sometimes four, examiners are appointed for each study. These are for external students who are trying for a degree. There are other examiners for internal students, about seven or eight recognized teachers being appointed in addition to the four external examiners. Two examiners, generally one internal and one external, are told off to set each paper. When they have set the papers, they are submitted to the whole Board of the 11 or 12 Examiners for discussion and consideration and, after being approved they are printed and sent to the candidates. In the Faculties of Arts, Science, Mechanics and Engineering the internal and external examinations are separate. The only ones in which they are identical are Medicine, Law, Theology and Music. The University is bound by statute to try and make the standards of the two examinations the same.

The question of men who have had shop practice and who wish to go to a University to prepare for teaching industrial and technical classes has not come before the University Authorities as yet. The question is one of very considerable practical difficulty, because the kind of people that would be useful as teachers are the skilled persons who are snapped up by the employers. They are so valuable that the employers prefer them; therefore the demand on the part of the colleges for competent teachers, who have shop experience and teaching ability, is one which it is exceedingly difficult to supply.

The Board of Education has a system of national scholarships intended to meet this difficulty in England. It has been a means of bringing a very large number of men straight from the works to schools and colleges which have given them academic training.

The demand in Canada for this class of teachers is likely to be very much larger than the demand in England, where University Extension work to train foremen and other men, who already know the craft, into teaching ability and to make them competent for evening schools through literary assistance and training in the art of teaching as such, is being rapidly developed.

In connection with the London University alone there are 15 classes, each attended by about 30 working people who band themselves together to attend a certain course, and attend regularly during the session. Their desire is not to be transferred from their present work, but to get more knowledge, not particularly for teaching, for the sake of the intellectual and social benefits of University training. These people could be utilized as teachers for evening schools. The great difficulty in getting teachers who know the trade and shop conditions, and who also have enough general intellectual culture and ability to be good teachers, arises from the fact that such practical men often have not the faculty of expressing themselves. A common complaint is that boys learn so much at school that they do not learn to use their own language in writing and speaking. No teacher can be a successful teacher without knowing how to use his language.

## CHAPTER VII: MANCHESTER.

### SECTION 1: INTRODUCTORY.

The Municipal School of Technology represents the highest form of technical education offered in Manchester. It has day and evening departments, the total number of individual students amounting to 5,299, of whom about 300 attend the full-week day classes. In the evening department, group courses of study are arranged as follows:—General 1st year courses: Mechanical Engineering, Electrical Engineering, Plumbing, Sanitary Inspection, Municipal Engineering, Building Trades, Cotton Spinning and Cotton Weaving. These are attended by 477 students in all.

The Municipal School of Art also has day and evening classes.

#### EVENING CLASSES THE FEATURE.

There are Evening Schools conducted by the Education Committee in addition to those mentioned above, these being divided into three groups, viz. Grade I, Evening Continuation Schools and Lads' and Girls' Clubs; Grade II, Branch Technical Schools, Branch Commercial Schools and Evening Schools of Domestic Economy; Grade III, Municipal Evening School of Commerce, Central Evening School of Domestic Economy, and Teachers' and Special Classes.

The number of evening students in all the evening classes, both those of the Schools of Technology and Art and those under the Education Committee, was 22,362, or 3.9% of the population.

The courses in the Evening Continuation Schools cover 2 years, and comprise technical, commercial and domestic subjects.

There are 6-year courses for technical students, the first 2 years being taken in an Evening Continuation School, the next 2 years in a Branch Technical School, and the last 2 in the Municipal School of Technology.

The 6-year commercial course is similarly arranged, the first two years being taken in the Evening Continuation School, the next 2 in the Branch Commercial School, or in the Municipal Evening School of Commerce, and the last 2 years at the latter institution.

It is a noteworthy fact that employers co-operate with the education authorities, allowing their employees to attend classes, and granting them facilities to do so. Some firms pay the fees for their employees, others refund them, and in some cases raise wages for successful studies at the evening school. The education authorities are prepared to furnish reports to employers on the progress of their employees.

## DAY CLASSES ALSO.

The Municipal School of Technology has special day classes for engineering apprentices. These boys are selected by their employers and give one full day of 8 hours a week. They are found to make more progress in this way than at evening classes.

There is also a day class for apprentice painters and decorators, as well as one for apprentice plumbers.

## TRAINING FOR GIRLS.

Girls attending elementary schools receive special training in Domestic Economy at Housewifery Centres, which are equipped and furnished as workmen's cottages, at which the teachers reside. The course covers 7 to 8 weeks, and is attended by girls who are about to leave school. The instruction comprises Housewifery, Cooking and Laundry, and lectures are also given on the care of infants and young children. There are 45 centres for Cookery, 9 for Laundry, and 3 for Housewifery, and 9,949 girls attended in 1908-9. There is a special 3 months course at the Granby Row Centre, at which girls reside in turns.

The School of Domestic Economy offers a Housewives' Course of 6 months, on the conclusion of which a diploma is awarded. Girls from the Housewifery Centres can obtain scholarships to attend this school.

At the Evening School of Domestic Economy, a Housewives' Diploma is awarded on the completion of a 2-year course.

A Summer session is also held in connection with the foregoing.

SESSIONAL PAPER No. 191d

DIAGRAM A

ILLUSTRATING THE GRADED SYSTEM OF COURSES OF INSTRUCTION ADAPTED TO THE REQUIREMENTS OF THE DIFFERENT CLASSES OF STUDENTS IN THE MANCHESTER EVENING SCHOOLS. (*Read up.*)

GRADE III.—CENTRAL INSTITUTIONS.

MUNICIPAL SCHOOL OF TECHNOLOGY.	MUNICIPAL SCHOOL OF COMMERCE AND LANGUAGES.	MUNICIPAL SCHOOL OF ART.	MUNICIPAL SCHOOL OF DOMESTIC ECONOMY AND COOKERY.
Advanced instruction in Science and Technology.	Advanced instruction in Commercial Subjects and in Languages.	Advanced instruction in Art and Design.	Advanced instruction in Domestic Subjects. [Day classes only.]



GRADE II.—BRANCH TECHNICAL SCHOOLS, BRANCH COMMERCIAL SCHOOLS, BRANCH ART CLASSES, AND EVENING SCHOOLS OF DOMESTIC ECONOMY.

Second, Third, and Fourth Year Technical Courses, to meet the requirements of all classes of Technical Students.	Second, Third, and Fourth Year Commercial Courses, to meet the requirements of Juniors in business houses.	First and Second Year Art Courses leading up to the instruction at the Municipal School of Art.	Specialized Instruction in Domestic Subjects, for Women and Girls over 16 years of age.
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GRADE I.—EVENING CONTINUATION SCHOOLS.

First and Second Year Technical Courses, for Boys engaged in manual occupations.	First and Second Year Commercial Courses, for Boys and Girls engaged in commercial or distributive occupations.	First and Second Year Domestic Courses, for Girls desirous of receiving a training in domestic subjects.
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PREPARATORY COURSE.

For Boys and Girls who desire to improve their general education or who are not sufficiently prepared to take advantage of the above Courses.

DIAGRAM

SHOWING COURSES OF INSTRUCTION EXTENDING OVER SIX YEARS FOR TECHNICAL STUDENTS IN THE MANCHESTER EVENING SCHOOLS. (*Read up.*)

Advanced instruction in Science and Technology, in the Municipal School of Technology.  
FIFTH AND SIXTH YEAR TECHNICAL COURSES.

Engineering Course.		Building Trades Course.		Chemical Industries Course.		Electrical Course.	
Machine Construction.....	2 hrs.	Building Construction.....	2 hrs.	Chemistry (Theoretical and Practical) ..	5 hrs.	Magnetism and Electricity (Theoretical & Practical).....	2½ hrs.
Applied Mechanics (Theoretical and Practical).....	2½	Applied Mechanics (Theoretical and Practical).....	2½	Physics (Theoretical and Practical).....	2½	Mathematics and Geometry.....	2
Mathematics.....	1	Mathematics.....	1			Machine Construction.....	2
Geometry.....	1	Geometry.....	1				6½
	6½		6½		7½		

FOURTH YEAR TECHNICAL COURSES.

Engineering Course.		Building Trades Course.		Chemical Industries Course.		Electrical Course.	
Machine Construction....	2 hrs.	Building Construction....	2 hrs.	Chemistry (Theoretical and Practical).....	2½ hrs.	Magnetism and Electricity (Theoretical & Practical).....	2½ hrs.
Applied Mechanics (Theoretical and Practical).....	2½	Applied Mechanics (Theoretical and Practical).....	2½	Physics (Theor. & Prac.).....	2½	Applied Mechanics (Theor. & Prac.).....	2½
Experimental Mathematics....	2	Experimental Mathematics....	2	Experimental Mathematics....	2	Experimental Mathematics....	2
	6½		6½		7		7

THIRD YEAR TECHNICAL COURSES.

Practical Mathematics and Practical Drawing.....	3 hours weekly.
Practical Mechanics and Physics.....	2 " "
English.....	1 " "
	6 " "

SECOND YEAR TECHNICAL COURSE.

Practical Mathematics and Practical Drawing.....	3 hours weekly.
*Woodwork.....	2 " "
English.....	1 " "
	6 " "

FIRST YEAR TECHNICAL COURSE.

TAKEN IN BRANCH TECHNICAL SCHOOLS.

TAKEN IN EVENING CONTINUATION SCHOOLS.

SESSIONAL PAPER No. 191d

## SECTION: 2: THE MUNICIPAL SCHOOL OF TECHNOLOGY, MANCHESTER.

The object of this School is to provide instruction and training in the principles of science in their application to the industrial arts, with a view to a right understanding of the foundations upon which these arts rest, and to promote their effective development. The circular of the School states:—

The successful career of a student depends essentially upon his previous general education, for unless this has been thorough and liberal no satisfactory progress can be attained in any of the departments of the School.

The power of clear linguistic expression, and the mastery of the elements of mathematics, physics, and descriptive geometry are vital as a means of successful study of the applied Sciences. The chief aim of all preparatory study should, therefore, be the effective training of the thinking and observing faculties.

It is impossible for a student to obtain full benefit from the courses of instruction unless there has been adequate previous preparation.

Mere interest in experiment, or in machinery in motion, or even evidence of manual skill and dexterity, without a firm grasp of the above named fundamental subjects is of small avail if the purpose of the student be to attack serious problems in engineering, physics, or chemistry, and to fit himself for a position of industrial responsibility.

The courses of instruction of the School are directed more especially to the requirements of the industries of South-East Lancashire, of which Manchester is the commercial centre.

The School accomplishes its purpose by means of lectures, laboratory and shop-work exercises, together with scientific research directed to the solution of industrial problems.

The essential aim of the instruction is the training of faculty through a systematic course of sound theoretical study, and the development of resourcefulness and habits of self-reliance by means of an exact, thorough, and progressive course of laboratory and shop work, so as to prepare the student after due experience for positions of responsibility.

Students are required to pass an entrance examination in subjects of general knowledge, or to produce satisfactory evidence to the principal of their attainments.

The courses of instruction in the respective departments also prepare for the degree of Bachelor or Master of Technical Science (B.Sc. Tech., or M.Sc. Tech.) of the Victoria University of Manchester and for the certificate of the University. Students proceeding to the degree must have first passed the examination for matriculation of the Joint Board of the Northern Universities, or such other examinations as are approved by the Board.

Special courses of fourth year post graduate study and research are offered.

In addition to the regular courses there are special day courses for selected apprentices in the employ of engineering, plumbing and house painting and decorating firms and for library assistants.

### EVENING STUDENTS.

The School of Technology offers to evening students systematic courses of technical instruction and training in all the chief, and in many of the minor, industries of the city and district. Such students must be not less than sixteen years of age at entrance and have such previous preparation as will enable them to enter profitably upon the course of study they elect to pursue.

The Education Committee have provided in all parts of the city at convenient centres, suitable preparatory courses of instruction leading up to the

more advanced and specialized courses of the evening classes and of the School of Technology and of the School of Art.

Similar provision is also made, in Evening Continuation Schools and in Branch Intermediate Schools, for evening students beyond school age, for courses which include subjects of general knowledge, science, art, technology and commerce as well as domestic subjects for girls and women.

Classes for teachers in the subjects of Manual Training, Kindergarten Training and for certificate and scholarship courses are also provided. Provision is made for persons desirous of proceeding to the external degree examinations of the University of London.

In the Central Evening School of Commerce complete courses of instruction are offered of an advanced character in subjects bearing upon commercial and professional pursuits for which the courses, provided in the Intermediate and Continuation schools above named, are intended as preparation in cases where the general education is deficient.

#### ORIGIN OF THE MUNICIPAL SCHOOL.

The Municipal School of Technology is the direct outcome of the Mechanics' Institution. This form of educational effort was for nearly 80 years of the nineteenth century, in the main, the only means whereby the working and, in large part, the middle classes found the opportunity of continuing their education or of making up the serious deficiencies which resulted from the inadequate provision of day school education that characterised the years preceding the great educational enactment of 1870.

After committees of enquiry had visited the Continent of Europe and individuals had visited the United States, the erection of the new school was begun in 1895.

On October 15th, 1902, the new building was opened in the presence of a distinguished audience by the Prime Minister, The Rt. Hon. Arthur James Balfour, M.P. In the course of his address he referred to the School in the following terms: "This building is perhaps the greatest fruit of its kind, the greatest fruit of this kind of municipal enterprise in this country. . . . Nobody can go over this building, observe its equipment, study even in the most cursory manner the care which has been devoted to it, without feeling that the Corporation of this great city have set a great example worthy of the place they hold in Lancashire, worthy of the place they hold in Great Britain."

#### TECHNOLOGICAL DAY COURSES.

The school offers to-day students who have reached their 16th year the following courses, each of 3 years' duration:—

- 1.—Mathematical Courses.
- 2.—First Year General Course.
- 3.—Mechanical Engineering.
- 4.—Physics and Electrical Engineering.
- 5.—Municipal and Sanitary Engineering.



SESSIONAL PAPER No. 191d

- 6.—Applied Chemistry.
  - (a) General Technological Chemistry.
  - (b) Chemistry of Textiles (Bleaching, Dyeing, and Printing).
  - (c) Manufacture of Paper.
  - (d) Metallurgy and Assaying.
  - (e) Brewing.
  - (f) Electro-Chemistry.
  - (g) Photography.
- 7.—Textile Manufacture.
- 8.—Photography and the Printing Crafts.
- 9.—Advanced Studies in Technological Subjects.
- 10.—Engineers' Apprentices' Course.
- 11.—Plumbers' Apprentices' Course.
- 12.—Painters' and Decorators' Apprentices' Course
- 13.—Architectural Courses.
- 14.—Library Assistants' Course.

The courses in Cotton Manufacture and for Engineers' and Plumbers' Apprentices are here given as representative of the others, and as useful for consideration in Canada.

#### COTTON MANUFACTURE.

*Courses of Instruction*—These are designed to give a sound training in the theory and practice of Spinning and Weaving to those who are or intend to be engaged in the spinning of yarns, the design and manufacture of woven fabrics, the buying and selling of yarns and textiles, or the manufacture or export of textile machinery.

The scheme of theoretical, practical, and experimental study extends over 3 years, and includes the technology of fibres; the principles and processes of spinning and weaving as applied to cotton, silk, and mixed fabrics; the analysis, testing, and costing of yarns and fabrics; freehand drawing and applied design; geometrical and machine drawing; mathematics, mechanics, physics, and mechanical and electrical engineering; construction of works, and factory law; and chemistry in its application to the treatment of textile fibres, and to the materials used in sizing and other textile processes.

Whilst the courses are specially intended for those who can give all their time, facilities are also offered to persons employed in the textile industry whose employers are willing to give them the opportunity of attending such lecture, laboratory, and workshop courses as may be arranged after consultation with the head of the department.

Times, in addition to and other than those set forth in accompanying time table, are arranged in the subjects of practical spinning and weaving, the testing of fibres and fabrics, and in design and drawing and the analysis of cloth.

*Equipment*.—The department contains a complete plant for ginning, mixing, opening, carding, combing, spinning, roller covering, doubling, gassing, reeling, preparing and bundling cotton yarns, and for the spinning of waste cotton, the preparation of cotton and mixed yarns for the loom, the manufacture of cotton and mixed goods by hand and power, silk reeling, throwing, preparing,

and the manufacture of silk by hand and power; and for the chemical, microscopical, and mechanical testing of fibres, yarns, and fabrics, arranged as follows:—

*Preparatory Treatment of the Cotton Fibre.*—Typical cotton gins—Roller and hopper bale breakers, conveying lattices and cotton bins— Willow, compound opener with hopper feed and lap attachment, single scutcher— Revolving flat, roller and clearer, and condensing cards— Sliver lap, ribbon lap, combers and drawing frame— Slubbing, intermediate, roving, and jack frames— Stripping, grinding, and burnishing machinery, for flats, rollers and cylinders, flats fastenings.

*Spinning.*—Waste, medium, and fine mules, also an experimental mule—Twist and wet ring frames—Roller covering plant— Doubling winder, ring doubler and twiner— Clearing, gassing, reeling, preparing and bundling— Experimental machines and working models— Plans of mills and arrangements of machinery—Specimens of coarse, medium, and fine grey and coloured cotton in various stages of preparation

*Weaving Preparation.*—Winding machines for warp and weft— Mill, beam and sectional warping machines— Running-off frame for sectional warping— Yorkshire dressing frame— Drawing-in and twisting frame—Dobby card punching machines—Piano card cutting machines— Lacing frames.

*Hand and Power Loom Weaving.*—Dobby, jacquard, and pattern hand looms— Tappet, dobbie, and jacquard looms, with single and multiple boxes— Leno, lappet, terry, plush and automatic looms—Working models— Diagrams and plans of machinery in mills.

*Silk Spinning and Preparation.*—Cocoon reeling machines— Winding, cleaning, doubling, spinning, throwing, and reeling machines, reel steaming chest, reel stand, dramming and deniering scales, splitting rices, boiling pan, steeping tub and soap cutter, for hard silk; and also the following machines for soft silk: Winding, re-drawing, pirn winding, mill, and sectional warping and winding on.

*Silk Weaving.*—Jacquard, swivel, gauze, and velvet hand looms. and English and foreign tappet, dobbie, and jacquard power looms, with single and multiple boxes, a jacquard swivel and a ribbon loom.

*Textile Testing Laboratory.*—Wrap reels, scales and balances, microscopes, lea testers, single thread testers, twist testers, mechanical and hydraulic cloth testers, water bath ovens, conditioning stoves, hygrometers, and other appliances for special work.

The driving throughout is by means of electric motors of power ranging from 4 h.p. to 20 h.p. A complete humidifying plant and independent heating pipes are fitted to secure the necessary temperature and degree of humidity.

The class rooms are fitted with every convenience and appliance for the complete illustration of the lecture courses. There are also collections of English and foreign models of textile machinery and appliances and of ancient and modern textiles. The library contains English and foreign books and periodicals relating to the textile industries. The journal of the Textile Society established in the School is issued annually.

The subjects of the course for the first year, with the hours per week devoted to each subject are as follows:—

Subjects.	Hours per week.
Mathematics.....	4
Mechanics.....	1
Experimental Mechanics and Sketching of Textile Machinery.....	2
Geometrical Drawing.....	2
Textile Engineering Drawing.....	2
Physics, including Laboratory.....	3
Textile Fibres and their Preparatory Treatment.....	1
Spinning Calculations.....	1
Fabric Structure and Weaving Calculations.....	1
Weaving Mechanism.....	1
Principles of Colouring.....	1
Freehand Drawing.....	2
Technical Design and Analysis.....	3
Practical Spinning.....	6
Practical Weaving.....	
Total.....	30

SESSIONAL PAPER No. 191d

## SPECIAL DAY COURSE FOR ENGINEERS' APPRENTICES.

This course is arranged to afford facilities for the instruction in special day classes of selected apprentices employed in engineering works. Fee for each year of the complete course, £1 10s.

Candidates should give evidence of a satisfactory knowledge of mathematics and mechanical drawing, and be of such good character in respect of conduct and capacity as to deserve the privilege of attending this course.

In order that the organisation and business arrangements of works from which apprentices are drawn may be disturbed as little as possible, classes comprised in the course are held on Monday, extending from 9 a.m. to 1 p.m., and from 2 to 6 p.m. throughout the whole session of 40 weeks.

The subjects included in the course are as follows:—

## FIRST YEAR:

Mechanics Lecture.....	9 a.m. to 10 a.m.
Physics Lecture.....	10 a.m. to 11 a.m.
Mechanical or Physical Laboratories.....	11 a.m. to 1 p.m.
Mathematics.....	2 p.m. to 4 p.m.
Engineering Drawing.....	4 p.m. to 6 p.m.

## SECOND YEAR:

Mathematics.....	9 a.m. to 11 a.m.
Properties of Materials and Theory of Structures (First Term).....	11 a.m. to 1 p.m.
Theory of Machines and Theory of Heat Engines (Second Term).....	11 a.m. to 1 p.m.
Electrical Machinery.....	2 p.m. to 3 p.m.
Electrical Laboratory.....	3 p.m. to 4.30 p.m.
Engineering Drawing and Engineering Laboratory.....	4.30 p.m. to 6 p.m.

The time thus arranged is equal to that given on four evenings per week in the evening classes, and, moreover, the session is some ten weeks longer than the evening session. The student has the further advantage of being relieved from attendance at evening classes, so that he has full opportunity to prepare the home-work and do the reading required, and under these circumstances can obtain a more extended and more satisfactory course than the evening classes afford.

Students who propose to take the second year course must take a paper equal to that of the final examination in Mathematics of the first year.

TEXT BOOKS—First Year; Algebra, Hall and Knight, 3s. 5d.; Trigonometry, Hall and Knight, 3s. 5d.; Machine Construction, Crye and Jordan, 2s. 3d.; Applied Mechanics, Cryer and Jordan, 2s. 3d.; Class book on Physics, Gregory and Hadley, 4s. 6d.

Second Year: Practical Mathematics, Saxelby, 4s. 11d.; Testing of Materials, Popplewell, 10s. 6d.; Strength of Materials, Popplewell, 5s.; Graphical Statics, Gray and Lowson, 2s. 8d.; Heat Engines, Ripper, 2s. 3d.

## SPECIAL DAY COURSE FOR PLUMBERS' APPRENTICES.

This course, which extends over two years (with a special course for students who can attend for a third year), is intended for the education and training of plumbers' apprentices. Fee for each year of the complete course, £1 10s.

Candidates must not be less than 16, and should possess a fair knowledge of the preliminary subjects connected with plumbers' work; should be nominated by their employers as of good conduct and capacity, and worthy of the privilege of attending the course; and are required to attend regularly and punctually, and do all the necessary home-work. Reports are periodically submitted to employers on the progress of their apprentices, and these students who pass satisfactory examinations and make the required attendances during the two years' course receive certificates.

## EVENING CLASSES.

### SCIENCE AND TECHNOLOGY.

- I.—General First Year Course.
- II.—Pure, Practical, and Applied Mathematics.
- III.—Mechanical Engineering.
- IV.—Pure and Applied Physics.
- IVa.—Electrical Engineering.
- V.—Architecture and Builders' Work.
- Va.—Municipal and Sanitary Engineering.
- VI.—Pure and Applied Chemistry.
- VII.—Photography, the Printing Crafts, and Bookbinding.
- VIII.—Textile Industries.
- IX.—Dressmaking, Millinery, Plain Needlework.
- X.—Natural Science.
- XI.—Miscellaneous Technical Subjects.

Group V is chosen as representative of the work in the other groups.

### ARCHITECTURE AND BUILDERS' WORK.

This course provides for the complete training of men engaged in the Building Trades in the theory and practice of Building Construction.

It extends over 5 years, and evening students following a systematic course and fulfilling the conditions as to examination can thus obtain the diploma of the school.

The instruction is at once theoretical and practical, and wherever possible students are counselled to take full advantage of the workshop and laboratory courses.

Many of the subjects of study in the more advanced stages will be found of especial benefit to articled pupils of architects and surveyors. Excellent facilities are provided for the study and testing of materials of construction.

Particular attention is directed to the important courses in the subject of Sanitary Engineering, which are of special value to architects, surveyors, engineers, and to others engaged in the work of local government administration.

There are special courses for House Painters and Decorators, Cabinet Makers, Masons, and Metal Plate Workers.

SESSIONAL PAPER No. 191d

**SECTION 3: CONVERSATION WITH MR. J. H. REYNOLDS.**

*Information obtained in "Conversation" with MR. J. H. REYNOLDS, Principal, Municipal School of Technology, Manchester.*

Mr. Reynolds said he kept in close touch with the industries of the particular neighbourhoods, and reported monthly to different firms on the progress of boys. If building trades are strong in a neighbourhood, he provided courses in those trades; in another section the inclination might be in the direction of chemistry. While very glad to allow any persons who took an interest to form an advisory committee, the activity of such a committee would make the management very cumbersome.

The real crux of the success of evening classes is that employers be kept in sympathy with the work and believe in its advantages. Boys going into evening school do better from every point of view than those who do not; not only from good influence as to character, but from getting the kind of knowledge to make them more observant, more intelligent and more in touch with their daily work. They get the elements of practical arithmetic, drawing, mechanics and physics; and every endeavour is made to illustrate the principles and apply the boy's knowledge directly to his work. If employers are in sympathy, the school succeeds, but it is difficult to get the sympathy of employers in a small way of business, because they want to get as much as possible out of the boy.

The enormous amount of overtime in the workshops troubled Mr. Reynolds, who finds the greatest difficulty in maintaining evening attendance when trade gets busy. The men who attend such institutions as these, paying their own fee and giving their time, never come to waste their time, and would not attend if it were not for their advantage—which is necessarily that of their employers.

**VALUE OF EVENING SCHOOL.**

The evening school has been an enormous gain to Lancashire, having been the means for 60 or 70 years of enabling a large number of men to raise themselves to positions of responsibility, and in some cases affluence, as the result of such training. No two counties in England are doing more for the education of the artisans and persons employed in the day time than Lancashire and Cheshire. One cause of this is the tradition that has grown up in these two counties in favor of adult education, and the strong interest always taken in the various institutions such as the Mechanics' Institute, established long before the present Acts of Parliament. There is a Union comprising all the evening institutions of the two counties, whose committee meets monthly in Manchester, and virtually controls a great deal of the continued education carried on in the two counties. This year at least 120,000 papers have been worked in the various subjects relating to continued elementary education, apart from the Science and Art department. The men in control are thoroughly interested in their respective institutions, and are doing a thoroughly effective work. They set the papers and largely control the teaching. The movement is growing in influence and numbers.

3 GEORGE V., A. 1913

## GERMANY GAINS ON ENGLAND.

Mr. Reynolds was of opinion that up to a certain period there were numerous reasons why England should be in the position she does occupy—her geographical position, climate, natural resources and the energy and capacity of her people. All those things gave England her position. But times have changed, and the last 40 years have created a revolution in industry, especially chemical and electrical. Germany has gained on England because more intimate knowledge of natural phenomena has become necessary in industry, and the native capacity and other adventitious causes of England's success no longer apply to the same extent.

## EDUCATION HELPING WORKINGMEN.

Conditions of living among the workers have greatly improved since 1851. Mr. Reynolds has been among working people all his life, and the difference in that class is enormous. That is quite consistent with the fact of a large number of derelicts, because the population was increasing by millions and there is as deep poverty to-day as ever existed in the nation, and a good deal of it. Education has reached every class of the community since 1870. Before 1870 Manchester was not more than a third of its present size, yet there were 16,000 children running about the streets going to physical destruction. Now every child is looked after. The amenities of life are much better attended to now. At that time there were 20,000 people in Manchester living in cellar dwellings, practically holes in the ground. There has been an enormous improvement in the standard of living; people will not endure to-day what they endured then; the outlook generally has improved. More than a generation of workers has gone through the schools who before 1870 did not go to school at all.

Mr. Reynolds said that, when he was a young man, he had taught reading, writing and arithmetic regularly on Sunday afternoons, and many men who are to-day in good positions never got any other education except what they got in Sunday schools, which were very powerful at that time in this city. Personally he would not mind using Sunday now in that way, but public sentiment is against it. At that time people had no other chance, for they worked very long hours. The Saturday afternoon holiday is only about 60 years old; before that everybody worked till ten o'clock on Saturday night.

Mr. Reynolds said that while Technical Education is more highly appreciated by the public than it was 15 or 20 years ago, yet men like himself, urgent in the pursuit of this work, felt the want of sympathy. In his opinion there is not the same appreciation of education as a whole in Eng'and as there is in Switzerland or Scotland. Referring to a meeting he had addressed, when the question was afterwards asked him why he should have been talking to them about the value of education when there were plenty of men in the room worth £30,000 who had never been to school in their lives, Mr. Reynolds remarked that conditions had largely changed, and such men would not now have as good a chance to get on; but we must recognize that an Englishman can make a vast deal of use of a very small amount of knowledge.

SESSIONAL PAPER No. 191d

## EDUCATION IN MANCHESTER.

There is only one public educational authority in Manchester, and Mr. Reynolds was against a division of authority—one controlling elementary and secondary education and the other controlling technical education—because education is one thing and rests on a broad basis if it is education at all. As soon as a child is able to go to school, it must be trained body, mind and soul up to a certain age. The vast majority of children must go work at 14; so the problem is how far you can pick out from the ruck of children those able to extend their general education to a later day.

In Manchester the evening classes are held in the elementary school buildings. If a boy is taking secondary education, Mr. Reynolds would continue his general education in the secondary school; he was against specialization either in elementary or secondary schools. If he knew a boy would be leaving at 14, he would arrange his subjects carefully, but they would still remain general subjects, for nobody knew how he was going to get a living.

There should be some trade schools for elementary boys and girls, because he thought the time was short enough to give them a broad, sound basis of general education. This was quite consistent with carrying the kindergarten principle right through the whole course, to train hand and eye the whole time, so that whenever a boy leaves school, his mind is alert, he has been taught to use his hands in co-ordination with his eye and other faculties, and he is fit for any job that anybody likes to put him at, the question not being how much he knows, but how he has been trained.

One of the most important things, Mr. Reynolds thought, was a thorough knowledge of English and all that that implies, which is more than mere knowledge of grammar and rhetoric, and includes the history of the country and the whole language. If this, with a knowledge of geography, were made important features of the schools, and the applications of mathematical training were made clear to the boy, he did not see why these things should turn the pupil from industrial pursuits at all.

## TRAINING OF LEADERS.

The question of training leaders in industrial activities—whether they should be men who had had training in the shops or those who had been reserved longer for training before going into the shops—was rather a difficult one in Mr. Reynolds' view. He thought that it would be a great advantage to get young fellows who had had a year or so in the shops to come to the Technical Institute in the day time, provided they kept up their knowledge; but if they allowed their school knowledge to grow rusty, they would find great difficulty in taking a position in that Institute after a year or two. The German Technical High School now requires that very thing—that at 18 or 19 a boy must go into the shops, and then for four years go to a Technical High School. That drives a man to 23, or, counting a year for military service, 24, which makes him too late in an industry. One difficulty in Manchester is that once a fellow has

got into a shop and found his feet there, he is not likely to leave it because he does not know that he will get back readily, and he would rather stick there and go to classes in the evenings and do the best he can.

#### DAY-TIME COMPARED WITH EVENING INSTRUCTION.

Mr. Reynolds was in favour of part time work by which apprentices attended the Institute for a full day weekly, and expressed decided preference for that plan over having them come two or three times a week for a few hours. He thought it was one of the best features of the work that they were doing, but it had not got on as it should have done. Seven hundred are now coming in from 16 to 18. He thought the advantage is unquestionable. The school term is 40 weeks, or 320 hours, as against 180 hours of evening work at the very most, with the advantage that their evenings being free, they could do their reading and homework, and get reasonable recreation. If men were let off at 5 o'clock and came to the evening classes, it would not be as well as having the day's work at the Institute. When the man has had his rest and comes fresh to the study, the Institute can begin serious work with him and keep it up all day, without his flagging. That was a feature in favour of the choice of Monday. What is really wanted, in Mr. Reynolds' opinion, is some legislative measure whereby a boy leaving school at 14 to 17, would get time enough to continue his education in the day time. That would mean that he should not be expected to go more than 30, or at the very outside 35, hours weekly to his employment. That would enable the Institute to deal with him satisfactorily from the point of view of his education. However the plan of giving one day weekly can, in the best circumstances, apply only to a small number.

Mr. Reynolds has not an atom of sympathy with legal compulsion to attend evening classes. If there is to be any compulsion, it must be on the employer to give the time in the day, and not on the parent or the boy. It is impossible to do it in any other way.

#### WHEN BOYS LEAVE SCHOOLS.

Every week the City Education Department sends to Mr. Reynolds' office a list of boys who have left school that week. Mr. Reynolds' office writes to the boy, and if it is late in the session, says "Here is a permit to entitle you to come next session, or to an evening school, for so many hours a week," Mr. Reynolds had found that more than half attended the classes at their own cost. A number of scholarships were given to evening students, and the plan worked well.

As to the increased value to employers of apprentices who attend the school, as against those who do not, Mr. Reynolds said there were various opinions. Plenty of people, especially those engaged in engineering, say that technical education in evening classes is not worth a straw. Such people will ask, "Why does the boy want education? He has only to turn a machine;



3 GEORGE V., A. 1913

he simply minds the machine." That is all they want. Mr. Reynolds' point of view was quite different. He said to the boy, "While you are minding that machine, try and improve yourself in the direction in which you are engaged; follow up all about it." It is an individual matter for the boy; it is not for the employer to say he does not need education.

#### ATTITUDE OF TRADES UNIONS.

As to the attitude of the trades unions in Manchester, Mr. Reynolds said they had not been any obstacle to technical education, but they had not given any impulse to it. He had always found the trades union officials sympathetic, but he could not say he had had any help from the trades unions in the movement for the training of artisans engaged in various trades. Asked as to the motive of the Plumbers' and Steamfitters' Union, which objected to the admission of men not engaged in that business, who afterwards decided that all their apprentices should attend the school, Mr. Reynolds said he thought there was a feeling among the plumbers that the class had given them something of real value, because plumbing is a trade which may be done on a large or small scale, and is mostly done by the small master who has at most two or three men and an apprentice, and cannot give the apprentice the range of work sufficient to make him a good workman. Another factor is that many things in plumbing that now require great deftness and skill are being made by machinery, such as the bending of pipes; the plumber does not know how to make a drop or bend lead or boss it up. The school gives opportunity to learn these things.

He had had trouble with the Printers' and Lithographers' Union, who had objected to salesmen in shops entering these classes, but Mr. Reynolds had argued, "Who is going to get the orders by which you live? If a salesman understands these processes, he is going to bring you trade, because he can talk to the customer far more intelligently, and he needs to know all about the various processes." So a salesman may go to learn bookbinding, that he may talk more intelligently about it. An articled clerk in an architect's office might enter a plumbers' class, and Mr. Reynolds would not object, and would tell the plumbers that it would be good for them, because such a man would not be content that a contractor would have his own way, but would have something to say for the plumber. Mr. Reynolds thought that objections in such cases were through ignorance, and through taking short-sighted and narrow views of the question.

#### MACHINERY DISCOURAGES ALL-ROUND SKILL.

In the last thirty or forty years automatic machinery is used to a tremendous extent in making, on a wholesale scale, things which need only putting together. The classes in carpentry and joinery are not nearly as well attended as they should be because of this. A man has very little chance to become a chief joiner. When the enquiry was made in London, they found no London boys in the building firms, because they took improvers from the country where they learnt the minutiae of the business in small shops.

Mr. Reynolds said that his Committee had just bought 12,000 yards of land for a Domestic Science School that would accommodate 300 day pupils. Women are being trained as domestic economy teachers not only for Manchester but for anywhere. The present building is not big enough to afford room for everything they need in Manchester. They had no room for motor car engineering, though it is a good thing; but short courses of instruction are given to fellows of more or less experience and expert knowledge. If they think there is anything desirable to do, Mr. Reynolds at once takes it up and gets the committee to sanction the establishment of a class or classes in such work.

Mr. Cowan, Mr. Reynolds' assistant in the evening classes, has the organization of the evening classes all over the city; and if there is a district without a satisfactory class, or a demand in a neighborhood for a class, one is put there. The Manchester Institute arranges for instruction on Saturdays, and men come from as far as Hull, 120 miles away, returning the same night. Any subject that is likely to be interesting is taken up. For example, Calico Printing and Engraving were taken up a year or two ago, there having been no classes at all for those engaged in that work. Sometimes classes run dry in three or four years, all possible recruits having been exhausted. The classes were open to everybody, and the fees the same to people in and out of the city, or in and out of England; and Mr. Reynolds said he would not make a difference in the fees as between residents and non-residents.

#### THE INSTITUTE'S COST AND POLICY.

This school costs £18,000 yearly, above all received by way of Government grants and fees. The grant from the Board of Education (London) is nearly £11,000. The balance is borne by local rates and fees, the latter, which are very low, only a few shillings, totalling £5,000.

The graduates have as high standing as graduates of the Imperial College. It is a three years' course, and sometimes four, and stands as high as any degree course of a University.

Mr. Wrapson, the Assistant Superintendent, said that after all his experience it was not practicable to teach trades fully in school or in an institution; and he objected in particular to being asked to produce articles that could be sold, because the tendency would be to subordinate the instruction and training of pupils to getting work out on time or getting work that would have value. In the School for Commerce there was special attention given to training men for municipal service, and in the Technical School to training men for municipal service by way of management of motor cars; therefore while the rates for maintaining the schools were a tax, it was an economy in training their own servants for saving the municipal property and doing better work.

## CHAPTER VIII: LEEDS.

### SECTION 1: INTRODUCTORY.

The city of Leeds has a population of 445,600. Its chief industries are mechanical and electrical engineering, textiles, building and allied trades, commerce, leather and boot trades, clothing trades, mining, printing trades and chemical industries.

In 1905 statistics of the occupations of the residents in the different parts of the city were compiled to ascertain,—

(1) What industries were carried on in Leeds and their relative importance, with a view to deciding whether the supply of Technical Instruction was sufficiently complete and varied to meet the needs of the population;

(2) Whether the schools and classes in existence were conveniently placed with respect to the homes of those who might be expected to attend them.

Maps were prepared showing the areas where the heads of families engaged in the various industries lived. Another map showed the location of the various classes and schools adapted to the occupations. By superimposing a transparent copy of the latter over each of the former the adequacy or inadequacy of convenient provision was at once seen. On that basis plans for development and extensions were made. These provided particularly for the residents engaged in occupations as follows:—

Occupations.	Heads of Families.
Mechanical and Electrical Engineering.....	7,500
Building and Allied Trades.....	4,770
Commercial Occupations.....	4,400
Leather and Boot Trades.....	3,160
Clothing Trades.....	2,900
Mining Trades.....	1,300
Textile Trades.....	1,130
Printing and Bookbinding.....	800
Chemical and Allied Trades.....	700

Provision was made also for Bakers, Glass-blowers, Furniture Trades, Carriage Builders and Wheelwrights, Watchmakers and Jewelers and other industries.

#### TECHNICAL COURSES.

The courses of Technical Instruction in Leeds are well graded, ranging from the general evening Continuation Schools up to the University of Leeds.

The first grade is taken in the general evening school; the second in the various Mechanics' Institutes and Branch Artisan Schools, the latter for elementary courses, the former both elementary and intermediate. The third grade comprises the Central Technical School, the Cockburn Technical School

and the West Leeds Technical School (the latter for advanced courses); while the fourth grade is taken in the University of Leeds. Grade I covers preparatory courses; grade II the 1st and 2nd years technical courses for all trades; and the 3rd year course in Mechanical Engineering and Building at the Woodhouse Mechanics' Institute, and others taking this work; grade III comprises 3rd and 4th year courses in Mechanical Engineering, Electrical Engineering and Building, 3rd year in Chemical Trades, and 5th year in Mechanical Engineering; also Mining, Tailoring, Boot Trade, etc. The University offers advanced courses in Mechanical and Electrical Engineering, Mining, Textiles, Leather and Dyeing.

#### EVENING COURSES, ETC.

The evening Art instruction is well organized in connection with the *Central School of Art*. There are preparatory Art schools and branch Art schools leading up to the Central School, the aim of the entire co-ordinated instruction being the advancement of the industrial arts.

A special Saturday course is held for Teachers.

Evening craft courses are held in Bookbinding, Painters' & Decorators' work, Lithography, Cabinet Making, Stone Carving, Jewelry and Silversmiths' work, Jewelry Repairs, Wood Carving and Wrought Iron work.

*Evening Commercial Work* is organized from the general evening schools, through the branch commercial schools, the Central School of Commerce and other institutions of similar rank, up to the University.

*Evening work in Domestic Arts* is begun in the general evening schools, continued in the various Young Women's Institutes, and concluded in the Central Institute for women and girls. The subjects taken are English, Household Accounts and Correspondence, Cookery, Needlework, Laundry, Hygiene and Home Management, Dressmaking, Home Nursing, arranged in group courses.

Exhibitions and scholarships are available, in all the various branches of evening work, to higher institutions.

*Training courses for Teachers* of all grades are fully provided for, the subjects including Manual Training, Singing, Elocution, Physical Training, Art, Nature Study, Photography and Modern Languages.

There is a *School of Music* under the Leeds Education Committee.

## SECTION 2: CONVERSATION WITH MR. JAMES GRAHAM.

*Information obtained in "Conversation" with MR. JAMES GRAHAM, Secretary for Education, Leeds.*

When Mr. Graham came to Leeds seven years ago he prepared a memorandum of the trades and industries of Leeds, taking a census of all the houses from £30 a year rental downwards, with six maps to show the locations of the

SESSIONAL PAPER No. 191d

workers for the different trades. Then they set to work to plant preparatory courses in Evening Schools, where they made good what young fellows had forgotten of their ordinary education. Then they put down Intermediate Schools of an artisan type for those engaged in works, giving a two years course; also Intermediate Schools of a commercial class; Intermediate Schools of a domestic class for women; Intermediate Schools with artistic classes for Art students, etc., then large Central Institutions.

They fixed the number, stuck to that number, carefully selected the men and started to train teachers, putting them through a two years course, during the first year of which they had to retail out what they got on Saturday mornings and certain evenings; but at the end of the second year they had covered practically the whole course, and the Intermediate Schools were running all right. For the Central Technical Schools they looked to graduates who had specialized in certain directions, and to men who were graduates engaged in practical work, or in special departments of the corporation, or as civil or electrical engineers, and put them in charge of the classes.

In a few years the whole course was running. They set up a system of registration, of record cards showing attendance and work, so that in a few years all the pupil had to do was to show his card and the new teacher knew exactly where to put him in the course. One problem was to lead young fellows on to higher institutions, and men who had been doing good work for two or three years were helped by technical scholarships on to the University. They went there full time, and were paid their full maintenance allowance. Ten of those scholarships a year were offered and the men proved the best in the technical department of the University.

#### PRACTICAL INDUSTRIAL ART.

Art in Leeds in the past began and ended on paper; it finished up with beautiful drawing, highly coloured, which might be awarded a silver or bronze medal. Mr. Graham felt that was not sufficient, and he brought over from the School of Industrial Arts, Geneva, Switzerland, an exhibit showing how the paper work was carried along through many stages and an artistic object produced in the form of a vase or statuette or piece of jewelry or a hundred and one other things. The actual artistic object was the finished product, instead of a design which remained on paper. That exhibition seven years ago opened the minds of many educational authorities, and caused them to turn the artistic teaching and training of England on to the craft basis. The Leeds School of Art has gone a long way in certain directions and certain crafts.

#### HOW ADVISORY COMMITTEES HELP.

Behind every craft or trade there is, in addition to the general Managing Committee of the school, an Advisory Committee of experts connected with each craft or trade, called together to consider or suggest any new development, to visit other places, to advise how the school should be equipped or the course

developed, and later on to visit the courses in progress, criticise the work, suggest improvements, and in a general way offer useful advice to students. The work of some of those crafts has greatly developed the different callings into which art feeling and instruction enter. The school has helped very largely to develop printing and lithographing trades, boot and shoe trades, etc. The process-engraving work of Leeds used to be sent away to Manchester, but as a result of the school's new process department a large number of the big printing works have developed process departments and a good deal of engraving is now being done in Leeds.

#### BOOT AND SHOE TRADE REVOLUTIONIZED.

The boot and shoe trade used to be chiefly the heavy boot with thick soles, for working men. Even that was dying out; many of the big manufacturers were folding their hands and heaving sighs because the prosperous times had departed, never to return. But the schools set up boot and shoe training classes, which gradually developed until now they have had to be taken into the technical schools and put into a separate building as a Boot and Shoe School. It has a modern up-to-date equipment under an arrangement with the machine makers that if they bring out an improvement on the machine now in school the old machine can be discarded and the new introduced by paying them a small sum per annum. Those machines are obtained at a very cheap rate because the school allows any prospective buyer to come and inspect them at any time. The boot and shoe business has been revolutionized in Leeds; the trade is now in light boots and shoes; and Leeds manufacturers can hold their own against the light boots of any other place. The U. S. boot trade has practically disappeared from England, although at one time it looked like collaring the whole British market. At present the English makers are busy clearing them out of the foreign markets. The export of boots from England is going up by leaps and bounds, running into hundreds of thousands a year and steadily increasing. That shows how co-operation between employers and the school can bring about a revolution in a trade, and regain ground which seemed to be absolutely lost.

How do the boot and shoe employers help the school? In many ways. They send their work people. Then if in the course of instruction the school wants a hundred pairs of boots at a certain stage of finish—say they want rivetting or finishing in a particular way—they have simply to ring up a number of shops and tell them so, and at the hour named the boots at that stage of manufacture are at the school, and are handed around to the students. The whole process is explained theoretically; the students are shown practically how the job is done; they make a trial of a quarter or half an inch, which is carefully watched; then another quarter of an inch, which is carefully inspected; then they are allowed to go ahead. That lesson in theory and practice is given, and the following morning the boots are sent back to the manufacturer. At any time and at any stage the manufacturers are always glad to let the school have the material at the stage required to carry on the manufacture one stage further.

SESSIONAL PAPER No. 191d

## INTEREST OF EMPLOYERS AROUSED.

To get the interest and sympathy of the general employers of labour was a tough task. They took no notice of letters; then a man who had been in an engineering shop was engaged to interview the employers of labour and work up interest; also to call on boys who were leaving the technical schools, or who had gone into workshops and ought to be attending the technical school. That plan was very successful. Still the man engaged could not get hold of the big employers; and finally Mr. Graham and another gentlemen interviewed them. In some places they were received rather coldly, and in others with decided opposition. However, they persevered, returned, and in most instances succeeded. If they did not gain active support they asked employers of labour if they would let young fellows who were attending the technical schools leave half an hour earlier on school nights, and let them come to work after breakfast on the morning following their attendance at night school? Would they pay the fees? Would they let attendance at the technical school count towards promotion? and a number of other things. They got out a series of printed bills. The employers looked them over. One man would pay the fees and do nothing else; another would let apprentices leave a little earlier. A hand bill was printed for each one of these; finally a bill for the man who was prepared to do everything. This hand bill had every appearance of having been printed by the firm, and in a blank was inserted the name of an important clerk connected with the works who was told off by the firm to receive the names of young people who intended to go to the technical schools during the coming winter. This man proved to be a point of contact between the school and the works—one to whom Mr. Graham could go and discuss questions or deal with difficulties at any time. That was found very useful. The hand bill gave an outline of the courses.

## PRACTICAL ABILITY DEVELOPED.

All this work resulted last year in an increase of 500 students, and this year an increase of 800 students, or a total of 1300 in two years in the evening technical schools.

The idea gradually permeated the whole of the technical schools of Leeds, which have 7,000 odd students, that they meant earnest work. The result is that they won't tolerate any student who is there wasting time; they are all ready for work; there is now an atmosphere and feeling different altogether from what prevailed formerly. Home work is secured in considerable quantity—an evidence of personal work on the part of the students; and a separate register is kept for this home work.

For the future, Mr. Graham does want to see day technical education in England under that of the University grade. He wants to see work such as that done at the Holbeck Preparatory Trade School put into every elementary school for boys throughout the length and breadth of Leeds, so that between the ages of twelve and fourteen they will have knowledge of the principles underlying

3 GEORGE V., A. 1913

all the main trades of Leeds; their English will be much better than at present; their ability to draw will be much better. They will be able to read a plan and make measurements, and able to work out any practical arithmetic sum—based on measurements, statement of machinery details, etc. In short they will rapidly become skilled workmen either at the bench or at the lathe. If they are going to be that, the sooner they are into the works after 14, the better for the boys as mechanics.

#### COMPULSION AND HALF-TIME.

Mr. Graham would like to see an Act of Parliament making attendance compulsory between 14 and 18, so that half the boys would be in the works half a day while the other half were at the technical school, theory and practice thus going on hand in hand. This alternation could be for half-days, or half-weeks. In the shop the boy might be kept at one machine and become skilful at it, and as part of the competitive system he would be able to turn out an article accurately in a certain time, and thus enable the British engineer or workman to compete with his brethren at home and others in foreign markets. In the technical school the boy would be taught the theory of the whole trade, with an opportunity for practice on other machines. There would be sufficient equipment in the technical school to show how the theory was applied. By this half-time plan the boy would go through the whole trade and understand both theory and application. Skill would only be got in a workshop, but you would have a workman who, in case of upheaval in the trade or of his being turned from one department or trade, could enter another; he would be quickly adaptable and could pick up any trade because of his thorough knowledge of the principles underlying that trade, for the principles underlying all mechanical trades are practically the same.

This is what Mr. Graham hopes to see for the workman: "Out of the mechanic will come the foreman. There will always be an upthrust of brains; and we will have men who become managers and possibly controllers of large firms. That plan, joined to selection of the brightest boys who have worked four or five years in evening technical schools, who have worked on this half-day system, and who are sent to the University and kept there three or possibly four years with all fees paid and a maintenance of ten shillings a week, will produce an army of workers trained and adjustable, ready to face all possible competition, whether from Germany or anywhere else."

#### SCHEME LINKED WITH UNIVERSITY.

In drafting the scheme of Technical Education for Leeds the scheme of education was arranged according to the amount a young fellow could cover year by year in a technical school. The first two years were devoted to the general Evening Schools, the second two years to the Intermediate Schools, and the next three or four or five years to the Central Technical School or School of Art or Commerce or Domestic Science. The advanced science and



SESSIONAL PAPER No. 191d

the honors work were left to the University. In view of the very expensive equipment at the University it was considered unnecessary to duplicate that by putting it into the Central Technical School; so the education authorities worked out a co-ordination scheme and arranged with the University what they would do in regard to technical work during the day and evening. After this was agreed to the whole of the expensive University equipment became available for evening students, who can either go there entirely for the work or take part of it in one of the Central Technical Schools. This plan is working very satisfactorily and saving a great deal of money. The University is working very heartily with the Technical School, and in their evening department doing very excellent work.

When the technical organization was set up at Leeds the number of University students was inconsiderable, and the Principal was very much exercised. Mr. Graham told him, "You will lose students for two or three or possibly four years; at the end of the four years we will begin to turn into the University pupils who have been in our grade 1, 2 and 3 schools." Now about 80 pupils have been through the whole scheme, and are ready to take advantage of anything the University can give them, and move ahead very rapidly. Young people were lifted out of the workshops at the age of 22 and sent to the University; several groups have already passed from the University and are now filling very important controlling positions, thus showing that the money has been exceedingly well spent.

#### STRONG SECONDARY EDUCATION WANTED.

When Mr. Graham came to Leeds seven years ago they had a Grammar School for boys and one for girls, sadly in need of reorganization; two small Catholic Schools; two Higher Grade Schools, largely fed by boys from the elementary schools at the age of 12; not secondary schools as he understood them, but simply continuations of an elementary school. What he wanted, and what they are now getting, was a secondary school system giving a secondary school education, having its foundations laid in the kindergarten at 5 to 7 years, steadily developing through the years to the age of 17 or 18, and then rounded off and completed as secondary education, making pupils ready for the University. Leeds now has a strong system running from 5 till 11 or 12. Then scholarship holders from the elementary schools, 200 or 250 a year, act as tributaries to the main school; they take hold of the idea of the secondary school, and are indistinguishable either on play-fields or in class-rooms from the product that has been in the school since the age of 5 or 6 or 8. That result is secured by the atmosphere that has grown up from the age of 8 years. The idea is to carefully select the Principals, then give them a free hand and let them develop a system of schools every one of which differs from every other within the system, so that all the schools will not be as like as peas from the same pod.

There are roughly 3,000 pupils in Leeds secondary schools; 25% come in with free places, and a fair number of others pay fees; 483 last year came in

directly from the primary schools and paid the fee. Probably 700 would come from the elementary schools of the city or outside, either to pay fees or come in on scholarships. They come in about the age of 10 or 12.

### SECTION 3: CONVERSATION WITH MR. BEES.

*Information obtained in "Conversation" with MR. BEES, Assistant Secretary for Education, Leeds.*

Mr. Bees, as assistant to Mr. Graham, said the educational movement in Leeds during the past 7 or 8 years had certainly been very rapid. Primary education had been too bookish; what was needed was to train the child in initiative so as to develop its capacity to do for itself, to take advantage of its surroundings and make the best of them. More education is wanted on the lines of Holbeck Trades Preparatory School, where the teacher does very little talking but acts as a guide, pointing out to the lad how he may get over his difficulties himself.

They had failed as regards girls by not having in mind sufficiently what the girls were to do afterwards. As 90% of them ultimately are in charge of homes, education should enable them to be good wives, good mothers, good home managers. The curriculum for girls ought to be threefold: On one line the study of English, which should consist very largely of reading, with the object of giving girls a liking for reading good matter and also something to occupy their leisure in a satisfactory way. On the second line they should have lessons on home-management, including personal hygiene and management of the home generally with certain associated lessons in good household cookery, laundry work, etc. The third line should be handicraft with its basis in needle-work, built upon which there might be simple dressmaking, etc. With a curriculum of that kind, girls between 12 and 14 could be made good home managers.

#### EDUCATION ONE COMPLETE PLAN.

Education had in the past been dealt with as so many distinct sections—elementary, secondary, technical, etc., whereas it is simply one complete thing, with each section running very smoothly into the other. In Leeds they had tried to secure the influence of the primary school teacher in helping suitable boys and girls to go forward into Trade Schools and also to go on to evening schools without wasting any time. Absence from school causes loss of power, of concentration of thought and application; hence the effort to have pupils come direct from the elementary to the evening school without an undesirable break. All that can be done to break down the barrier between the ordinary day school and the Technical School would be an advantage to the student and to the community. Another development was to secure the interest and co-operation of the employer of labor, who unfortunately now looks on the

SESSIONAL PAPER No. 191d

whole of his business simply as a commercial thing, as a matter of getting good dividends, the exception being to find one who looks on the employee as a human being who needs assistance in the way of education. A few employers have assisted their employees to enter Technical Schools. What is wanted is to get the employer to feel that in his business he needs boys who have taken a certain amount of technical instruction.

#### SECURING PARENTS' INTEREST.

Another line of development is to secure the interest of parents in education. Unfortunately now the parent is keen to get the child away from school at the earliest possible moment, and looks on education as something that must be done, but something that he would rather had not to be done. No doubt many parents need the money that can be earned by the children, but they do not seem to be able to look beyond the few shillings of earnings. Crowds of boys are leaving day school for various employments which give them a fair wage for three or four years; then when the boy is becoming a man and wants more wages he has to leave, and some younger boy from the Technical School takes his place, while the untrained boys go to swell the army of casual workers, and finally a large number of them get into the ranks of the unemployed.

Recently an Advisory Committee for Juvenile Employment has been appointed with two important functions. The first is to give the child, and the parent wherever possible, advice as to the child's employment. It is hoped a large percentage of parents will take advantage of such advice and put their boys into employment which will likely be lasting, and not throw the boy on the streets in three or four years. The Committee will also watch the boy or girl after getting into work, and encourage them to take advantage of an opportunity for further education.

### SECTION 4: HOLBECK DAY TRADES PREPARATORY SCHOOL.

This School was opened in 1906. The building was at one time a Mechanics' Institute, but has been altered and refitted in a simple manner with suitable machinery and apparatus. The lathes are driven by foot power.

Any boy of 13 who has attended an Elementary School regularly is eligible for admission. The course of instruction is calculated to answer two very useful purposes: (1) the hand, eye and brain are trained on sound common-sense lines with a view to the ultimate employment of the boy in some branch of engineering; (2) the boy has many opportunities of observing and taking part in different kinds of work and processes. His interest is aroused and stimulated. He competes with his class fellows, and often develops ability in quite unexpected directions. By this means the boy is encouraged to select some particular branch and to some extent to specialize thereon, with a view to following it up in the works. When the time comes for him to be drafted into the particular shop

3 GEORGE V., A. 1913

or office selected, he goes with a clear understanding of what is before him and with a mind fully prepared to master all the intricacies of his craft in record time. The leading local employers are in full sympathy with the aims of the school, and evidently the time is not far distant when a full preparatory trade course will be an essential qualification for entry into the better class engineering works.

The course of instruction covers 2 years, and is laid down with the object of improving the general education, developing common-sense and reasoning power, and enabling a boy to acquire the necessary manual dexterity to ensure that he shall be put at once on useful work when he enters the shops.

An undertaking is required from parents that boys will not be withdrawn in less than one year, but they are allowed to go whenever suitable openings to lucrative positions occur. The school authorities prefer that the lads should stay in this school at least a year and a half. The teachers take a personal interest in the lads, and are continually on the look out for places for them.

The attitude of the students was noticeable for earnestness, interest and keenness.

Our Commission secured specimens of the boys' work in this school. These include patterns, castings made therefrom, fine tools, work in tin, etc., The workmanship is excellent as to accuracy and finish.

#### PLAN OF INSTRUCTION.

The instruction is divided into three sections, each receiving about the same amount of time, viz.; English subjects, Mathematical subjects, and Shop practice.

The scheme of instruction for the first year is as follows:—

Mathematics (Practical).....	5	hours	per	week.
Mechanics.....	3	“	“	“
Technical Drawing.....	4 $\frac{1}{2}$	“	“	“
Metal-work.....	6	“	“	“
Wood-work.....	2	“	“	“
English.....	6	“	“	“
Drill.....	1	“	“	“
	<hr/>			
	27 $\frac{1}{2}$	“	“	“

Visits to works, rambles, etc., are also arranged.

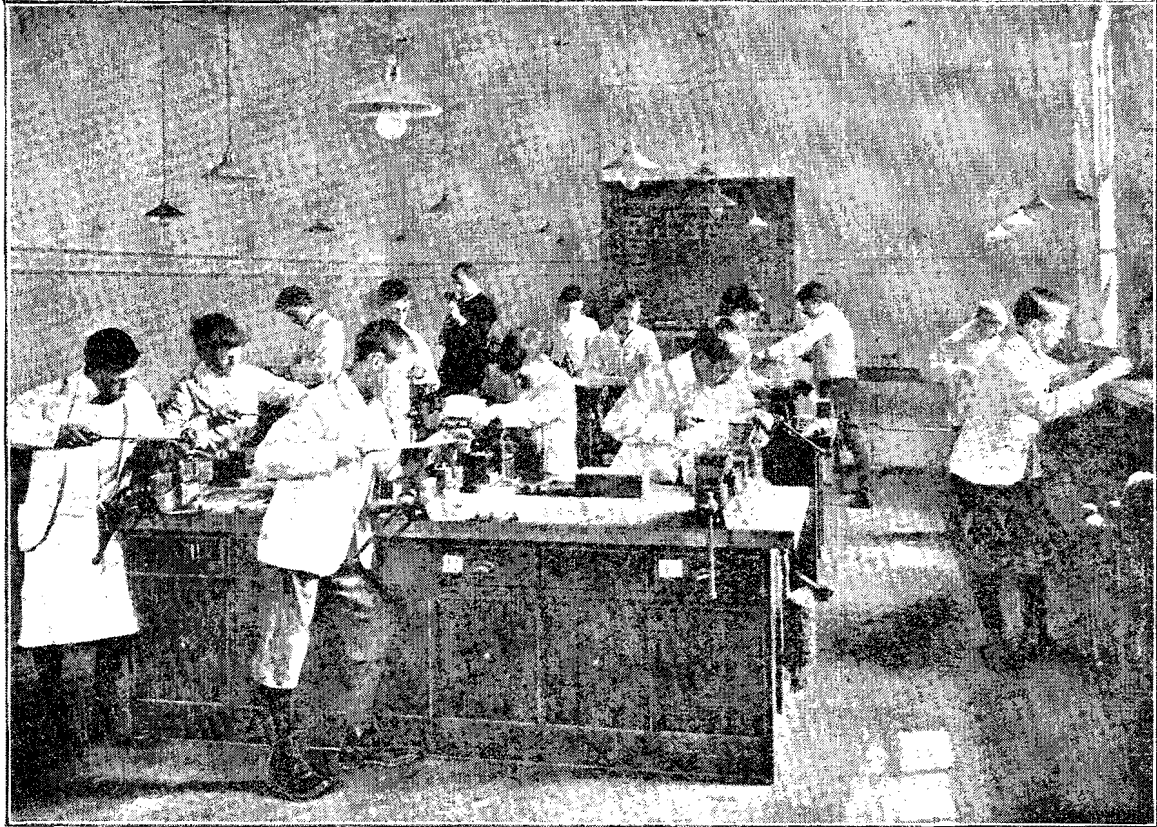
The second year's Course is arranged on similar but more advanced lines, and students of exceptional promise are encouraged to specialize in their work.

#### SYLLABUS OF WORK.

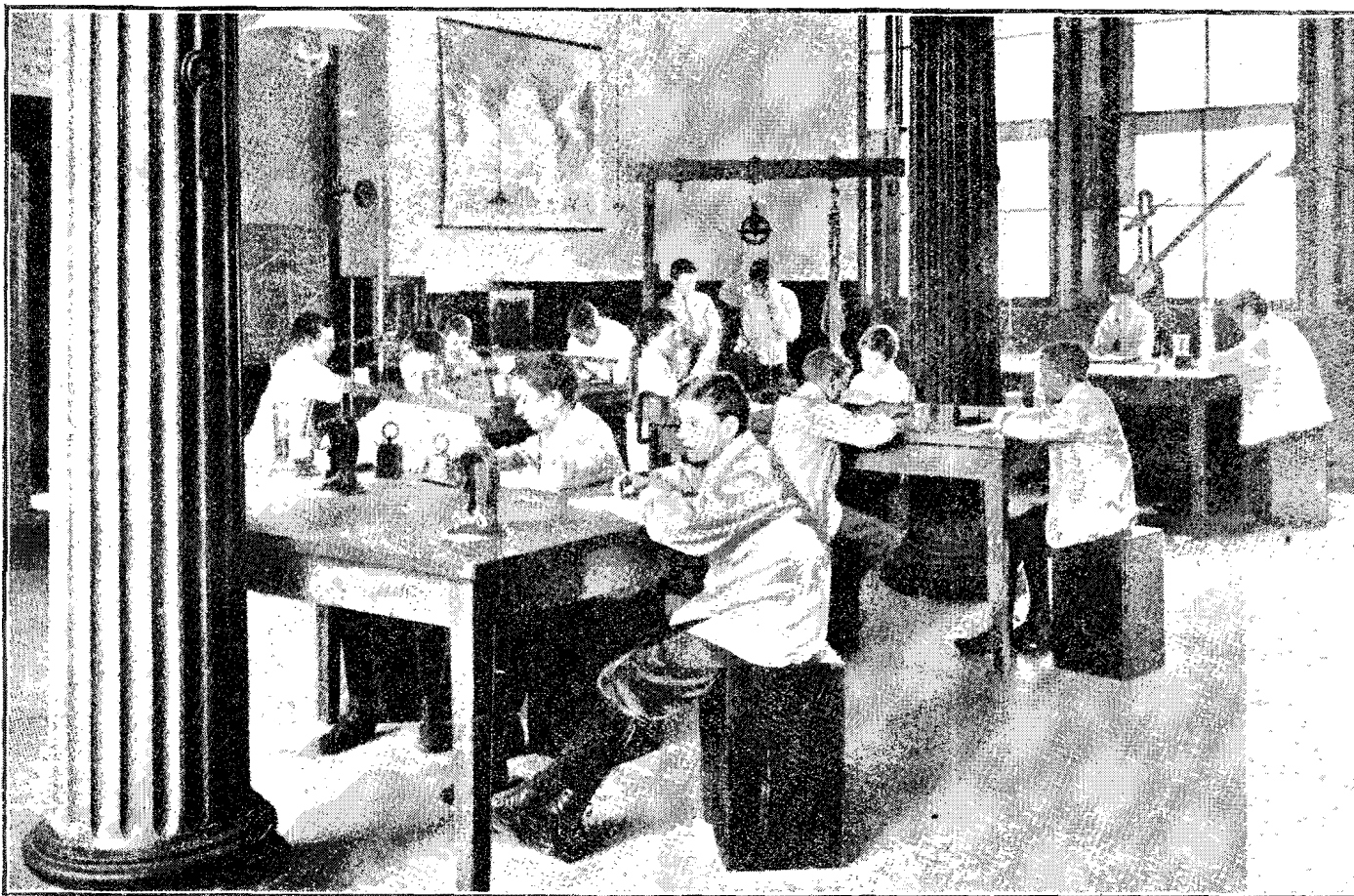
*Practical Mathematics.*—Revision of Vulgar and Decimal Fractions, English and Metric Units of Measurement, Methods of Conversion, Mensuration, Application to Workshop Problems, Contracted Methods, Averages, Percentages, Simple Algebraic Expressions, Formulæ, Ratio and Proportion, Equations, Graphs, Logarithms, &c.

*Mechanics.*—Experimental Verification of Simple Laws, Practical Determination of Areas, Volumes, and Weights, The Balance, Mass and Weight, Displacement, The Principle of Archimedes, Density, Simple Calculations on Force, Work, Power, Horse Power, &c.

Principle of Moments, the Lever, Pulley Blocks, Wheel and Axle, Triangle of Forces, with practical applications.



METALWORK SHOP: HOLBECK DAY TRADES PREPARATORY SCHOOL.



MECHANICAL LABORATORY

MECHANICAL LABORATORY; HOLBECK DAY TRADES PREPARATORY SCHOOL.



WOODWORK SHOP: WOODHOUSE DAY TRADES PREPARATORY SCHOOL.

Short Lectures are given on the above subjects, and the student, by means of actual experiment in the laboratory, *finds out for himself* the important principles involved.

*Technical Drawing.*—The care and correct use of Drawing Instruments, the principles of Practical Plane and Solid Geometry, including graphic solution of problems. The method of making dimensioned hand sketches of simple machine or building details from actual examples. The preparation of working drawings, Tracings, and Blue Prints.

*Metal Work.*—Uses of ordinary Bench Tools. Principles of accurate Measurements and Gauging. The Lathe, Drilling, Punching, and Shearing Machines. The Forge, Soldering and Brazing.

Practical Examples involving Filing, Fitting, Screwing, Drilling, Turning, Soldering, &c.

Lessons on the physical properties of Metals, Cast-Iron, Wrought-Iron, Steel, Brass, and other alloys. Hardening and Tempering, Case-hardening. Workshop Processes.

*Woodwork.*—The use of the ordinary Wood-working Tools, the Wood-turning Lathe and its accessories, useful Joints in Woodwork. The Elements of Pattern-making, simple Patterns, Core Prints, Core Boxes, &c.

*English and Geography.*—Reading and Spelling. Correct use and meaning of Technical Terms. Clear Expression of Simple Ideas. Lecture and Laboratory Notes, Essays, Letter writing. Industry and Trade Materials used in Construction, where obtained, general Distribution, &c.

*Drill.*—Physical Exercises, Dumb-bell and Bar-bell Drill, Swimming, &c.

The attention of Parents and Guardians is called to the following points:—

(1) 90% of the boys who have completed the 2 years' course at this school have entered skilled occupations either as draftsmen, mechanical or electrical engineers, or some branch of the building trades.

(2) An undertaking is required on admission that a student shall not be withdrawn within one year except with the consent of the Committee.

(3) Regular and punctual attendance is essential. In case of lateness or absence a note of explanation is expected from the parent.

(4) Home lessons of about one hour's duration will be set regularly, and it is expected that these will be carefully and systematically prepared.

(5) The Head Master may be consulted at any time during school hours, or by appointment.

(6) The Fee is 7s. per term payable in advance.

(7) All necessary books, apparatus, stationery, tools, etc., are supplied free of charge.

## SECTION 5: TECHNICAL EVENING SCHOOLS.

The organization of Evening work in Leeds follows five main lines:—

I. Technical and Technological Education and Training.

II. Commercial Education and Training.

III. Art Instruction and Training.

IV. Domestic Arts Education and Training.

V. Training Courses for Teachers of all grades.

### TECHNICAL AND TECHNOLOGICAL EDUCATION AND TRAINING.

The evening work has been co-ordinated and systematized. It follows a continuous line from the general Evening Schools, through the Branch Artisan Schools and the minor Mechanics' Institutes, to the Advanced Technical Schools,



SESSIONAL PAPER No. 191d

situated in the Centre, South, and West of the City, and ends in the University of Leeds, thus:—

Grade I.—General Evening Schools (Preparatory Courses).

Grade II.—Holbeck Mechanics' Institute, Hunslet Mechanics' Institute, Woodhouse Mechanics' Institute, Wortley Working Men's Institute, (Elementary and Intermediate Courses). Branch Artisan Schools (Elementary Courses).

Grade III.—Central Technical School (The Leeds Institute), Cockburn Technical School, West Leeds Technical School (Advanced and Honours Courses).

Grade IV.—The University of Leeds (Special Lecture and Honours Courses).

The scheme of evening work provides complete courses of instruction and training for persons engaged in,—

- (1) Engineering Trades.
  - (a) Mechanical Engineering.
  - (b) Electrical Engineering.
- (2) Electrical Industries.
- (3) Building Trades.
- (4) Sanitary Work.
- (5) Leather and Boot Trades.
- (6) Clothing Trades.
- (7) Chemical Industries.
- (8) Bread Making and Confectionery.
- (9) Mining.
- (10) Textile Industries (Woollen, Worsted, Linen, &c.).
- (11) Printing.

The courses of study in all branches are of a practical character, and the instruction is in charge of experienced teachers specially qualified in their respective subjects.

#### *Grade I.—General Evening Schools.*

Preparatory sections for youths and men are attached to the various Branch Artisan Schools where necessary.

The General Evening Schools meet three times weekly, from 7.30 to 9.30 p.m.

The course of instruction in the Preparatory Schools is specially arranged to prepare pupils later to take up with advantage one of the various trade courses provided in the Branch Artisan Schools or in the Central Technical Institutes. It gives a thorough grounding in fundamental subjects:—English, Mathematics, Hand Sketching and Instrumental Drawing, Woodwork, or Wood-carving, including Clay-modelling—without which it is useless for pupils to attempt any of the trade courses.

A higher fee is charged a pupil who does not take a grouped course.

#### *Grade II.—Branch Artisan Schools.*

The course includes Experimental Mathematics, Practical Mathematics, Practical Plane and Solid Geometry and Hand Sketching, English, Mechanical Laboratory work.

Fee for course, 50c.; higher for those not taking group course.

*Grade III.—Advanced Technical Evening Schools.*

At the Advanced Technical Evening Schools, courses of instruction have been arranged for persons engaged in:—

- (i.) Engineering Trades—
  - (a) Mechanical Engineers.
  - (b) Electrical Engineers.
  - (c) Motor-car Engineers.
- (ii.) Electrical Industries—
  - (a) Wiremen and Linemen.
  - (b) Post Office and Telephone Clerks.
- (iii.) Building Trades and Professions—
  - (a) Carpenters and Joiners.
  - (b) Bricklayers and Masons.
  - (c) Plumbers.
  - (d) Surveyors.
  - (e) Architects.
- (iv.) Sanitary Work—
  - (a) Inspectors of Nuisances.
  - (b) Women Health Visitors.
- (v.) Leather and Boot Trades—
  - (a) Boot and Shoe Manufacture.
  - (b) Leather Manufacture.
- (vi.) Clothing Trades—
  - (a) Tailors' Cutting.
  - (b) Practical Tailoring.
- (vii.) Chemical and related Trades—
  - (a) Chemists:—Works Chemists, Analytical Chemists, Pharmaceutical Chemists.
  - (b) Bakers and Confectioners.
  - (c) Photographers and Process Workers.
  - (d) Oil and Soap Workers.
  - (e) Gasworks Employees.
  - (f) Metallurgists, Iron and Steel Workers.
- (viii.) Textile Trades.
- (ix.) Printing.
- (x.) Farriery.

Courses are provided also in Botany, Geology, Physiology, Hygiene, &c.

*Grade IV.—The University of Leeds.*

Special courses for advanced students in Mechanical and Electrical Engineering, Leather Manufacture, Mining, Textile Industries and Dyeing. An attendance of six hours a week throughout the session is required, unless for special causes.

Fee \$2.50 for each group course.

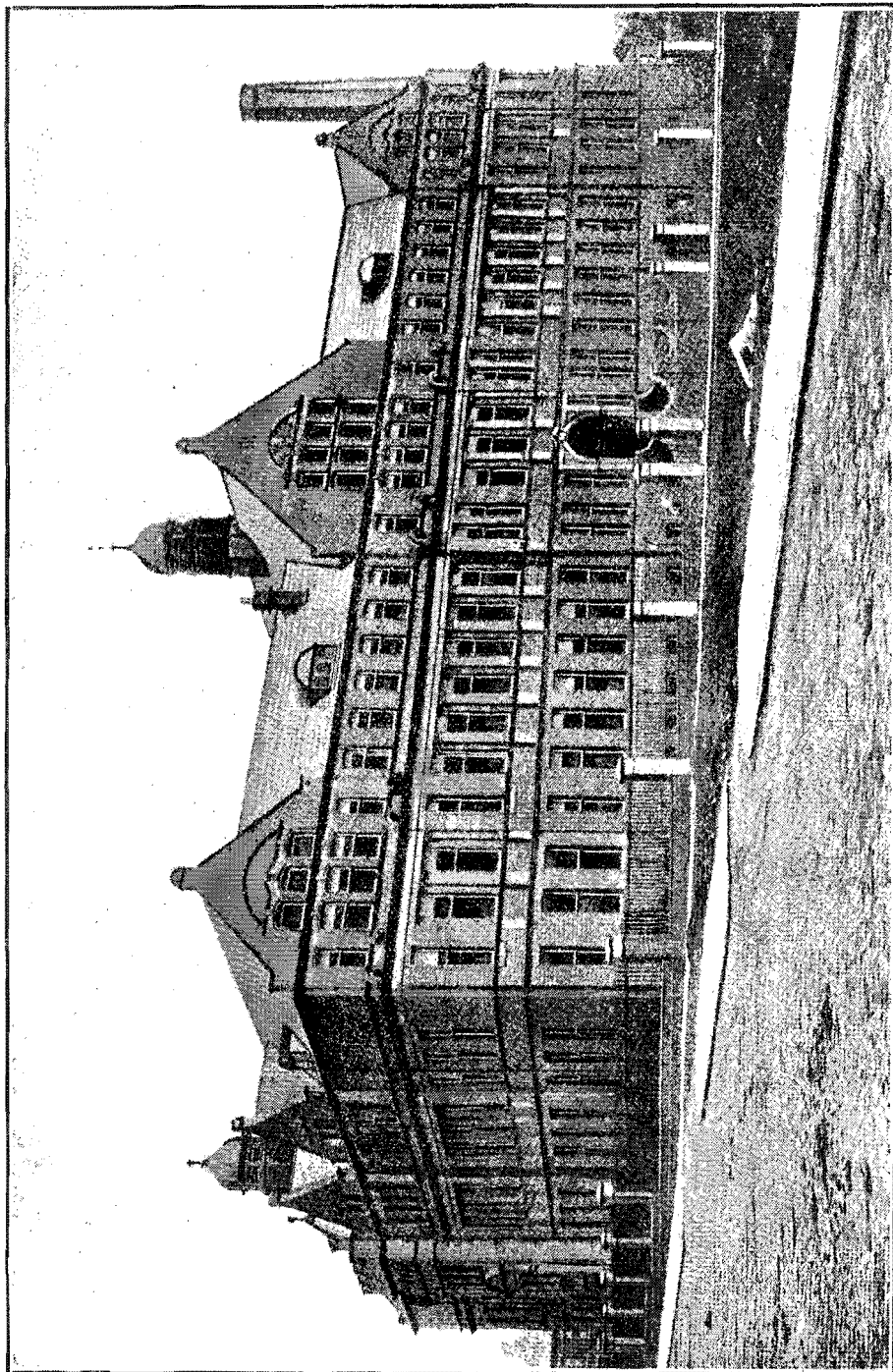
## COMMERCIAL EDUCATION AND TRAINING.

The work in commercial education and training has been co-ordinated and systematized. It follows a continuous line from the General Evening Schools, through the Branch Commercial Schools, to the Advanced Schools of Commerce, and ends in the University of Leeds, thus:—

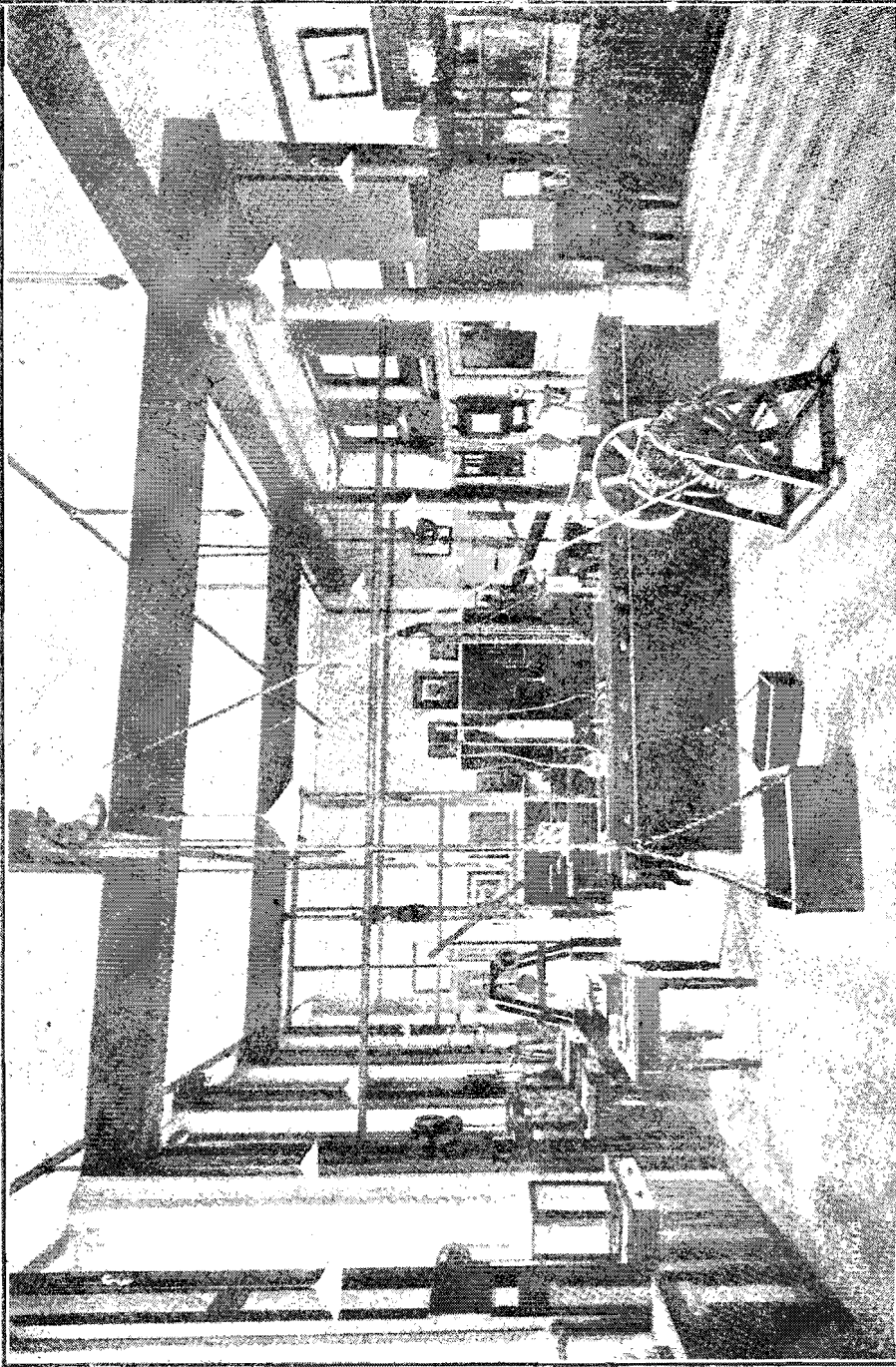
*Grade I.*—General Evening Schools (Preparatory Courses).

*Grade II.*—Branch Commercial Schools (Elementary and Intermediate Courses).

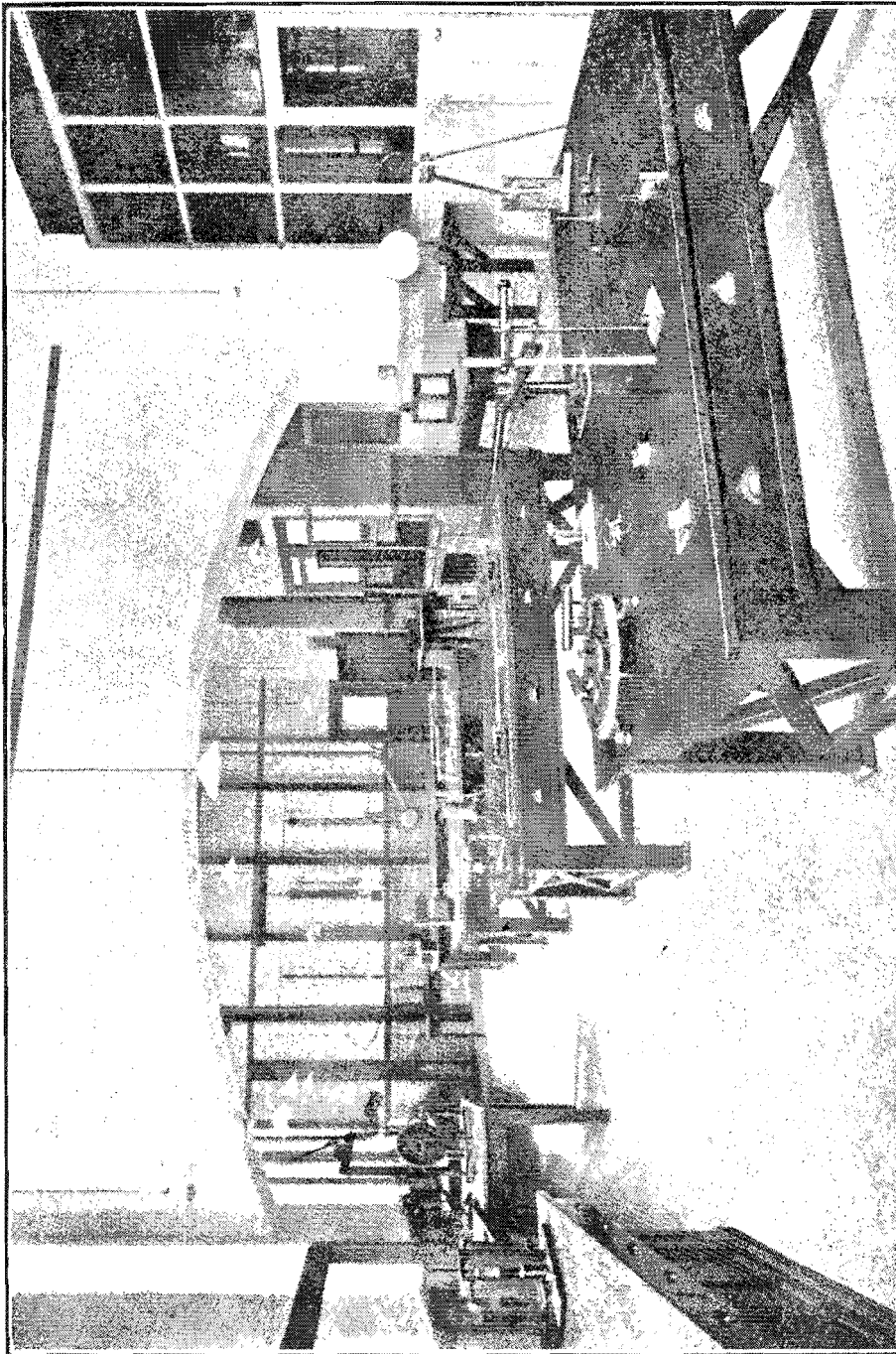
SESSIONAL PAPER No. 191d



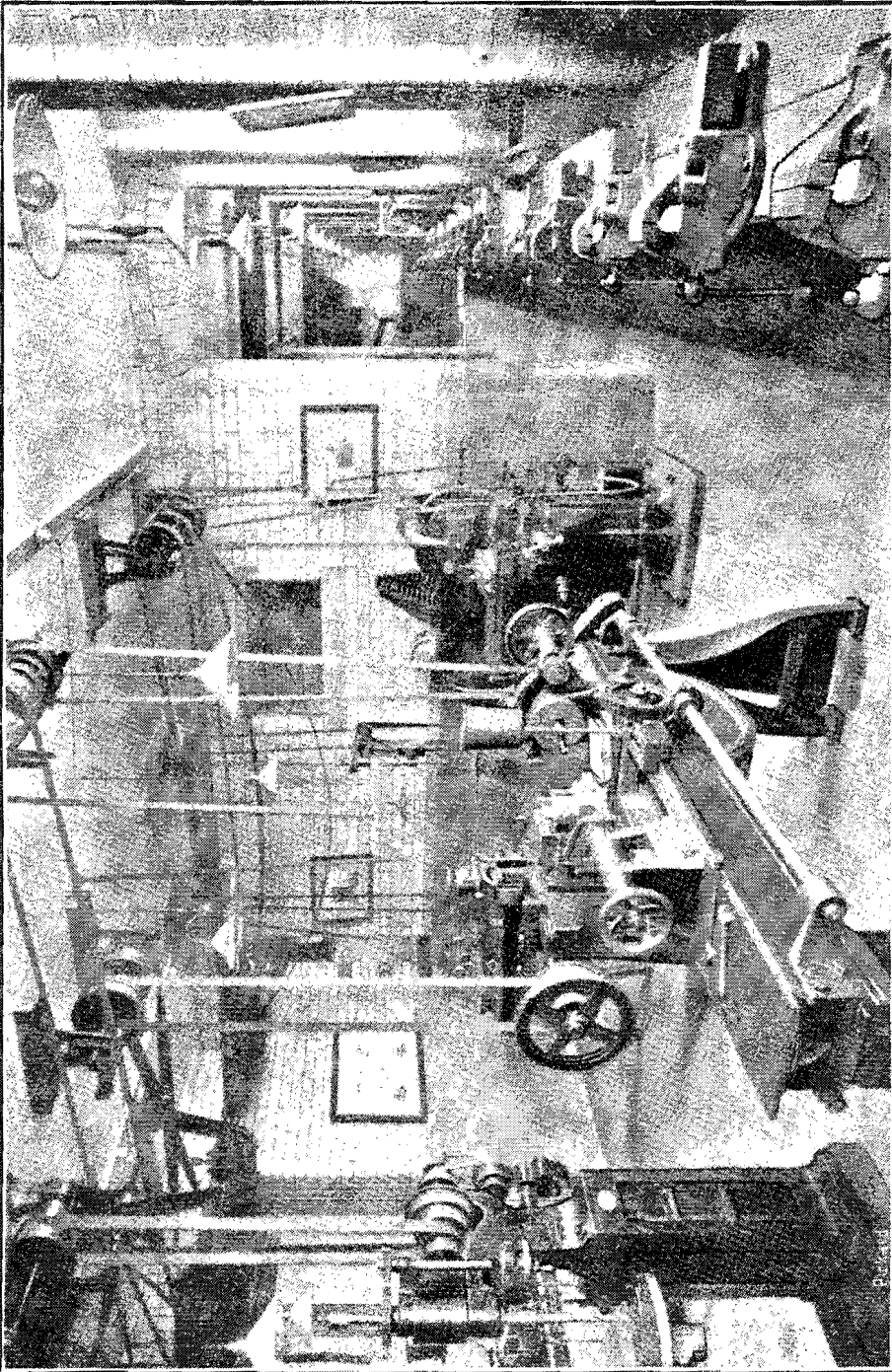
COCKBURN HIGH SCHOOL, LEEDS.



COCKBURN HIGH SCHOOL: MECHANICAL LABORATORY.



COCKBURN HIGH SCHOOL: ELEMENTARY PHYSICAL LABORATORY.



COCKBURN HIGH SCHOOL: ENGINEERING WORKSHOP.

## SESSIONAL PAPER No. 191d

*Grade III.*—Central School of Commerce (Central High School), Cockburn School of Commerce (Cockburn High School), Western School of Commerce (West Leeds High School), Intermediate, Advanced, and Honours Courses.

*Grade IV.*—The University of Leeds (Special Lecture Courses).

In the comprehensive scheme of commercial education for the City, opportunities are provided for young persons who intend to follow a commercial career to obtain a complete and intelligent knowledge of all branches of commercial practice and to secure such training as will fit them for the highest positions in the commercial world.

The courses of study are of a thoroughly practical character, and in schools of all grades specially qualified teachers have been appointed to take charge of the instruction.

## SCHEME OF EVENING TECHNICAL COURSES IN COMMERCE.

<i>Preparatory.</i>	<i>Elementary.</i>	<i>Intermediate.</i>	<i>Advanced.</i>	<i>Honours.</i>
1. English and Pre-cis.	1. English.	1. Commercial Arithmetic.	1. Commercial Practice and accompanying Arithmetic.	1. Accountancy and Commercial Practice, Importing and Exporting under various conditions.
2. Handwriting Figuring.	2. Commercial Arithmetic.	2. Commercial Practice.		2. Banking and Currency.
3. Arithmetic and Mensuration.	3. Commercial Practice.	3. Book-keeping	2. Advanced Book-keeping.	3. Commercial Economics.
4. Geography and History.	4. Commercial Geography.	4. Commercial Geography and History	3. Banking and Currency.	4. Commercial Law.
5. Drawing.	5. Shorthand.	5. English and Shorthand (with Typewriting) or Foreign Language.	4. Commercial History and Economics.	5. Foreign Language or Shorthand and Typewriting.

There are courses for Municipal Officers, Bankers, Grocers and Provision dealers, also lectures on Citizenship.

## ART INSTRUCTION AND TRAINING.

This section is dealt with under Chapter XI on Drawing, Design and Art.

## DOMESTIC ARTS.

The work as a whole has been co-ordinated and correlated. It follows a continuous line from the General Evening Schools for girls, through the Branch Young Women's Institutes, to the Central Institute for girls and women.

The group courses aim at imparting a thoroughly useful knowledge of domestic and general subjects. The various schools are provided with well-

equipped Cookery rooms, Needlework and Dressmaking rooms, Starching and Ironing rooms, Laundry, etc.

Students in Dressmaking and Millinery should usually have received prior instruction in Plain Needlework.

Students must provide their own materials for Plain and Art Needlework, Dressmaking and Millinery classes, subject in each case to approval of teacher. Students taking Needlework and Dressmaking are strongly advised to attend a special Course in Art as applied to Needlework and Dressmaking. Students taking Cookery might with great advantage enter for a Course in Elementary Science in preparation for or in conjunction with a Course in Hygiene and Home Management.

As an alternative, but one considered likely to be less effective, the full course may be organised in two divisions; — (*a*) Hygiene and Home Management, Household Accounts, Cookery and Laundry; (*b*) Drawing and Design, Needlework, Dressmaking, and Millinery. A student should in this case devote at least two years to the work of one division before passing to the other. In Division (*a*) Hygiene and Home Management and Household Accounts should be taken for the first two years, generally with only one of the subjects, Cookery or Laundry; in Division (*b*) Needlework, and Drawing and Design should be taken for two years with one of the subjects Dressmaking or Millinery.

At the Central Institute there is an excellent series of class-rooms and specially equipped workrooms for Needlework, Dressmaking, Millinery, Cookery, and Science work in connection with the Domestic Arts. A staff of specialists and highly qualified assistants has charge of the classes. The fee per session for each class is \$2,50, or \$3,75 if two subjects are taken.

## SECTION 6: TRAINING COURSES FOR TEACHERS.

The City of Leeds has provided a Training College through which to obtain a supply of thoroughly trained teachers for its schools. A few facts regarding this College are stated to illustrate the character of the provision being made.

The College is for men and women who intend to become teachers in Public Elementary Schools, and is conducted under the regulations of the Board of Education (London) for the Training of Teachers for Elementary Schools (two years course). The Governing Body of the College is a Sub-Committee of the Leeds Education Committee.

A fine old estate containing an elegant manor-house was purchased, and subsequently additional land for playing fields was obtained, making the total extent of the Training College estate now over 90 acres. There is a fine garden for Nature Study, Gardening, Fruit Culture and Botany, and also good kitchen gardens. The estate is on rock covered with a few feet of good soil, and contains a good water supply within its boundaries. It is easily approached from the University and the Leeds School of Art, from the markets, and from schools of all types.



SESSIONAL PAPER No. 191d

One of the most pleasant features of the site is the extensive woods through which walks ramify in various directions. Trees are scattered about the estate, and provide ample shade for outdoor reading in summer time.

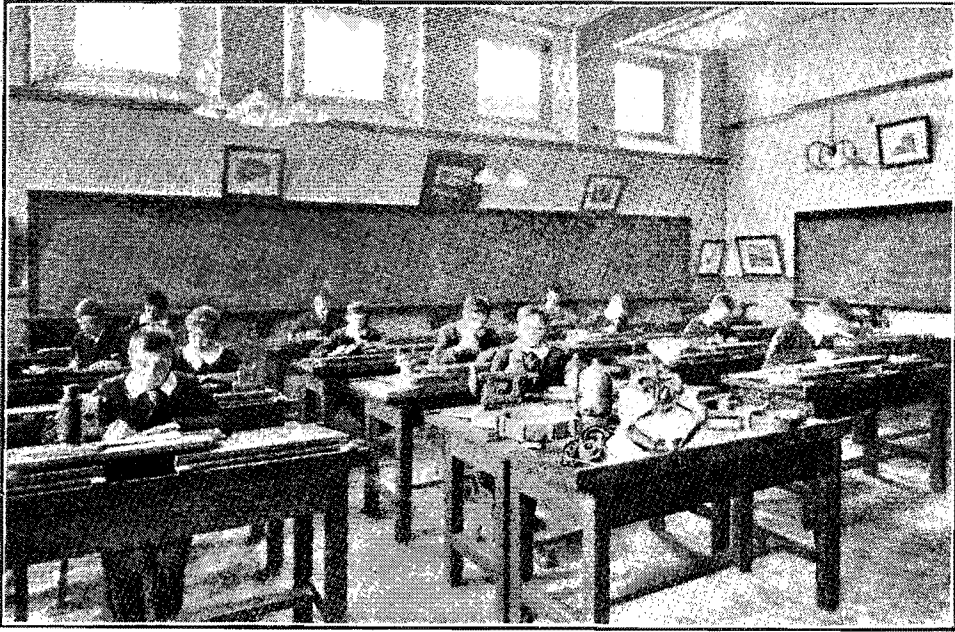
The new buildings, which were in progress of construction at the time of the visit of the Commission, consist of an Educational Block, together with 8 Halls of Residence—3 for men and 5 for women; and provide accommodation for 480 students—180 men and 300 women. There are in addition a Sanatorium, Swimming Bath, Laundry, and Games Pavilions.

The Halls of Residence are arranged in order to stimulate as far as possible the home feeling rather than the institutional feeling. Each student is provided with a study bedroom, so furnished that during the day it has the appearance of a sitting room. In addition to these private rooms, each Hall possesses its Library, Dining Room and Common Room. Students therefore have the advantage of privacy in work and also of opportunities of corporate life.

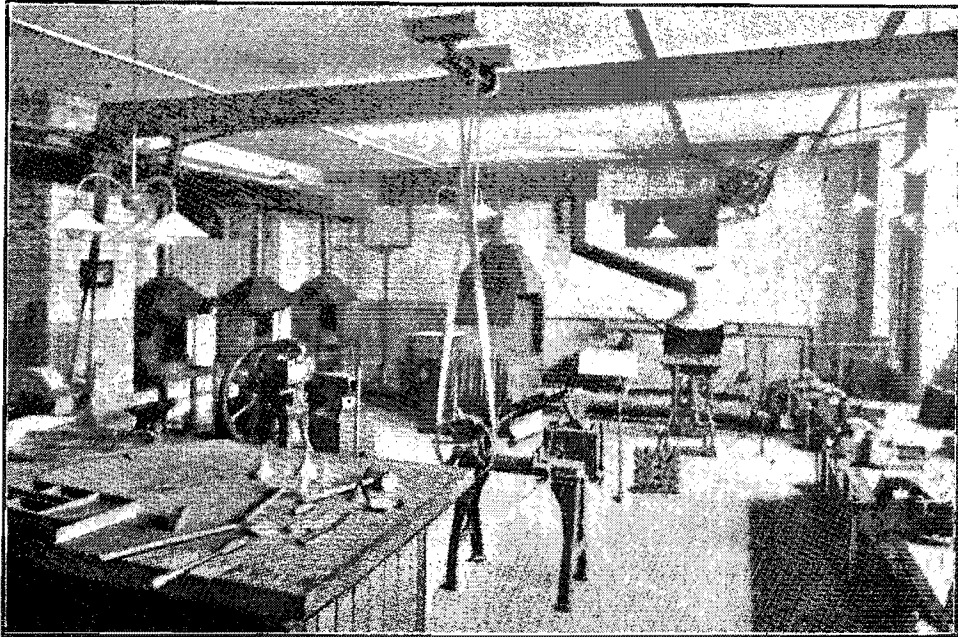
## SECTION 7: UNIVERSITY OF LEEDS.

Begun in 1887 in the rising City of Leeds as Yorkshire College, and affiliated to Victoria University, the University of Leeds was, with Owen's College, Manchester and University College, Liverpool, in 1904 converted into an independent University. Its evolution had been gradual, from a Science & Technology School in 1874. Each of these was made into a Faculty. The Faculty of Arts was added in 1877, and Medicine in 1881. It has been a remarkably energetic and successful training school for scientific workers. Its successful application of chemistry to leathermaking and its complete sympathy with the industries of Leeds are well known abroad. It has gained a great reputation also in Textile Industries and Dyeing (Chemical). In its four Faculties,—Arts, Science, Technology and Medicine, it has a staff of 37 professors, 21 lecturers and 62 assistants, totalling 120, who successfully taught in 1908-9 its band of 932 day students, 64 occasional students and 28 post-graduate Students, of whom 378 were taking Pure and Applied Science. Besides these, there are Evening Classes, attended by 233 students from the industries of the City.

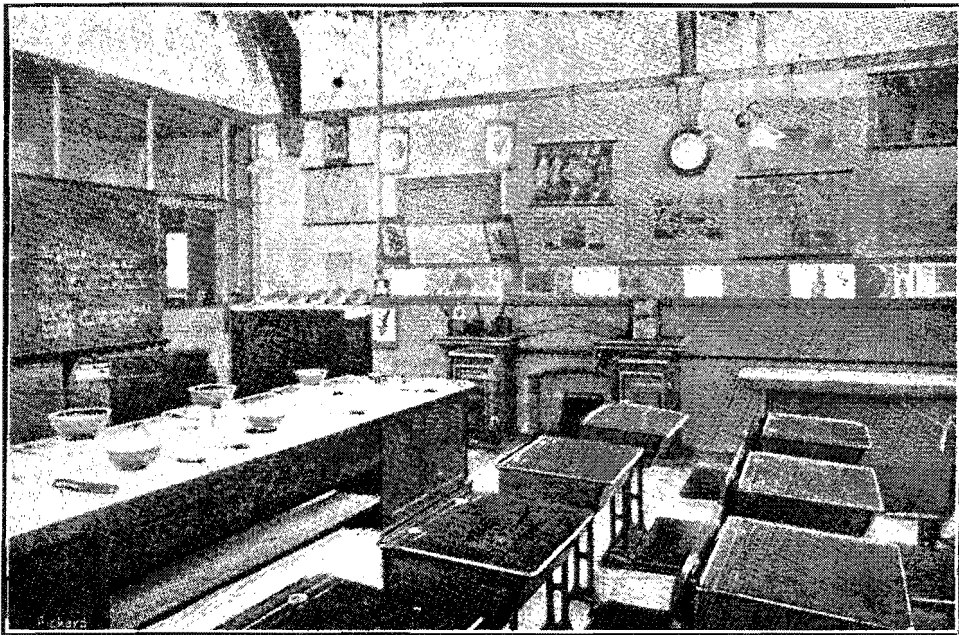
A strong feature of Leeds University is that it has Advisory Committees of leading business and professional men and manufacturers for each of its main Departments. The chief of these Committees are,—Finance, Textile Industries & Dyeing, Mining Engineering, Leather Industries, Elementary & Secondary Training, Coal Gas & Fuel Industries, Higher Commercial Education, Agricultural, University Extension.



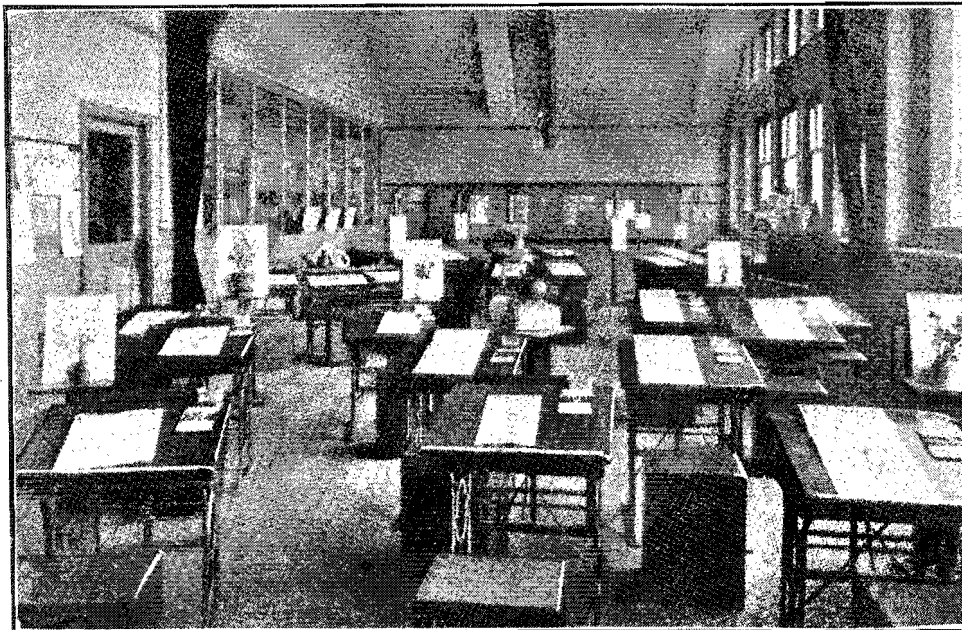
MACHINE DRAWING ROOM.



COCKBURN HIGH SCHOOL: THE FORGE.



COOKERY DEMONSTRATION ROOM.



COCKBURN HIGH SCHOOL: ART ROOM.

## CHAPTER IX: HALIFAX.

### SECTION 1: CONVERSATION WITH DR. J. CROWTHER.

*Information obtained in "Conversation" with DR. J. CROWTHER, Principal of the Municipal Technical College.*

Halifax is a city of 100,000 with a variety of industries, chiefly woollen mills, dye works and engine works. A large number of half-timers work in the textile mills in the morning and attend school in the afternoon, or *vice versa*. They are allowed to commence as half-timers at 12, and generally work that way for a year. At 13 they are allowed to discontinue school, provided they have made not less than 350 attendances a year for 5 years consecutively. They are not allowed into the workshops until 14. In the worsted mills there is not a living wage, *i.e.*, 21s. a week, when they attain manhood, for more than one out of eight of the boys who start as half-timers. Others may become overlookers or such, and there are positions where they may earn 30, 35, or 40 shillings; but even at 21s. the employers would be glad to get rid of the men who are doing boys' work. Hence the endeavour must be to guide these boys from the textile mills. That was one of the principal things that led to the establishment of the Preparatory Trade School, where all are prepared for different industries.

When boys leave school, they are visited at their homes and advised to go into the Evening Schools. Every week the City Education Office sends to the Technical College the names of all pupils leaving school that week. A clerk is detailed to visit each boy's home, taking a syllabus of the Evening School and explaining what is done there, and the benefit of it to any vocation in which the boys are engaged. In some occupations, such as a greengrocery, the boy's tendency is to sever his connection with education altogether, because he works at night.

#### 65 PER CENT OF BOYS JOIN EVENING CLASSES.

In Halifax there are 70 or 80 solicitors who have office boys simply for opening doors, stamping envelopes and posting letters, and when those boys reach 16 or 17 there is nothing suitable for them. This College therefore tries to get hold of these lads and to find them suitable positions, and if possible guide them into them. By personal visits to pupils leaving school a fairly large percentage of them are got into Evening Classes. The clerks who visit these students have had experience of going through the classes themselves, and they can usually handle all cases, but when anything exceptional arises the Principal makes a personal visit.

SESSIONAL PAPER No. 191d

When positions are obtained for boys in that way, they go to Evening Class, not to Day School. The clerks who visit the homes go through the preparation of examination papers, seeing to the questions, answers, etc. When the clerk visits the young people, he cannot promise them places but can simply say what has happened to others.

A feature about the Evening Schools is that without exception the vocational commercial teachers started in the Evening School as students. They are clerks in offices who, having gone through the commercial course in the College, have come back as teachers. The same remark applies to dressmaking and millinery.

These classes are practically free, as the fee is returned on the pupil making 90% of possible attendances. It is difficult to find such attendances and such homework in any other place in England. About 65% of those who leave Day School attend Evening Classes. A special effort was made to ascertain what was possible in that matter, and it was found that 15% could not stand the pace; another 15% were undesirables, who might have been defective in Day Schools, or have had other illnesses. At one particular period a big effort was made, and over 80% were got into the schools, including boys and girls. The big transition from the Day School, of five and a half hours per day and no homework, to 50 hours per week in the mill is to be considered.

#### CO-OPERATION OF EMPLOYERS.

Employers will help very much so long as the plan does not touch their pockets, some being very enthusiastic about the College and always praising it sky-high; but if it costs them two or three shillings a week, that is different. There is not the same necessity for canvassing employers in Halifax as in most towns, because the Educational Authorities keep in close touch with the students from the time they leave school. In all the textile mills and engineering shops the school has a big poster outlining the classes at the beginning of each session. The Chamber of Commerce gives prizes, and this has a very beneficial effect on the pupils, because it represents the employers of the town. Each year the Chamber awards 4 gold and silver medals, 8 bronze medals, and about £20 in money prizes, and there is invariably a large number of employers present at the prize distribution. The engineering employers, through their Federation, offer prizes and medals and money each year to the most successful students in the Engineering Section.

The house painters take a very deep interest and supervise the work, adjudicating upon it, etc. They used to give prizes, but there was a disagreement with the School, as the painters wanted to award prizes on what the School considered the purely mechanical side, as apart from the artistic, and to make their prizes dependent upon marbling and graining—purely mechanical arts—and time tests, while the School wanted a more artistic course whereby the students would go into such work with a tendency towards a general uplift. The painters therefore continued to do their work, but were relieved from giving the prizes.

Employers allow the school representatives to go into the works and distribute circulars during working hours. There is no place in Halifax into which

the Principal could not go at any moment and speak to the apprentices, and Mr. Crowther did not think there would be any objection to his taking a class in and showing them around the works. One large engineering firm offers to pay the whole of the fees for their apprentices, and there is no direct opposition on the part of the employers.

#### PREPARATION OF APPRENTICES.

Mr. Crowther pointed out that this is not really a trade school at all, but simply leading up to a trade and supplementing shop experience—quite a distinct thing altogether. To him it was an ideal scheme for young boys in a country such as Canada, attempting to develop its industries. In Halifax no attempt is made to teach trades but what is claimed is that after students have left the school they are specially intelligent apprentices. Then the schools meet another purpose, that of the limits of specialization, which is fairly prevalent in England. Indeed in engineering industries apprentices cannot get the training they could in old times. The object of this school is to give them an insight into the various sections of the trade, and when they get into the works, they are sufficiently intelligent to be able to pick up very rapidly. Even if a boy is confined to one job he can soon switch off and get into another.

The Incorporated Chamber of Commerce, representing general, textile and engineering employers, passed a resolution strongly in favour of the establishment and development of Preparatory Trade Schools, and the Federated Trades & Labour Council also passed a resolution strongly advocating the establishment and development of Preparatory Trade Schools, and that the schools should be maintained largely by funds from the Central Authority. This addendum was put in because these lads after being trained go everywhere. The President of the Local Branch of the Engineering Employers' Federation expressed unqualified approval of the scheme of preparatory training for apprentices, as admirably meeting a requirement in the engineering trade. He believed the scheme would be of greater advantage locally than some of the higher branches of training, because practically all the youths trained under this scheme can find employment in their own town, as against a very small percentage with the higher and more purely scientific training.

#### OBJECTIONS TO COMPULSORY ATTENDANCE.

In Halifax the percentage of pupils between 14 and 16 is higher than in Germany, where attendance is compulsory. If small employers in engineering allowed an apprentice to attend in the day time, the machinery would stand still, because apprentices cannot be duplicated and idle time avoided, as in large concerns. Another difficulty in regard to compulsory attendance is to determine in which branch of industry the apprentice must attend. A plumber with one apprentice would be much more severely hit, because when he goes out on a job, he must take his apprentice with him; that is one of the regulations of the trade. One such plumber in the neighbourhood of Halifax is

SESSIONAL PAPER No. 191d

over three miles from the nearest tram; suppose his apprentice is compelled to attend, where is he to go? That is where compulsory attendance would break down; and if these difficulties arise in a County Borough, what must it be in a County area? Then there are a number of seasonal industries, such as housepainting, very busy in summer and very slack in winter. Housepainters let their apprentices come to school in winter for two hours a week without any reduction of wages, because the conditions of the trade favour that; but other industries are busiest in the winter; so that it would be difficult to put compulsory attendance into operation. Lastly, although they might be compelled to come to schools, they could not be compelled to take instruction or benefit by it.

Mr. Crowther differentiated between compulsory education before and after 14, because beyond 14 the student is no longer a child. His opinion was that before many years, England would have compulsory attendance for night schools, but he was against it, he and Mr. Reynolds, of Manchester, being the two great opponents of compulsion; and he would leave no stone unturned to prevent it. "Other countries have compulsory attendance, yet cannot equal what we are doing here in the way of attendance. You can persuade the pupils to come if you take the trouble, but if you are going to sit in the office and simply send out a circular or postal card and let it end there, eliminating the personal equation altogether, then there is no sympathy. On the other hand, if you can get at the boy, you can do a lot of good, not only for his industrial and technical education, but also so far as the moral side of life is concerned."

#### BETTER TO PUT COMPUSSION ON EMPLOYERS.

Dr. Crowther thought the schools and institutions would have everything to gain by an arrangement requiring employers to give apprentices between 14 and 17 free time from shop work for four to six hours per week, this time to be used in any way the authorities considered advantageous for the boys' development. He did not think there was so much as people make out in the argument about boys being worn out after working hard all day. The difficulty would be to put into practice the plan of taking stated hours. He would prefer taking the time in the morning, even if it came as early as six o'clock. As to the effect of study upon the boys, he said that the classes began in September, and in Halifax in winter time it was dark before six o'clock; there was nothing in town but the music-hall; what was a boy to do? If he had been working a machine all day he was physically tired, but not mentally tired, and the change from the physical shop work to the mental side would be beneficial. Besides, if the boys were not in school, they were at the street corners. If a number of leading employers got into the way of allowing the time off to the boys, it might lead to legal compulsion and that might make it more acceptable. It would be easier to put compulsion on the employer to allow the boy so much time than on the boy to attend, but of course the two would have to go hand in hand. He thought the only drawback about the shop school was its tendency to become too shoppy.

There are no definite instances of employers in Halifax who are increasing apprentices' wages on the ground of their attending night school, as compared with those who do not go, but those who attend get positions in shops over those who do not, because employers recognize that they are more intelligent in the shops than the other class. Many of the most important industries in Halifax are either managed by ex-students of the College, or positions next to the highest are held by such ex-students, and of course that kind of thing is bound to help.

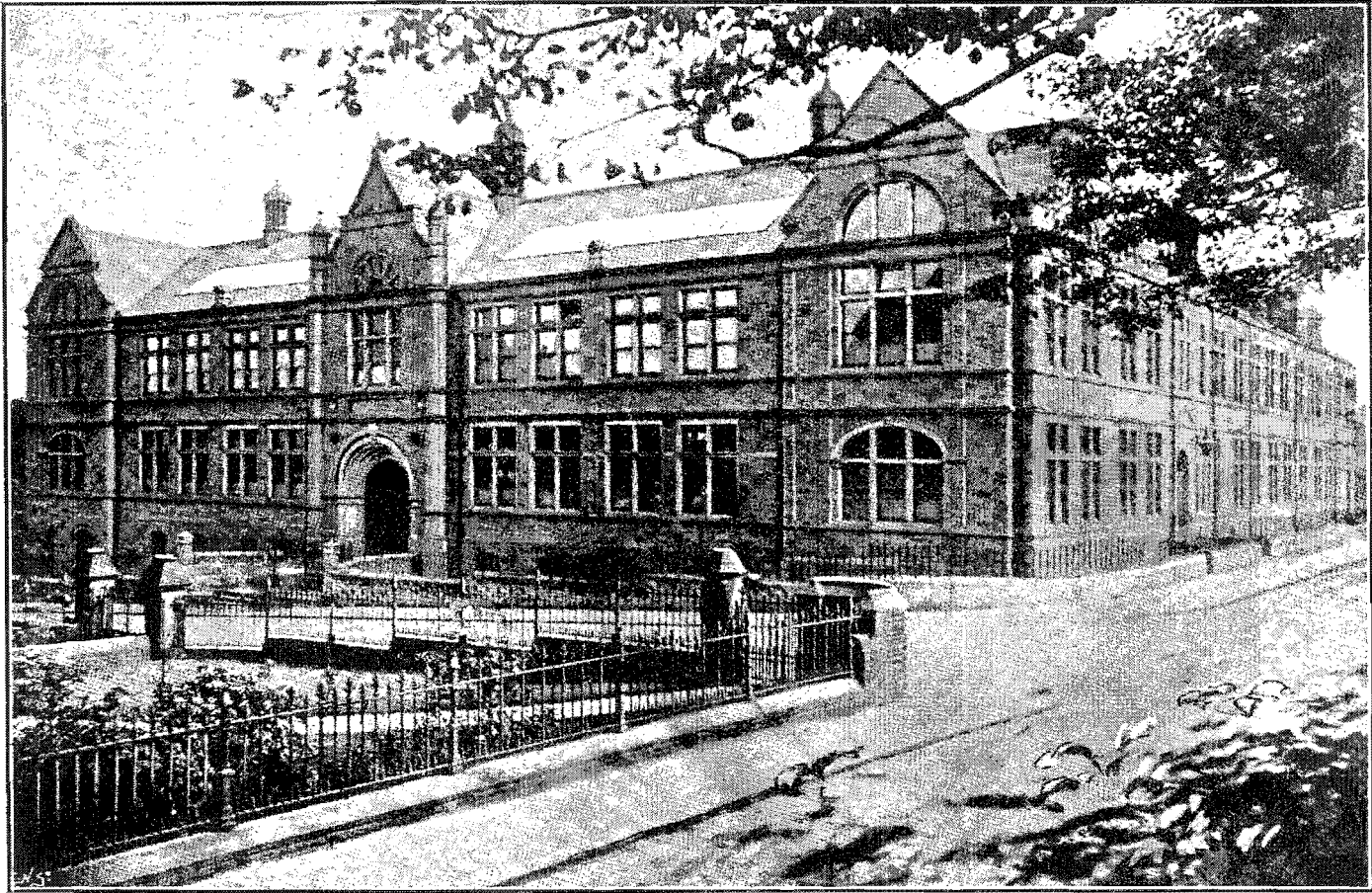
Dr. Crowther referred to the desirability of Elementary School work teaching children to observe and do things, so as to increase the avenues of intake and thus prepare for greater enjoyment of life. In the technical classes practically the whole curriculum is concrete. Observation is trained straight away; history is life-history, geography is almost entirely commercial; and in experimental science work there is observation all the time; a broader mental basis of activity is being given continually.

## SECTION 2: MUNICIPAL TECHNICAL COLLEGE.

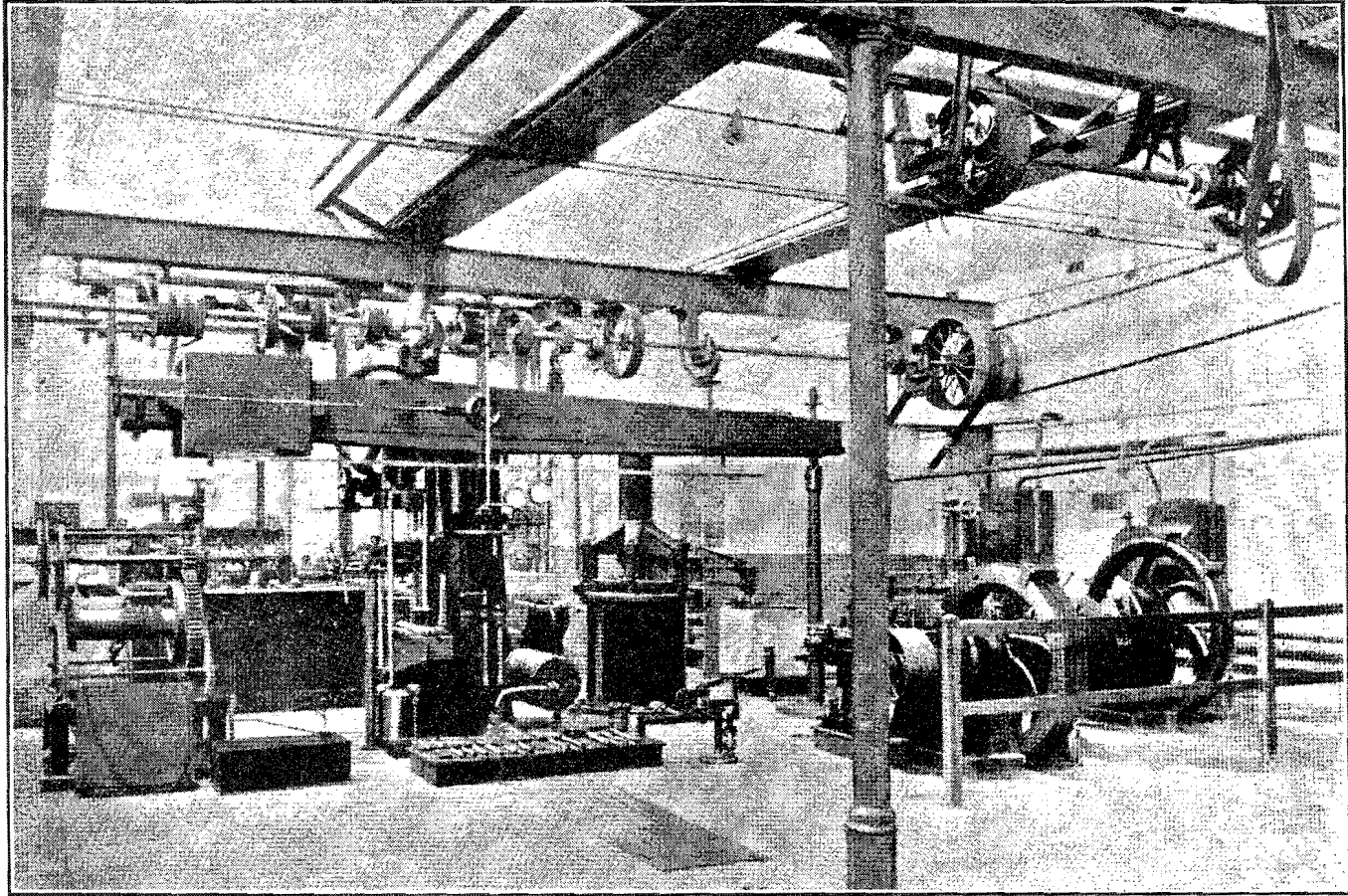
This college costs about £9,000 per annum. The Board of Education (London) grants about £3,000. The College covers the whole field of industrial life from Elementary Schools upwards. Dr. Crowther is strong on the industrial and civic advantages gained through the improvement of the individual. The industrial improvement is very marked through the graduates of the Evening Technical Schools and Colleges being in positions of authority and in charge of works. The teachers are thoroughly competent and experienced in the particular trades, most of them, if not all, having been trained through the Halifax evening classes. One teacher in the evening class was given three guineas per night. He was worth it because he could handle large classes, so that the Imperial Grant on student hours covered the whole cost. The remuneration to evening teachers, according to supply and demand, varied in the same subject from year to year, the usual range being from 5 to 10 shillings per lesson.

Students must satisfy the instructor that they were able to profit by the course offered. No restriction is made in evening classes as to men following trades in the day time. Medals and scholarships and prizes are offered. Cases of students who have been very successful are cited for the emulation of pupils. Students have the personal assistance of the Principal to get out of blind-alley occupations. The teachers are most earnest and enthusiastic men. For example Mr. Turner, the weaver, has had 17 years experience. The earnestness and keenness of students in their work is very noticeable; discipline takes care of itself. The physique of the students is excellent in the different classes. Years of attendance in the technical classes count in cutting off years of apprenticeship. There has been a decided improvement in the cloth trade by means of the College; also in dyeing and patterns, and in the understanding of the use of factory machinery by those who were trained. A number of inventions have been perfected and patented by graduates of the school. Improvements have been effected in the output of the machines by differences in the management of the machine and by the use of common machines for making an uncommon product.

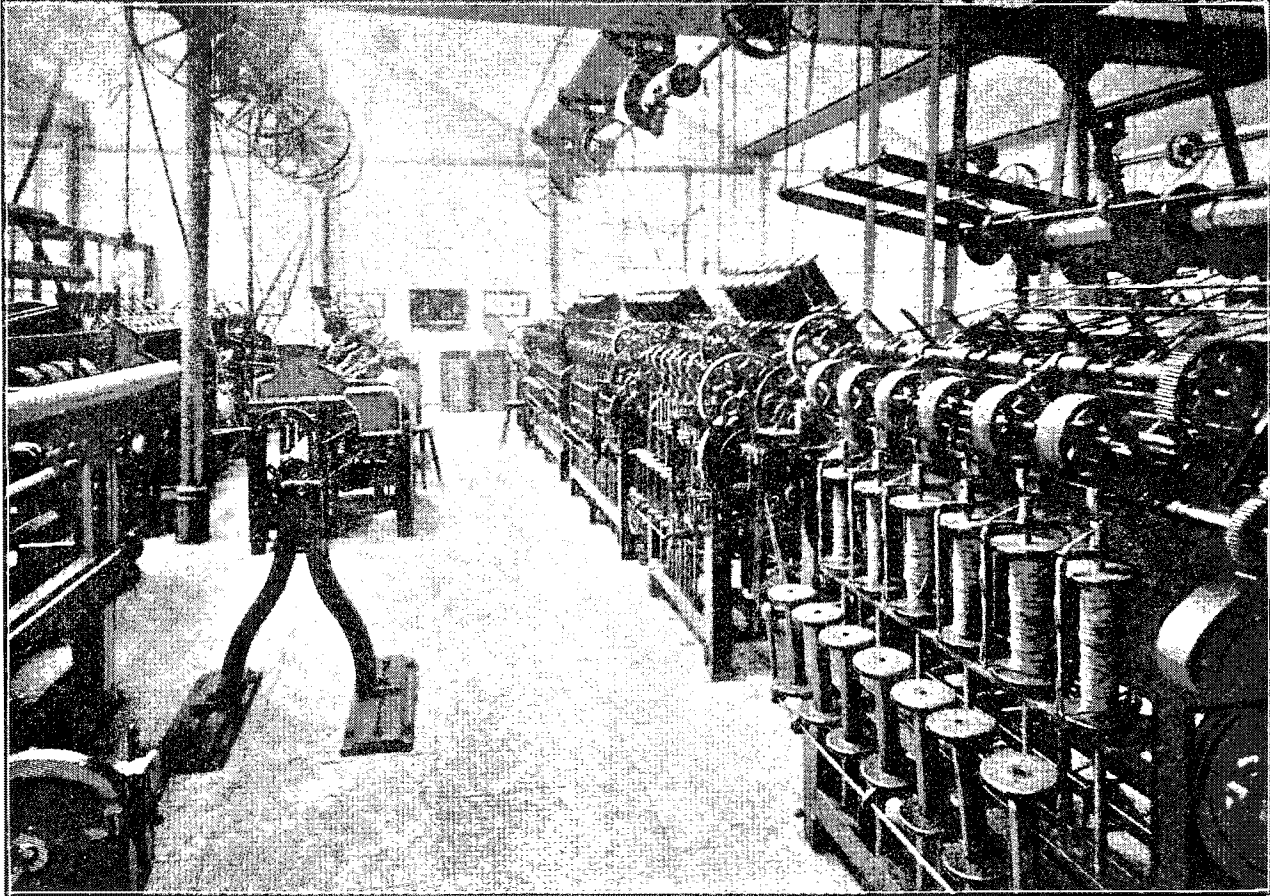




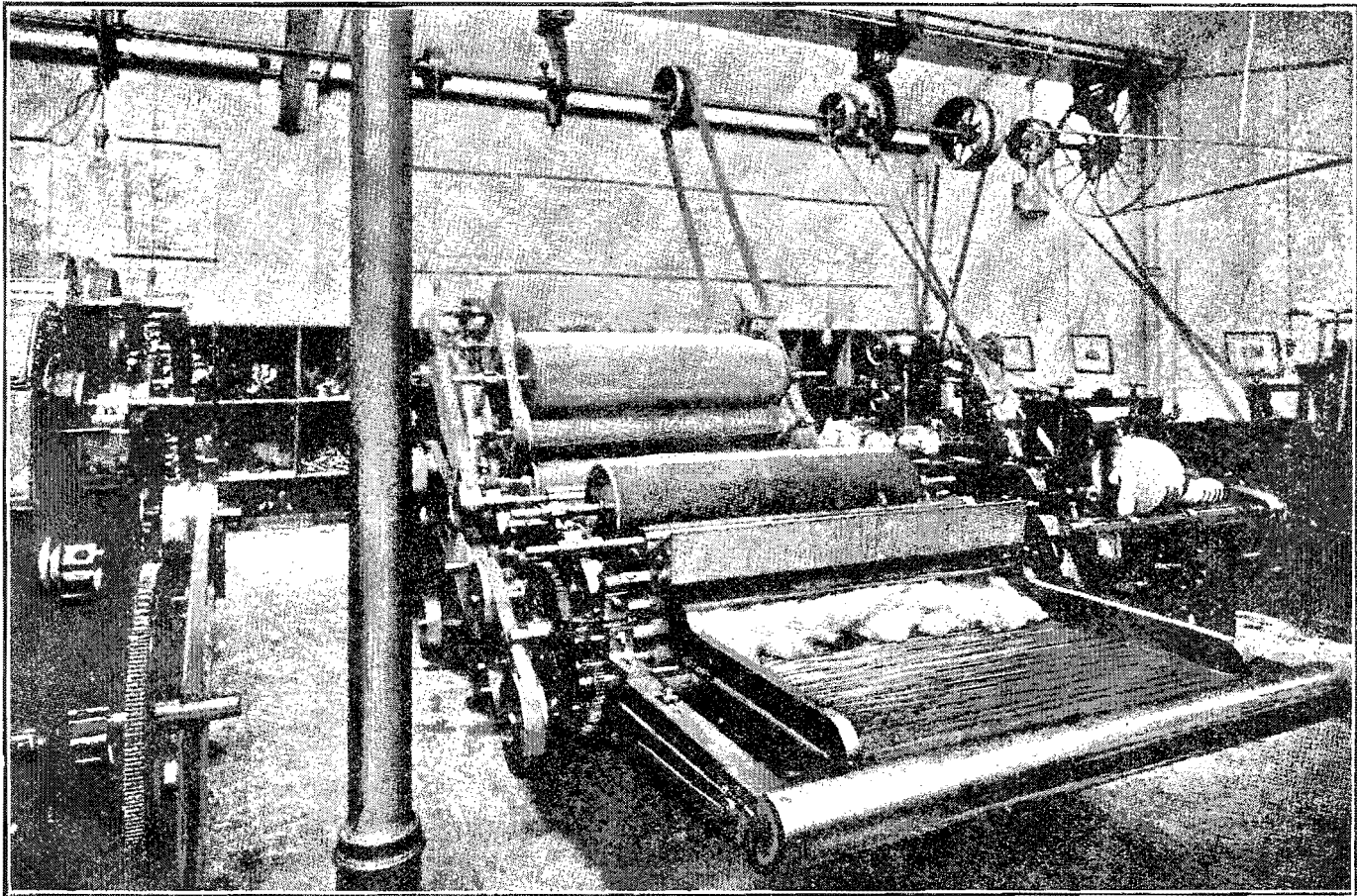
COUNTY BOROUGH OF HALIFAX: MUNICIPAL TECHNICAL COLLEGE.



MECHANICAL ENGINEERING TESTING LABORATORY: MUNICIPAL TECHNICAL COLLEGE, HALIFAX.



CENTRAL PORTION OF THE SPINNING SHED: MUNICIPAL TECHNICAL COLLEGE, HALIFAX.



CORNER OF THE SPINNING SHED: MUNICIPAL TECHNICAL COLLEGE, HALIFAX.

SESSIONAL PAPER No. 191d

There has been a change in the attitude of the people towards education. They now appreciate this training and are willing to support it.

### SCIENCE AND TECHNOLOGY.

The following courses are given:—

1. Mechanical and Civil Engineering.
2. Electrical Engineering.
3. Motor Car Engineering.
4. Textile Industries.
5. Pure and Applied Chemistry.
6. Courses for University (Science and Engineering) Degrees.
7. Cabinet Making.
8. Topography.
9. Domestic Subjects.

### TEXTILE INDUSTRIES.

Some details of this Department are given. The provisions in the other Departments are equally complete.

#### *Worsted Spinning.—Weaving and Designing.*

The course of instruction in Wool and Worsted Spinning and Weaving and Designing extends over 3 years.

The courses are designed to meet the requirements of those to whom a knowledge of the theory and practice of wool and worsted spinning and weaving and designing will be of practical utility, whether as designers, overlookers, managers, or merchants. The instruction is thus of special value to those intended for or engaged in:—

(1) The spinning of yarns and the designing for, and manufacture of, woven fabrics.

(2) The buying and selling of yarns and woven fabrics.

(3) The manufacture or export of textile machinery.

The equipment consists of a whole range of worsted spinning machinery, appliances for yarn testing, hand and power looms, also diagrams and lantern slides for the satisfactory illustration of the courses of lectures.

#### *Practical Spinning Course.*

The practical course in spinning consists of exercises in adjusting, setting, timing and working the various machines, and in sampling, mixing, and testing the several varieties of wool, slivers, rovings, yarns, and twists, and also in making complete drawings of the machines and their parts.

*Weaving and Designing.*

*Designing.*—The principles of cloth construction, including the consideration of plain and twilled cloths; also modifications of plain cloths.

Sateens and the derivations of new weaves from the sateen.

Twills, etc., formed by the combination of two or more weaves; sateen, re-arrangement of twills, etc. The production of elongated and fancy twills.

Stripes and check designs, and drafting to weave on the lowest number of healds, and pegging plan of the same.

Application of the principles demonstrated in the foregoing to dress fabrics, such as cashmeres, lustres, silks, etc., worsted and woollen trouserings, coatings, overcoatings, and mantle cloths.

*Calculations.*—The principles of counting yarns in worsted, woollen, cotton and silks. Finding the weight of warp and weft, and the cost of producing simple fabrics. The principle of counting the sett for local and other districts.

*Loom.*—The hand loom, its construction and various movements; elementary principles of power loom weaving.

*Pattern Analysis.*

Analysis of weave, including twills, ribs, sateens, corkscrews, stripes, checks, drafted patterns, and weave combinations.

Materials. Microscopic analysis of cloths, yarns, rovings, and fibres. Chemical tests. Testing for strength, elasticity, twist and evenness.

Various methods of ascertaining the weight per yard of cloths, and counts of warp and weft. Determination of warp and weft of the cloth.

Methods of finding sett and picks, also allowance for shrinkage.

*Practical Weaving Course.*

The practical course in weaving includes the following branches:—

Drawing-in and twisting. Cording-up and gaiting hand looms. Cording up and gaiting power looms. Tappet setting. Jacquard harness building. Card-cutting for dobbies and Jacquards. Lag pegging for dobbies. Setting and timing the various parts of power looms. Altering looms to weave different kinds of cloth. Weaving.

## DAY CLASSES FOR UNIVERSITY EXAMINATIONS.

These classes cover Matriculation Examinations of London and the Northern Universities, and the Intermediate Examinations, Science and Engineering, of the University of London, also in Mathematics, Physics, Engineering subjects, Chemistry, English, French, German, Book-keeping House Painting and Decora-

SESSIONAL PAPER No. 191d

ting, Commercial Practice, Shorthand, Typewriting, Dressmaking, Millinery, Needlework, Cookery, Laundry Work, Art.

#### EVENING CLASSES AT THE COLLEGE.

These courses at the College are designed to give systematic training in the principles of Science and Art, as applied to the commerce and industry of Halifax and district, with especial reference to the following departments:—

(1) Commercial Knowledge. (2) Mechanical Engineering. (3) Electrical Engineering. (4) Building Trades. (5) Pure and Applied Chemistry. (6) Textile Industries. (7) Women's Work. (8) Art.

Courses have also been arranged for students desirous of obtaining Certificates of the Institutes of Bankers, Royal Institution of British Architects, Institute of Civil Engineers, the Bachelor of Science Degree, also the Bachelor of Science (Engineering) Degree of the University of London.

The real object of the student is to acquire a sound knowledge of principles and their direct application to his daily work. This can only be attained by a systematic training.

In the courses of study it is assumed that the student possesses a knowledge at least equivalent to the Fourth Form of the Council Secondary School. The Sub-Committee strongly advises those intending students who do not possess this preliminary knowledge to attend the Evening Continuation Schools.

With a view to aid in the systemization, which it is the great object of the College to encourage, the regular 5 or 6 year courses are suggested to young students.

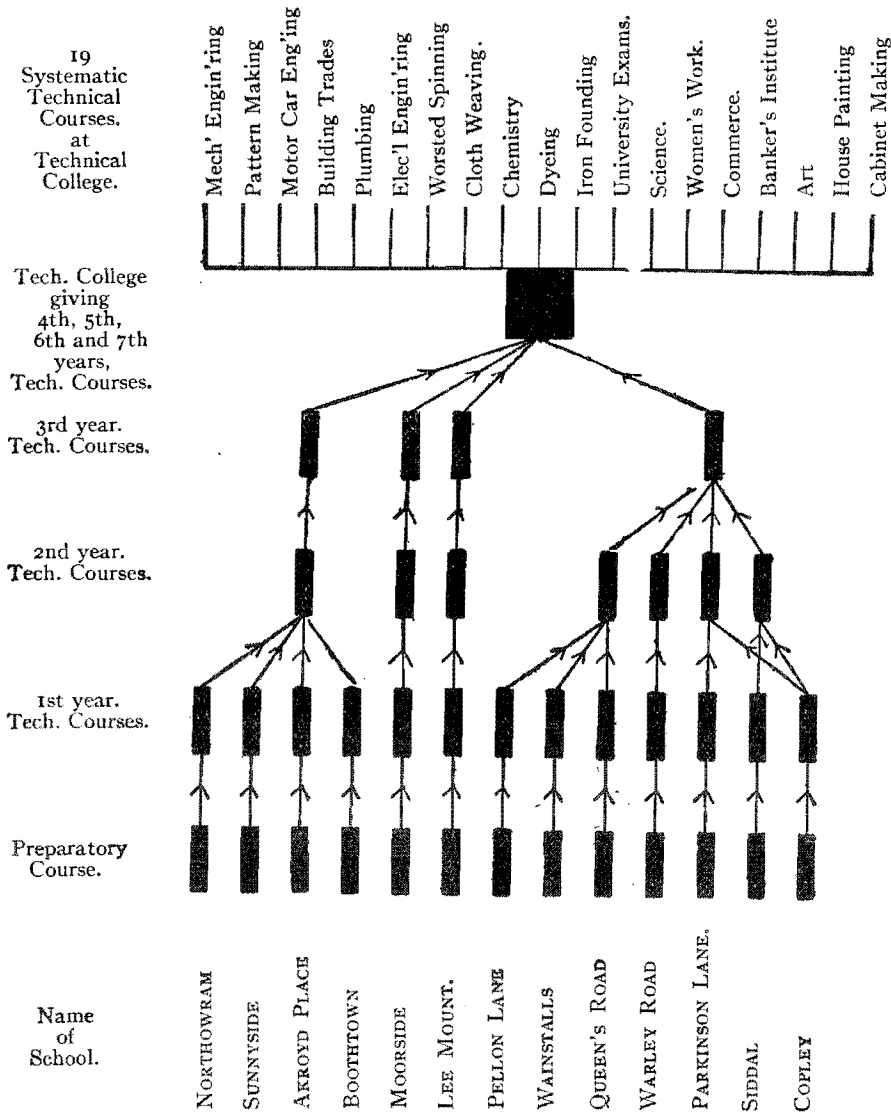
In the Building Trades Department courses are held having an especial bearing on plumbing, house painting and decorating; while in the department of Textile Industries, courses are given in wool and worsted spinning, weaving, etc.

#### EVENING SCHOOLS, CO-ORDINATION.

The following diagram illustrates the Co-ordination Scheme. The heavy lines represent schools in which various courses are given (see details on left hand side). The thin lines show how the student passes from one course to another, either wholly in the same school, or partly in one school and partly in another of a higher grade.

Since preparatory courses are arranged in nearly all schools, a scholar who desires to take one of these courses will probably attend the school nearest to his home. After having passed successfully through the preparatory course, he will take one of the first year courses. If this be provided in the school he is already attending, he will continue his studies at that school, but if not, he will proceed to the nearest school of a higher grade indicated in the diagram; *e.g.*, a boy having satisfactorily attended the preparatory course and a first year course at Copley School will proceed to Siddal School for the second year course; similarly, a boy

from Siddal School desirous of taking the third year course will proceed to Akroyd Place or Parkinson Lane School.



EVENING CONTINUATION SCHOOLS.

The object of these Schools is two-fold,—(1) To continue, by means of carefully graduated courses of instruction, the work of the day school; (2) To afford the necessary preparation to enable students to benefit by the instruction given in the the various departments of Technical College.

The Evening Schools are of four grades, providing, (1) Only a preparatory course; (2) Preparatory course and first year industrial and commercial



## SESSIONAL PAPER No. 191d

courses; (3) Preparatory course and first and second year industrial and commercial courses; (4) Preparatory course, first, second and third year industrial and commercial courses and art courses.

## CURRICULA OF EVENING CONTINUATION SCHOOLS.

COURSE.	SUBJECT.	WEEKLY HOURS.
Preparatory.	Calculations and Drawing	2½
	English	1½
	Workshop Practice	2
First Year Industrial	Practical Mathematics and Drawing	2½
	English	1½
	Workshop Practice or	2
	Practical Physics	2
Second Year Industrial	Practical Mathematics and Technical Drawing	3
	English	1
	Practical Mechanics and Physics	2
Third Year Industrial	Practical Mathematics	2
	Practical Mechanics and Physics	2
	Machine Drawing or Building Construction or Worsted Spinning or Cloth Weaving or Plumbing	2
First Year Commercial	English, Geography and History and Hand-writing	4
	Calculations	2
Second Year Commercial	Book-keeping and Commercial Arithmetic	3
	English	1
	Shorthand and Business Methods or	2
	French	2
Third Year Commercial	Book-keeping, Business Methods and Commercial Arithmetic	4
	Shorthand or French	2

## WORKSHOP PRACTICE.

The workshop practice in the Preparatory and First Year Industrial Courses consists of either woodwork or metal work or lead work or wood-carving.

The workshop Courses extend over 3 or more years.

*Woodworking.*—The Course is intended for boys, who wish to acquire a practical training in the use of woodworking tools, including the construction of simple and useful models which the students have prepared to scale from sketches or from actual measurement. The students have the opportunity, under the supervision and direction of the instructor, of making any desired article, upon payment for materials, provided that the teacher is assured of their ability, and after a satisfactory working scale drawing has been prepared, either in the school or at home. Practical calculations are made by each student on the amount and cost of timber required for each model.

Short lectures are given on woodworking tools; their names, proper uses, correct handling, principles of construction, and the modes of hardening, sharpening and using them.

Also short lectures on timber; its nature, growth, description, qualities, seasoning, uses, etc.; countries and parts from which we receive our supplies, and the forms in which it is brought into the markets.

*Leadworking.*—The Course includes a series of graduated exercises on marking off and cutting out sheet lead, followed by simple exercises on lead bossing, and bending pipes up to 2-in. in diameter.

*Metalworking.*—Bench Work.—Use of hammer, chisel, and file in the preparation of flat and other surfaces. The making of keys and keyways for shafts and pulleys. Use of gauges and templates in fitting work. Use of the file and scraper in the preparation of true plane surfaces,

3 GEORGE V., A. 1913

viz., straight edges and surface plates. Use of the compasses, scribing block, square, &c., in marking out work preparatory to its being machined. The use of drifts in finishing square and other shaped holes. Use of taps and dies.

Turning.—Hand lathes. Use of the hand lathe. The different forms of tools required in working upon various metals.

Striking and chasing threads in the hand lathe. Chucking work in the hand lathe. Use of compound slide rests on these lathes. Use of boring tools.

There are Domestic Courses for girls under 16, running for 3 years, the compulsory subjects being English, Needlework and Domestic Science, or Drawing, or Singing; optional subjects, Dressmaking, Millinery, Cookery, Laundry work, Ambulance, Home Nursing and Housewifery.

#### SPECIAL CLASSES.

Special Classes are arranged for adults, *i.e.*, those of 18 and upwards, at any of the Evening Continuation Schools, provided a sufficient number of students offer themselves for enrolment. The following is a list of the Classes, with number of evenings per week:—*For Men*—Calculations, Reading and Composition, Geography and History, 2; Ambulance, 1. *For Women*—Calculations, Reading and Composition, and Needlework, 2; also 1 each for Making of Children's Clothes, Ambulance, Home Nursing, Cookery, Laundry Work, Dressmaking, Millinery.

#### DRAWING AND ART.

The object of this Course is to give, by a system of carefully considered exercises, a thoroughly practical knowledge of the rudiments of Drawing, so as to furnish a useful elementary training to those without previous knowledge of Art.

Those students who desire to make Art a part of their general education, or wish to adopt Art, either pure or applied, as a profession (*e.g.*, Designing), find this Course a most useful preliminary to the instruction given at the Technical College School of Art.

The subjects of instruction are English, Calculations, Freehand, Model, Geometrical Drawing, Light and Shade and Modelling.

### SECTION 3: PREPARATORY TRADE SCHOOL.

#### OBJECT OF THE SCHOOL.

To provide a practical course of instruction and thorough preparatory training for boys from 12 to 15 who intend to be apprentices in any of the local trades.

The existing system of education, whilst amply providing for boys intended for commercial occupations, does not altogether meet the needs of those who may wish ultimately to be skilled artisans. In certain industries, owing to the changed conditions of production, the old apprenticeship system has completely

SESSIONAL PAPER No. 191d

disappeared, and it is now almost impossible for an apprentice to acquire an all-round knowledge of his trade, hence the necessity of widening the educational work to provide a training for those who are to be skilled workmen.

The narrowed training of apprentices may have very disastrous results; (a) to the apprentice himself, who, through the introduction of labour-saving machinery into his branch of the trade and his inability, through lack of an all-round training, to adapt himself to some other branch, may be forced into the unskilled labour market; (b) to the masters through the inadequate supply of well-trained foremen and works managers; (c) to the nation, which will be unable to maintain its position in the face of foreign competition unless its artisans are trained to the highest efficiency in industrial work.

The course arranged for this school, though in no sense claiming to teach a trade, is intended to meet, to some extent, the deficiency referred to above. It will give the apprentice a full knowledge of the elementary principles, scientific and artistic, of all departments of his work, and also a practical acquaintance with the tools and machines, etc., used in its various branches; thus the practical training of an Engineer's apprentice will include (a) the use of woodworking tools, exercises leading up to wood turning, and the making of simple patterns, (b) Metalworking, commencing with the use of the hammer, file and scraper, and later the shaper, planer, lathe, milling machine, etc.; also work at the fitter's bench. Laboratory practice will enable the pupils to determine, experimentally, the various scientific and mechanical principles which the apprentice will meet with in the workshop.

#### SUBJECTS AND COURSES OF INSTRUCTION.

*Practical Mathematics*, dealing mainly with workshop calculations.

*Drawing*, including sketching and dimensioning details from machines, buildings, furniture, etc., and making working drawings from the same.

*Experimental Science*, illustrating the principles of those sciences which bear directly or indirectly upon our trades and industries.

*Workshop Practice*, giving each pupil an acquaintance with the practical part of his trade and at the same time making him of immediate practical value to his employer.

The courses of instruction extend over 3 years, During the first year all pupils take the same course, in the second the drawing and workshop practice are specialized to some extent according to the intended trade of the pupils; and in the third this specialization is carried much further.

#### REQUIREMENTS FOR ADMISSION.

Applications are received from candidates not under the age of 12 years on September 1st. They are required to pass an entrance examination Fee, £3 per annum.

Parent or Guardian must undertake that scholar will attend regularly through the 3 years course. Each scholar must prepare class and laboratory notes and home work. Not more than 24 scholars were admitted in 1911.

3 GEORGE V., A. 1913

## TIME TABLE (Hours per week.)

Subject.	1st Year	2nd Year	3rd Year (1st & 2nd terms.)	3rd Year (3rd term.)
Calculations.....	6	4	4	4
Drawing.....	6	5	4	6
English.....	6	4	4	.....
Exp. Science.....	4	7	6	4
Workshop Practice.....	8	10	12	16